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# Learning to Self-Regulate: Crafting Co-Regulation Experiences in an Online Learning Environment

Rasis A. Alanazi

*University of Connecticut - Storrs*, [rasis.alanazi@uconn.edu](mailto:rasis.alanazi@uconn.edu)

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Learning to Self-Regulate:  
Crafting Co-Regulation Experiences in an Online Learning Environment

Rasis A. Alanazi, Ph.D.  
University of Connecticut, 2017

Abstract

This mixed methods study aims to describe and explain the effects of co-regulation on students' self-regulation, which is hypothesized to lead to better learning. Students ( $N = 42$ ) in six online undergraduate and graduate courses worked in dyads for six weeks on shared activities. Variables of interest included students' self-regulated learning, co-regulated learning, and students' perceptions of the online course delivery based on a Community of Inquiry framework. Six students were also interviewed about their experiences in the dyads. A mediation analysis was conducted to detect if co-regulation mediated the relationship between students' self-regulation before and after working in dyads. A second mediation analysis was proposed to explore if post-OSLQ mediated the relationship between CRL and dyads' project grades. The results indicated that students' self-regulation prior to that dyad activity was not a significant predictor of students' co-regulated learning. However, co-regulated learning was a significant predictor of student self-regulation after dyads activity. Results indicated that students' self-regulation after dyad activities was a significant predictor of the online course delivery. Results of mediation analysis did not support the mediating role of co-regulation between students' self-regulation prior and after the shared activities and the second mediation analysis could not be conducted due to little variability in dyads' project grades. Analyses of the interview data suggest that dyads co-regulation experience was impacted by instructional factors, technical factors, environmental factors and students' social factors. Implications for instruction and future research are discussed.

Learning to Self-Regulate:  
Crafting Co-Regulation Experiences in an Online Learning Environment

Rasis A. Alanazi

B.A., King Saud University, 2009

M.A., Arabian Gulf University, 2012

M.A., University of Connecticut, 2016

A Dissertation

Submitted in Partial Fulfillment of the

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Doctor of Philosophy

at the

University of Connecticut

2017

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2017

# **APPROVAL PAGE**

Doctor of Philosophy Dissertation

Learning to Self-Regulate:  
Crafting Co-Regulation Experiences in an Online Learning Environment

Presented by

Rasis A. Alanazi, B.A., M.A.

Major Advisor \_\_\_\_\_  
Scott W. Brown, Ph.D.

Associate Advisor \_\_\_\_\_  
Bianca, Montrosse-Moorhead, Ph.D.

Associate Advisor \_\_\_\_\_  
Jae-Eun, Joo, Ph.D.

University of Connecticut  
2017

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## **CHAPTER I**

### **OVERVIEW OF THE STUDY**

#### **Introduction**

With the emergence and rapid expansion of online education, teachers and instructional designers are increasingly interested in understanding and improving the most effective instructional methods for such settings. Online courses have been used increasingly in higher education: estimates suggest that in the U.S.A., 20 percent of college students took at least one course online in 2013 (Deming, Goldin, Katz, & Yuchtman, 2015).

Online learning offers potentially rich resources for college students to learn from, with the guidance of the instructor or independently. In online environments, for example, learners can exercise more control over their learning by choosing when, what, and where to learn. The nature of the interactions between teachers and learners can also shift (Artino & Jones, 2012), as the online environment relies more on interactions that occur asynchronously than synchronously (Ku & Chang, 2011) compared to traditional face-to-face, synchronous learning environments. This can lead to instructors shifting from providing information to facilitating students' analysis and synthesis.

#### **Statement of the Problem**

While online learning holds much promise, there are also associated perils, for example, high dropout rates (Lee & Choi, 2011). Thus, despite numerous advantages of online learning -- flexibility, open resources, and accessibility among them -- not all students may have the necessary skills to accept the new responsibilities and opportunities online learning offers. Some research suggests that students in online environments are more likely to succeed in college if

they can use a range of learning strategies (Liu, Lin, Jian, & Liou, 2012; Wadsworth, Husman, Duggan, & Pennington, 2007). Students who are independent and self-directed, as well as willing and able to manage, control, and regulate their own learning, are also more apt to succeed in such environments (Serdyukov & Hill, 2013). Furthermore, self-reliance, persistence, and determination are characteristics associated with more success in online learning environments (Shea & Bidjerano, 2012).

Scholars have focused on the concept of self-regulated learning (SRL) -- the self-beliefs that enable learners to be motivated and proactive in a collaborative environment (Winters & Azevedo, 2005) – as a unifying concept for this set of characteristics. Although there is some variability in how researchers define the concept, it is generally used to refer to processes that students can use – metacognitive, motivational, and behavioral (Zimmerman, 1986) -- to manage their learning. One goal of online learning is to prompt students’ active involvement. Thus, instructors and instructional designers need to have a better understanding of what engages students on line, including how to sustain students’ different levels of regulation as needed.

Previous research has conceptualized SRL as an individual activity, with a focus on individual differences that are linked to SRL. Recent research has shifted to understanding SRL within a social context of learning (Hadwin, Järvelä, & Miller, 2011). According to Zimmerman and Schunk (2001), self-regulatory behaviors are “highly context dependent” (p. 125). Thus, self-regulatory behaviors and processes differ from one context to another. Different approaches that investigate SRL have used social cognitive or sociocultural perspectives (Zimmerman, 1986), highlighting the role that social interactions between peers and the more knowledgeable other (MKO) plays in fostering and internalizing regulating learning process (e.g., Vygotsky, 1978). This has led some researchers to propose “co-regulated learning” (CRL) (McCaslin &

Hickey, 2001) – or the “manifestation of emergent interaction within a zone of proximal development” (Panadero & Järvelä, 2015, p. 191) – as an important step in a student’s progress toward self-regulation.

In the context of online learning, creating opportunities for students to co-regulate may enable students’ success. For example, as students collaboratively work on solving a problem task, one student can address peers’ questions, clarifications, and confusions. Other peers can help answer questions by discussing the task and sharing thoughts. It is hypothesized that this process – one that promotes co-regulation (CR) -- has positive effects on SRL (DiDonato, 2013). Volet, Summers, and Thurman (2009) defined CR as related “to individuals working together as multiple self-regulating agents socially regulating each other’s learning” (as cited in Chan, 2012, p. 64). Co-regulation also has been influenced by socio-cultural theory, in which the learners share common problems and tasks through interpersonal interaction (Hadwin, Wosney & Pontin, 2005; McCaslin & Hickey, 2001).

While previous studies in the online learning context have focused on SRL and its relation to successful learning outcomes, the purpose of the study upon which this dissertation is based is to describe and explain the effects of co-regulation on students’ self-regulation, which is hypothesized to lead to better learning. A mixed-methods design was used to assess CRL and SRL processes in relation to project grade and students’ sense of community using qualitative and quantitative methods at different stages.

In the remainder of this chapter, relevant research is briefly summarized before describing the theories that inform the study’s conceptual framework.



## **Background**

### **Self -Regulated Learning**

Considerable research on SRL has been conducted by Zimmerman (1989), who defined SRL as the degree to which students are “meta-cognitively, motivationally, and behaviorally active participants in their own learning process” (p. 329). Schunk and Zimmerman (1994) further defined self-regulation as “self-generated thoughts, feelings, and actions which are systematically oriented toward attainment of their goals” (p. ix). Over the past 20 years, researchers have investigated SRL by examining how students master their own academic learning in face-to-face and online learning environments. Some of that research has examined the affective dimensions of the process (Zimmerman, 2001), including training students to be SR learners, otherwise referred to as “strategy training.”

However, training learners to self-regulate their own learning is complex (Zimmerman, 1990). Examples of SRL strategies include planning, monitoring, strategy use, task difficulty, help seeking, self-instruction, self-recording, and goal setting. Students switch from one strategy to another, depending on the task, content, and context. In addition, some might need to seek help on a project while others would not.

A growing body of research on SRL has led to the creation of different SRL models and measures. Several different instruments have been developed to measure SRL in different contexts and educational settings, such as online and face-to-face learning environments (Azevedo 2005, 2007; Azevedo et al., 2010; Azevedo & Cromley 2004; Hadwin, Nesbit, Jamieson-Noel, Code, & Winne 2007; Kramarski & Gutman 2005; Schraw 2007).

To succeed in online classes, students need to master certain strategies (Liu et al., 2012; Usta, 2011); some research suggests that self-regulated learners are more likely to be

comfortable in online courses than their peers who are less self-regulated (Moore, 1993, p. 32). As previously noted, Zimmerman (2000) identified different learning strategies that learners implement to succeed in their learning such as planning, monitoring, evaluating, and regulating. Learners' achievement has been found to be related to their elective use of self-regulation (Thoresen & Mahoney, 1974).

Learners with low self-regulation skills face many obstacles due to the lack of adequate skills, such as planning, and not due to the lack of sufficient intelligence (Zimmerman, 1990). Learners with low self-regulation skills -- in comparison to those with high self-regulated skills - - perform lower in online learning environments (Eom & Reiser, 2000; Yang, 1993; Young, 1996). A more extensive summary of this literature is presented in chapter 2.

Ultimately, researchers wish to identify strategies that are essential for learners to improve their overall achievement level (Boekaerts, Pintrich, & Zeidner, 2000). Students' achievement and success are focus areas in every educational setting. In online learning environments, students' success relies heavily on the ability of students to control their learning (Wang, Shanonn, & Ross, 2013). Often, successful learners are shown to be in control of their learning (Zimmerman, 2008) when they learn the importance of planning, monitoring, evaluating, and regulating their behavior. Online environments require students to take control of their own learning, as the nature of the settings endorses self-directed learning (Serdyukov & Hill, 2013). Self-directed learning has been found to be highly valuable when learners have the ability and willingness to manage, regulate and plan their learning process (Ally, 2004). For example, some online course instructors evaluate students' participation by their written posts in the discussion board. Students need to plan their time and regulate their learning to ensure their active participation. As researchers have become more interested in how self-regulation is

developed in students, some have proposed that co-regulated learning is a natural step on the way to the more independent state of self-regulated learning (McCaslin & Hickey, 2001).

### **Co-Regulated Learning**

Co-regulated learning originated from Vygotsky's idea of internalization, defined as the "internal reconstruction of an external operation" (1978, p. 56). According to this theory, learners internalize what they are exposed to – for example, different social tools such as language and norms of interaction. This constitutes learning, all the skills, strategies, and knowledge to which the learner has been exposed, having been internalized, can then be applied in new settings. Co-regulation is a relatively new idea that is rooted in a sociocultural approach to learning theory. Fogel (1993) defined co-regulation as a "continuous unfolding of individual action that is susceptible to being continuously modified by the continuously changing actions of the partner" (p. 29). The emphasis here is on the social environment in which learning occurs, not the individual learner in isolation. Cole and Wertsch (2001) claimed that without the existence of a social context, the "development of mind is impossible" (p. 4). Thus, CRL is defined as, "cultural, social, and personal sources of influence that together challenge, shape, and guide co-regulated identity" (McCaslin, 2009, p. 137).

Researchers have investigated several different social activities designed to foster co-regulation. For example, Hadwin, Wozney, and Pontin (2005) examined changes in the ownership of self-regulatory activity from teacher to student dialogue in a task completion process. Ten graduate students worked on developing a graduate level research portfolio. After conducting a qualitative analysis of teacher-student dialogue, the researchers found a decrease in incidents of teacher-regulation and an increase in student self-regulation.

This study builds upon and extends the previous and current research on SRL and, more significantly, CRL. The theoretical frameworks underpinning the study will be presented. Then the study research questions, hypothesis, and data collection procedures will be addressed.

### **Theoretical Framing**

As previously noted, co-regulation is based on the sociocultural theory of learning (Vygotsky, 1978). A brief description of the sociocultural theory, and then describe the study's conceptual framework will be presented.

#### **Sociocultural Theory**

The founder of sociocultural theory is the Russian psychologist Lev Vygotsky. The theory is rich and complex; the focus here will be on the implications of the theory in learning and teaching.

Vygotsky's work impacted many scholars after the publication of his writings in *Mind in Society* (Vygotsky, 1978). Vygotsky believed that human development relies on the internalization of experiences with other individuals who have more experience. Vygotsky placed learning within a social and cultural context. After interacting with more knowledgeable others, the learner takes over her own learning in joint activity (Lave & Wenger, 1991). In order for cognitive development to happen, learners need to interact with each other using "tools" that would facilitate the learning process. Some "psychological" tools that are used in learning are signs, symbols, text, language and mnemonic techniques (Vygotsky, 1978 p. 53). Central here is the idea of semiotic mediation, which is essential for constructing knowledge. Put simply, semiotic mediation is "language; various systems of counting; mnemonic techniques; algebraic

symbol systems; works of art; writing; schemes, diagrams, maps and mechanical drawings; all sorts of conventional signs and so on” (Vygotsky, 1981, p. 137).

In order for learning to be internalized from social processes, Vygotsky emphasized participation (Bruner, 1984). Mental functions are developed through the social and individual activities that are mediated by tools and signs in the learning context. For example, computer screens, concept maps, text, and charts. With the rapid development of technology and learning settings, new tools are constantly emerging. These developments have led to changes in the learning process. Learning is developed in online learning environments mainly through text-based interactions such as discussion boards, blogs and forums for collaborative knowledge construction between learners, with the guidance of the instructor. It is through mediated tools that establish social interactions and communication that behaviors are self-regulated by reflection that leads to internalization. Internalization is the process where learners take the new information and knowledge gained from a social interaction and later use the necessary skills to apply the information obtained in a different independent learning activity. Inner speech is an important step for internalization.

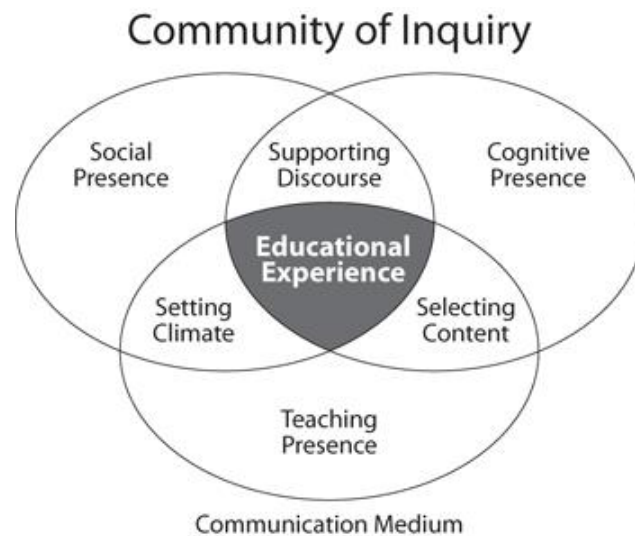
In Vygotsky’s social cultural theory, learning is more effective when instructors offers students the opportunity to interact with their peers, as a way to help students develop and grow intellectually. The opportunity of interaction between peers has the potential to create a Zone of Proximal Development (ZPD) by Vygotsky (1978), and is defined as the distance between the learner’s current knowledge “actual development level” and the desired level of development or performance that happens with the assistance from the more capable peer (Vygotsky, 1978, p. 86). Assessment of this concepts would be focused on the learning process that happens with

scaffolding. The more capable peer, such as instructors or other students would provide some learners with unique guidance within their ZPD and that would be an ideal learning practice.

In sum, from a Vygotsky-ian perspective, in any learning setting, learners use signs and symbols in interaction. For example, the use of computers is considered to be a vehicle that can mediate the learning between students. Scaffolded learning is a term that has emerged from sociocultural theory. It refers to the various ways of support that are provided to the learner to help in the completion of any problem-solving task that the learner would not be able to solve without the support of an expert or more capable other. The form of support in the online learning environments could be by providing hints to learners, guidance, questions, prompting, or further elaboration. The support that the learner receives may be enough to allow the learner to engage in any activity and eventually, and gradually, removed so that the student can then work on her own.

### **Community of Inquiry Framework**

The present study focuses on fostering student's co-regulation and self-regulation in an online learning environment. The learning environments in this study are online college courses where students interacted and co-regulated their learning as dyads. It is important to note that the researcher did not have control over the design and delivery of the online courses.



*Figure 1.1.* The relationship between community of inquiry social, cognitive, and teaching presence (adapted from Garrison, Anderson, & Archer [2000]).

The CoI framework was developed by Garrison, Anderson, and Archer (2000) as a dynamic model to guide researchers interested in better developing teaching and learning online (see Figure 1.1). Learners “strive to recreate the social and knowledge building processes by negotiation of meaning found in the classroom” (Shea et al., 2009, p. 10); much of this meaning is made in the context of a “community of inquiry.” This involves three overlapping “presences”: teaching, social, and cognitive. Teaching presence is the instructional design and content organization by the instructor to encourage learning and engagement (Anderson, Rourke, Garrison, & Archer, 2001). The social presence is a construct that has been previously studied by researchers to better understand how learners in the computer-mediated environment, project themselves as being real by establishing a sense of belonging and trust within the environment. Lastly, cognitive presence is based on Dewey’s idea of reflective thought, where learning is grounded in a process of a reflective inquiry.

Several studies have examined CoI presence separately in different contexts. Rourke, Anderson, Garrison, and Walter (2007) assessed students' social presence in asynchronous test-based computer conferencing by conducting a content analysis of students' discussion posted online. They found that high levels of social presence are important in supporting meaningful learning. In addition, teaching presence was examined by Shea, Li and Pickett (2006) who surveyed 1067 students using the *Teacher Presence Scale*. The results indicated that there is a connection between perceived teaching presence and students' sense of learning community. Students who reported high levels of a learning community have also reported effective instructional design and organization.

The concept of learning with the help of more knowledgeable other in a social context has expanded by theorizing about learning as distributed (Cole & Engestrom, 1993), interactive (Chang-Wells & Wells, 1993), context-specific (John-Steiner, Panofsky, & Smith, 1994), and as an outcome of learners' active participation and engagement in a community of practice (Rogoff, 1994). The study conducted here involves examining dyads' interaction embedded in online courses that fosters CRL and SRL. As the nature of the interaction between dyads is a key element in this study; the study uses a Community of Inquiry Framework (CoI) (Garrison, Anderson, & Archer, 2000) to theorize the experiences in the dyads. The framework reflects students' experiences through three elements; the social, cognitive, and teaching presence which creates a meaningful learning experience in online courses.

In sum, this study is based both on the broader sociocultural theories of learning, as well as the specific Community of Inquiry framework to investigate the effects of online learning experiences on students' CRL and SRL.



In the chapters that follow, a review of the research, study design, and study findings are presented. In chapter 2, a more comprehensive summary of relevant literatures is described. Chapter 3 describes the study's design, methodology, and methods. The results of the study are presented in Chapter 4, and in Chapter 5, is a return to the study's theoretical framing, as well as a discussion the study's implications for future work.

## **CHAPTER II**

### **LITERATURE REVIEW**

#### **Introduction**

In this chapter, online learning is briefly discussed. Then, research that investigates SRL in online learning context and the different views of SRL is reviewed. SRL strategies that are related to this study and are presented and the relationship between SRL and academic achievement are discussed. A brief discussion of SR measures is also presented. Several research studies examining CR in an online context and different models and measures of CR are also addressed.

#### **Online Learning in Higher Education**

Many universities have adopted online learning in one form or another. In “single mode” institutions, all faculty to staff members work remotely, offering courses in which most or all of the content is delivered online. For example, the Open University in England is one of the largest institutions in United Kingdom that offers different degrees for undergraduate and graduate students. Although, single mode institutions have been globally adopted, they are not favored in the U. S. public sector (Moore & Kearsley, 2011).

Dual-mode institutions offer the traditional face-to-face delivery mode and online learning. For example, the University of Connecticut offers traditional courses, hybrid courses, and online courses for students. Instructors and faculty members work with instructional designers to develop courses that align with their teaching practice and department’s needs. In the traditional courses, the content is delivered orally and in written format. As for the hybrid courses, they combine a face-to-face component and dedicate some of the course content

proportion to be delivered online. Therefore, students attend their regular classes and meet their instructors and colleague face to face. In addition, students may have online discussion boards to work on as a part of the course requirement. In the online courses, the delivery of the course content is offered fully online. Learning in the online courses (also called e-learning) takes place in a learning management system, where instructors document and deliver their content electronically.

According to the *2015 Online Report Card*, the number of graduate and undergraduate distance education students enrolled in private institutions are 61% and 27%, respectively. The definitions of three different types of course delivery modes and the proportion of the content delivered online are listed in Table 2.1.

Table 2.1

*Description of different types of course delivery (adapted from Allen & Seaman [2013])*

Proportion of Content Delivered Online	Type of Course	Typical Description
0%	Traditional	Courses where no online technology used. Content is delivered in writing or orally.
30 to 79%	Blended/Hybrid	Courses that blends online and face-to-face delivery. Substantial proportion of the content is delivered online, typically uses online discussions, and typically has a reduced number of face-to-face meetings.
80%	Online	A course where most or all of the content is delivered online. Typically have no face-to-face meetings.

In the U.S.A., at least five states have included online learning as a high school graduation requirement, including Arkansas, Virginia, Florida, Michigan, and, Alabama

(National Conference of State Legislatures, 2016). In addition, numerous institutions in U. S. higher education have rapidly increased their online offerings. Allen and Seaman (2013) reported that, in 10 years, there was a growth in online offerings: in 2002, only 34.5% online courses, in 2012, 62.4% reported offering fully online programs (p. 20).

The University of Connecticut, the site of this study, defines distance learning as “courses taught using a videoconference (interactive television) system, which enables students and the instructor to see and hear each other in real time” (Distance Learning & Online Courses, 2015). Online instruction is defined as “all required contact hours are internet-based. Contact includes instruction, learning activities, and interactions both student-student and/or student-instructor” (Distance Learning & Online Courses, 2015). Distance learning courses at UConn include hybrid or blended learning experiences, and the proportion of content delivered online can range from 30% to 80%. The online courses at UConn are the courses that deliver its content mostly online ranging from 80% to 100%.

In the academic year 2014-15, UConn offered 335 distance courses; in 2015-16, it offered 312. In contrast, there were 292 online courses in 2014/2015 and 243 in 2015-16. It has been widely reported that online courses have a significantly higher student dropout rate compared to the face-to-face courses. This can be seen in the UConn statistics: In 2014-15 and 2015-16, the students’ dropout rate was 2.49%, and the D/Fail/withdraw rates (DFW) was 16.91% in all of the courses (see Table 2.2). These results suggest that there is a need to examine possible ways to decrease student dropout rates and to find alternative methods to assist students who are at risk in online learning context.

Table 2.2

*Distance and Online Course Data for Academic Years 2014-2016 for UConn*

<b>Academic Years</b>	<b>Total of Distance Courses</b>	<b>Graduates &amp; Undergraduates enrolled in Distance Courses</b>	<b>Dropout Rate</b>	<b>DFW rate</b>
2014/15	335	5205	3.84%	28.82%
2015/16	312	9755	2.36%	28.18%
2014-16 -Total	647	14960	2.88%	28.4%

<b>Academic Years</b>	<b>Total of Online Courses</b>	<b>Graduate &amp; Undergraduate enrolled in Online Courses</b>	<b>Dropout Rate</b>	<b>DFW rate</b>
2014/15	292	6892	2.53%	15.88%
2015/16	243	7561	2.45%	16.47%
2014-16 -Total	535	14453	2.49%	16.91%

### **Regulation and Learning**

Although, online learning in higher education has been widely adopted, there is a need for further examination of online learning and teaching to identify factors that impact students' success and failure, as well as identifying successful online teaching practices (Carr, 2000; Levy, 2007; Tello, 2007; Willging & Johnson, 2004). Research suggests that students who drop out of online courses may experience diminished self-efficacy and self-esteem, prohibiting them from taking online courses in the future (Poellhuber, Chomienne, & Karsenti, 2008).

Students need to practice certain skills to have a successful online learning experience. Several researchers argue that self-regulated learning (SRL) (Zimmerman & Schunk, 1989) is essential for students to take the responsibility for their education and reach their goals. Self-

regulation (SR), as defined by Zimmerman (1986), includes metacognitive, behavioral, and motivational processes that learners use in their learning. The metacognitive processes refer to students' self-awareness about their own thinking. The behavioral processes refer to each students' ability to use their skills and strategies to regulate their learning and plan for their goals. The strategies that students employ to attain their goals are an aspect of motivation. Motivation explains student's engagement and persistence in any educational tasks (Puzziferro, 2008).

Although self-regulation is necessary in any learning context, it has been emphasized as a necessity in online learning because of the nature of the learning environment. In online courses, learners are expected to fully take charge of their learning by accessing the virtual environment on their own time, following up with the course requirements, and maintaining active participation in their discussion blogs and forums. Self-regulatory behaviors are important for online courses because of their association with positive outcomes, such as student retention, student achievement, and student satisfaction (Howland & Moore, 2002).

### **Views of Regulation**

The literature on regulation (self-regulation, shared regulation, and co-regulation) has mainly focused on socio-cognitive and sociocultural perspectives (McCaslin & Hickey, 2001; Zimmerman, 1989, 2000). Researchers who have adopted the social cognitive view, focused their attention on social factors and their relation to SR (Zimmerman, 1989). In particular, several researchers adopted Bandura's triadic reciprocal determinism model, that describes human functioning a result of the interaction of personal, behavioral, and environmental factors. Students' attempts to self-regulate their learning are influenced by the personal, behavioral, and environmental events in a reciprocal manner. Bandura (1986) identified three sub-processes that

interact with each other in SR: self-observation, self-judgment, and self-reaction. Students observe their progress and judge task quality, which leads to several personal and behavioral reactions (Schunk, 1995).

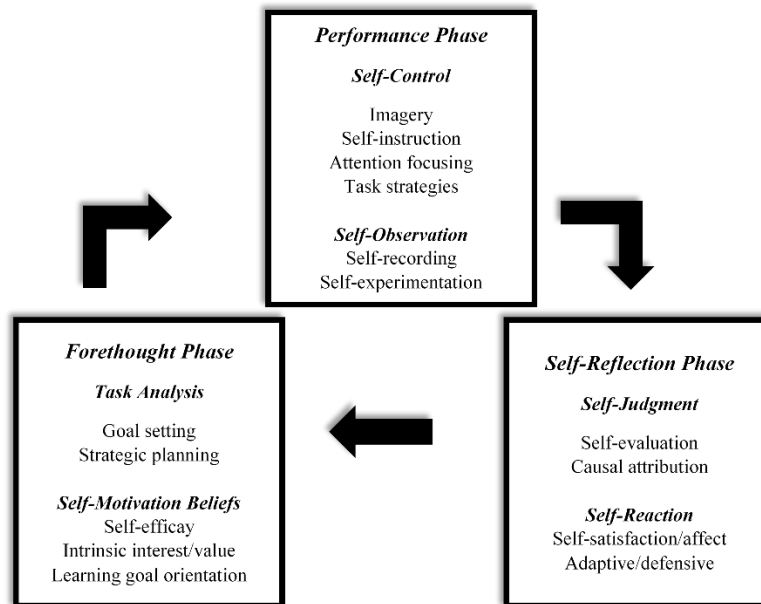
Sociocognitive theorists contributed to the development of the individual-in-context perspective in regard to regulation. Sociocultural theorists interested in regulation have emphasized the *social system* that the individual is part of while learning. This led researchers to develop co-regulation as a concept that looked at regulation in a social system (Hickey, 2003; McCaslin, 2004, 2009; McCaslin & Hickey, 2001). Hickey and McCaslin (2001) were influenced by Vygotsky's (1962) views of SR in terms of internalization, which posited that the social context in which learners and instructors interact with each other help learners internalize behaviors. From this perspective, self-regulation occurs through the interaction between learners and their instructors at an interpersonal level, then SR is internalized gradually by learners. In sum, SR is no longer seen as a fixed trait but rather a selective context-specific trait shaped by interactions with others (Zimmerman, 1998).

The development of co-regulation processes is complex because the field is still emerging and there is a need for in-depth exploration of the processes that emerge from the social system that individuals transfer. Several scholars applied SR strategies to understand both self- and co-regulation.

### **Self-Regulated Learning Strategies**

Different strategies have been identified that promote students' SR. SRL strategies as defined by (Zimmerman, 2001), "refer to actions and processes directed at acquisition of information or skills that involve agency, purpose, and instrumentality perceptions by learners" (p. 5). Learners can exercise SR processes and move from one process to another depending on

their needs. Zimmerman (2000) created a SR cyclic model that categorized the SR process into three phases: forethought, performance, and self-reflection. In the first phase, students predetermine a set of cognitions (e.g., goal setting and planning) and self-beliefs (e.g., self-efficacy) that will help them to accomplish their tasks. Then in the performance phase, students actively engage in behaviors that lead them to accomplish their goals. For example, students use certain strategies during their learning such as highlighting important topics in their assigned reading chapters to help them retain information. Last, in the self-reflection phase, students evaluate their learning outcomes and identify possible ways to improve their performance (see Figure 2.1).



*Figure 2.1* Cyclic Model-- Phases and Process of SRL (adapted from Zimmerman, 2002).



Several processes have been identified under each phase of this model. In this following section, six processes have been selected to be further examined as they are related to the focus of this study, including goal setting and planning, environment structuring, task strategies time-management, help-seeking, and self-evaluation.

*Goal Setting and Planning.* Students' motives to achieve and accomplish their learning is what Zimmerman (1998) identified as goal setting. It answers the question, "why" students are learning; goal setting is accomplished when students are "capable of choosing whether and how much to study" (Zimmerman, 1998, p. 74). When students set their goals, they specify the actions and outcomes they desire. Zimmerman (1998) provided an example to this process, stating that writers, athletes, musicians, and students determine their goals by either setting a daily word goal, specific training goals, practice sessions, or making lists of topics or tasks.

After learners set their goals, they plan their learning task accordingly. Planning happens in three phases: (1) setting educational goals, (2) adopting strategies in attaining educational goals, and (3) making decisions on how much time will be needed to accomplish the goals (Zimmerman, 2011, p. 10).

*Environment structuring.* Environment structure is linked "to the way that students regulate their physical environment" (Zimmerman, 1998, p. 75). It is the place and setting where students choose to study. Students who are self-regulated, are highly aware of the conditions under which they work best. For example, the use of mobile devices to check social media can cause many distractions, especially if the user gets constant notifications about others' updates and activities. A well self-regulated learner makes sure to turn off the mobile device or notifications while studying or even puts the device away.

*Task Strategies.* Learners use task strategies to reach their desired goals. This dimension is associated with “how” students learn. For example, some students adopt verbal strategies when memorizing names of different theorists (Zimmerman, 1998). Others write down the main points and summarize their readings or use concept maps while studying to have a better understanding of the content. Whatever the strategies learners prefer and use, what matters is that learners achieve their educational goals.

*Time management.* This dimension answers the questions about “when” learning happens (Zimmerman, 1998, p. 74). The better students are in regulating their learning, the more effort they put into managing their time. In most online learning environments, there are different tools that help learners to manage time. One example is the use of Google Calendar that allows learners to link the course calendar to their own personal calendar. Online learners can use tools that can make time management more effective, thereby increasing their success.

*Help seeking.* Help seeking is a social aspect of learning and answers the question “with whom” learning is most effective. Online self-regulated learners seek other colleagues or instructors to ask for help, if needed, without being afraid of how others would interpret their questions or concerns. This is an important aspect in maximizing learning resources in online environments. SR students “are aware of how study partners, coaches, or instructors can help or hinder their learning, and they can be readily identified by their sensitivity and resourcefulness in seeking help” (Zimmerman, 1998, p. 75).

*Self-Evaluation.* Self-evaluation is the student’s explicit behavioral performance: “Learners must be able to choose, modify, and adapt their form of response particularly from the feedback it produces” (Zimmerman, 1998, p. 75). Good self-regulators make sure that they go over grading rubrics after finishing an assignment, checking that they have met the criteria of the

assignment. Instructor feedback provides learners the opportunity to improve their learning by identifying their areas of strength and weakness. Successful SR learners use feedback to improve their learning.

### **Self-Regulation and Academic Achievement**

Researchers have linked to positive academic and nonacademic outcomes, such as successful leaning measured by grades and students' attitudes about online learning (Howland & Moore, 2002). Schunk (2005) stated, "self-regulated learning is seen as a mechanism to help explain achievement differences among students and as a means to improve achievement" (p. 85). Several researchers examined SR in relation to academic achievement (e.g., Boekaerts et al., 2000; Nota, Soresi, & Zimmerman, 2004; Zimmerman, 2008; Zimmerman & Schunk, 2001). In the traditional learning environment, the use of SRL processes and strategies usually predicts higher academic achievement (Wang, Shannon, & Ross, 2013). Consider some representative studies.

In a longitudinal study conducted by Nota, Soresi, and Zimmerman (2004) on high achieving students in their fifth and final high school year in Italy, researchers used a structured interview known as the *Self-Regulated Learning Interview Schedule* (SRLIS; Zimmerman & Martinez-Pons, 1986). Regression analyses were conducted to identify SR strategies that predicted students' grades. Researchers found that organization and transformation information strategy predicted students' school grades in Italian, mathematics, and technical subjects, accounting for 23% of the variance in students' mathematic grade, 73% of the variance in their Italian grade, and 83% of the variance in their grades in technical subjects. Moreover, the same students who relied on transformation information and organization strategy did significantly better on university examinations two years later, and had significantly higher grades. The

researchers argue that SRL strategies may be a good predictor of students' academic achievement.

Fisher and Baird (2005) examined the integration of web-based social media technology in an online course and its impact on students' retention, motivation, and perceived learning. Participants were graduate students in an educational technology program. The researchers found that students' retention was positively influenced by their sense of community. In addition, the increase of students' self-regulatory behaviors was associated with the support that students received. The study results suggest that students' involvement in collaborative group project work allowed students to construct knowledge both individually and collectively. Moreover, students' collaboration provided support to students by regulating their participation in online learning classroom.

A classic study conducted by Pintrich and De Groot (1990) examined the correlation between students' motivational orientation, self-regulated learning, and their academic performance in a small city in southeastern Michigan. One hundred and seventy-three seventh grade students who were taking either science or English classes completed the *Motivated Strategies for Learning Questionnaire* (MSLQ), an instrument used to measure students' self-regulation. Students' academic performance was measured by in-class work, including homework, tests, exams, essays, reports, and two semester grades. The results revealed that high levels of self-regulation significantly correlated with a high level of academic performance. Two variables were highly correlated with higher level of cognitive strategy use: self-efficacy ( $r = .33$ ) and intrinsic value ( $r = .63$ ). Furthermore, higher levels of self-efficacy ( $r = .44$ ) and intrinsic value ( $r = .73$ ) were correlated with higher levels of self-regulation. Prior achievement was a significant predictor of SR ( $r = .17$ ).

Lynch and Dembo (2004) examined self-regulation skills that were used by students in a blended learning context that predicted academic success. Data were collected from 94 university students, 47 males and 47 females, enrolled in a blended undergraduate marketing course. The course delivery was 75% online and 25% face-to-face. In the online portion of the course, students had access to lectures and assignments on the course online platform and were expected to complete assigned activities. Students also participated in a 45-minute session with the course instructor once every two weeks.

Students' academic performance was measured by using their final grades scaled as a percentage in relation to six predictor variables that were chosen based on a literature review of the hypothesized variables for performance in an online blended learning context. The five self-regulation variables were intrinsic goal orientation, self-efficacy for learning and performance, time management and study environment management, help-seeking, and internet self-efficacy, all of which were measured by the MSLQ (Pintrich, et al., 1991). A sixth variable -- internet self-efficacy -- was measured by the *Internet Self-Efficacy Scale* (Eastin & Le Rose, 2000).

Researchers also used a 50-item word meaning measurement from the Schubert's (1986) *General Ability Battery* to measure students' verbal IQ. The researchers conducted a non-experimental correlational research design using non-random sampling. A regression analysis revealed that only self-efficacy and verbal ability were significantly related to performance.

Barnard, Paton, and Lan (2008) examined whether self-regulatory learning behaviors mediate the relationship between students' perceptions of online course communication and collaboration with academic achievement. Data were collected from 204 students enrolled in online courses at a public university in the southwestern U.S. who self-selected to complete an online survey. Student academic achievement was measured by their cumulative grade point

averages (GPAs) at the time. Students' perception of online course communication and collaboration was measured with an 11-item scale with a 5-point Likert-type response format (Rose, 2006). Self-regulation in online learning was measured by the short form of the *Online Self-regulated Learning Questionnaire* (OSLQ) (Barnard, Lan, To, Paton, & Lai, 2010).

Data were analyzed using structural equation modeling in MPlus (v. 4.20). Results revealed that SR in an online learning environment positively mediated the relationship between students' perceptions of online course collaborative communication and their achievement. The indirect effects of SR in online learning between students' perception of the online course communication, collaboration, and GPA was a standardized path coefficient value of 0.13, at a 0.05 significance level.

In sum, there is a growing body of research that investigates the role that self-regulation plays in online learning environments. In general, the data suggest that self-regulation skills help students, both in terms of their achievement and their attitudes. That said, there is a need for more empirical research that investigates SRL in different educational settings, including the broad range of ways in which online learning environments are designed and implemented (Schworm & Gruber, 2012).

### **Measuring Self-Regulation**

Most research on SRL has relied on self-report instruments and performance measures. Both qualitative and quantitative measures have been widely used to capture processes of SRL that are correlated with academic achievement. Two types of self-report methods have been used to serve this purpose: questionnaires and interviews. These approaches have provided valuable information on what processes and strategies are used by successful learners, how they adapt

their learning, and by providing predictors of students' learning achievements (e.g., Pintrich & DeGroot, 1990).

A number of reliable self-report measures have been developed to detect aspects of SRL, such as the *MSLQ* (Pintrich, et al., 1991), that has been widely used to measure SR and motivational constructs. The *MSLQ* consists of an 81-item based questionnaire of six motivation subscales and nine learning strategies subscales. Another example is the *Learning and Study Strategies Inventory* (Weinstein, Schulte, & Palmer, 1987). The *OSLQ* (Barnard et al., 2008) has been developed to examine SRL in an online context and has been validated across two samples of learners. Results revealed satisfactory psychometric properties in both online and blended learning environments (Barnard, Lan, To, Paton, & Lai, 2009). The instrument revealed acceptable psychometric properties when examined with epistemological beliefs and academic achievement (Barnard, Lan, Crooks, & Paton, 2008), and acceptable psychometrics properties when used in identifying the relationship between self-regulation skills and online course communication (Barnard, Paton, & Rose, 2007).

The disadvantage of only using self-report measures is that they are static. Often, one-time assessments may not capture students' context-sensitive applications and dynamic adaptation of SRL in their learning process; this is especially relevant when conceptualizing regulation through a sociocultural lens. Therefore, different methods of measurement, such as qualitative analysis, can provide a broader vision of SRL (Zimmerman, 2001). Issues of measuring SRL are discussed further in chapter 3.

### **Co-regulation**

The focus of SRL is on individual changes to create more personally meaningful instructional practices and activities, instead of changing the learning context. Different theories

of SRL examine interpersonal, social, and cultural influences variables separately. In contrast, scholars who adopted socio-cultural approaches to SRL believe that SRL is fostered and developed in a social context and through student's interaction and engagement. Therefore, the term co-regulated learning (CRL) has emerged to convey the social aspect in understanding learner's acquisition of cognitive, motivational and behavioral strategies. Models of CRL assume that motivation to learn "standards" and "values" are constructed socially (Hickey, 2003). Over time, standards and values are presumed to be internalized by learners. CR expands SR by incorporating both cognitive and social attributes.

One key factor in improving self-regulation is a student's capability to interact with others by listening and observing them. Although the construct self-regulation implies an individualistic phenomenon, we cannot neglect the social aspect of it (Salonen, Vauras, & Efklides, 2005). Social experiences impact cognition, which in turn, impacts social experiences (Hacker & Bol, 2004). Therefore, co-regulation "assumes that the standards and values presumed to motivate learning are socially constructed" (Hickey, 2003, p. 409). According to McCaslin and Good (1996):

When the student has internalized the social structural support, she is capable of relatively self-regulated learning in that particular domain. Thus, although the ultimate goal may be self-regulation, *co-regulation* is the process by which social/instructional environment supports or scaffolds the individual via her relationships within the classroom, relationships within teacher and peers, objects and setting, and ultimately the self. (As cited in Hickey, 2003, p. 410).

The logic of co-regulation argues that learners first experience and eventually internalize social supports provided in the learning environment, which then enables them to regulate their



learning (McCaslin & Good, 1996). In particular, CRL draws upon Vygotsky's (1962/1978) ZPD. Sociocultural theory situates human mental development within contexts (Wertsch, 1990). Thus, individuals and social context are elements of an interacting system (Cole, 1985). Vygotsky asserted that, conscious behavior that enables humans to plan, set goals, and direct actions towards goals are all activated in an individual's social connection with the surroundings within a community of learners (McCaslin & Hickey, 2001).

### **Co-regulation in Online Learning**

In most online learning courses, learners are expected to collaborate, engage, and participate in different discussion threads that are designed to support higher-level thinking. Through collaboration, learners need to use processes such as time-management, goal setting, and ongoing evaluation to succeed in their task completion. These processes appear to be a strong indicator to SRL and CRL. Given the nature of online learning, then, it is vital to examine students' SRL and CRL as it relates to their success in online learning courses.

Some research on CRL examines how the design of specific learning tasks might lead to the transition from CRL to SRL. A number of studies employed SRL scaffolding through CR among dyads and peers, with a focus on how the dyads use strategies of CRL in their interaction (De Jong, Kollöffel, van der Meijden, Staarman, & Janssen, 2005; Winters & Azevedo, 2005). Others looked into how CRL is fostered within specific tasks that were designed to increase CRL (DiDonato, 2013). Despite the different goals of these studies (De Jong et al., 2005; DiDonato, 2013), they all raise the question: How do students coregulate their learning collaboratively? Although, the number of students assigned to work on a collaborative tasks in CRL research has mainly been conducted in dyads, and in some studies in triads, studies have varied in regard to the group size.

For example, DiDonato (2013) examined the use of collaborative interdisciplinary authentic tasks as a context in which middle school students develop and use SRL processes for a nine-week period. Two self-report measures were used: the SRL questionnaire adapted from SRL scales (Martinez-Pons 1999; Wolters et al., 2005) and the CRL questionnaire developed by (DiDonato, 2013). In addition, case study analysis was used to provide a description of how co-regulated efforts may lead to increases in self-regulation within one collaborative. DiDonato's results indicated that students' SRL scores increased over the course of nine weeks and that CRL scores moderate this relationship positively and significantly. This may reveal that, high-SRL tasks that are complex and personally meaningful promoted SRL and are effective contexts to measure and promote co-regulation, as well.

In another study, De Jong, Kollöffel and colleagues (2005) examined student SRL and its effects on performance in a computer-supported collaborative learning context. Three separate studies of students' regulation of learning were examined. In the first study, 36 Dutch pre-university students in their first year of high school in the Netherlands were selected based on students' national achievement scores (i.e., CITO performance). Ten boys and 10 girls were selected on the basis of high academic performance to participate in the study. Also, 11 boys and five girls were selected on the basis of low academic performance as participants. The average age of the participants was 12 years old. The study materials consisted of texts on probability problems. The learning task revolved around reading comprehension and problem solving skills. The test consisted of nine probability calculation problems and one knowledge question.

Participants were involved in two preparation sessions, a half hour each, to help them learn the think-aloud procedure. A week later, students worked on the learning task and took a test. Students were reminded that they should "learn out loud" and that the think-aloud would be

audiotaped. Two weeks later students completed the same test but with a different question order. Four raters analyzed the data by coding the audiotapes following a coding scheme that examined the four regulative processes of orienting, process monitoring, directing, and testing and two categories of transforming and intervention. Interrater reliability among coders was high with an average of 0.98 ( $SD = 0.11$ ;  $df = 52$ ;  $p = 0.001$ ). The results indicated that regulation of learning activities occurred in every learning context, and that learning the complex task started with information-processing skills, gradually shifting to “testing activities” such as summarizing, hypothesizing, and checking. Testing activities were found to occur more toward the end of the learning process than information-processing and concomitant directing activities.

Although the study results suggest that different SRL strategies occurred in different stages of learning, there is a need to further explore SR strategies and their relation to positive learning outcomes. The study focused on SR strategies use in different phases of learning but did not look into the correlation between SR and academic achievement.

In a second study, De Jong et al. (2005) examined the self-regulation strategies that students used while working on a divergent task in a computer-supported collaborative learning (CSCL) environment. Six students in tenth grade and twelfth grade from two different Dutch pre-university high schools participated. The students worked collaboratively at a distance in three dyads on an open task within a CSCL environment. Coding categories in the first study were revised to fit with the collaborative aspect of the study context. The study duration was four weeks, and participants were given information on how to use *Active Worlds*, a computer environment that allows users to create virtual 3D objects such as houses. The instruction was provided on how to collaboratively plan, design, and create a virtual exhibition. Different pieces

of textual information on Andy Warhol were given to students and they were asked to create a virtual exhibition. One student from each dyad was selected to guide a tour for an art teacher.

Two researchers analyzed the data consisting of chat logs of students' online discussions posts. Nine categories of self-regulation were included in the coding schema: orienting, planning, instructing, grounding, monitoring, testing, evaluating, other regulation, and off-task. In addition, a cognitive category was included in the coding scheme to identify any cognitive processes that occurred during collaboration, such as explanation and asking questions. Data analyses results indicated that the most often used strategy was grounding (32%) – which involves trying to maintain a common ground reflecting cognitive strategies (16.9%), off-task behavior (16.6%), followed by monitoring (9.2%) and planning (6.9%).

The study results revealed that the high use of grounding might have been due to lack of nonverbal and social context cues in CSCL environments. Previous researchers demonstrated that lacking social presence in communications may lead to a greater need for grounding (Short, Williams, & Christie, 1976). Students used grounding to ensure that their peers understood each other. As for monitoring, it revealed that students were tracking their task performance. Since students' task activities and content of the collaborative meetings were specified to students prior to the task, this may have affected other regulation strategies such (i.e., orienting, planning, instruction, testing, and evaluation) and manipulated the frequency of these regulation strategies.

Although the study results supported dyad collaborative work and suggests that dyad collaboration can promote students' use of different SR process, the research does not provide evidence to whether dyads' collaborative work impacted students' learning outcomes. The researchers pointed out that the dyads have successfully created exhibitions but with no other reference to students' use of SR strategies and its relation to their performance.

In a third study, De Jong et al. (2005) explored the regulative activities and strategies of elementary school children working in a CSCL environment. The study differed from the previous one in that students worked in their familiar classroom and with classmates whom they knew. Students worked in a “shared place” without 3D elements. The shared spaces were text-based with an advanced knowledge-building facility rather than the *Active Worlds* chat feature. Students worked for four one-hour lessons on 30 computers to discuss “horror stories” and to develop a common knowledge about the topic. Students’ written contributions were analyzed, and the analysis of the computer-mediated discussions exposed 98 of the 154 notes contained passages of a regulative nature, which means that students have used regulatory processes throughout their interaction. Common ground was the most frequent used processes in the regulative activities (62.6%) with 22.5% evaluation of the content and notes on task requirements. Evaluation remarks mainly concerned notes written by others and by students on their own written contributions (2.9%). Students made an effort to establish common ground in their notes either by addressing a note to a particular person (30.3%) or by stating explicit agreement or disagreement with a statement from others (28.4%). In addition, instruction of other students -- in the form of suggestions to edit and improve contributions -- was used by almost seven percent of the time. Monitoring their own learning process was shown to be used less by students in this study than in previous studies. Students monitored the collaborative process and evaluated it in terms of group and task goals.

In another study, Fisher and Barid (2005) found that students engaging in dyad communication online tended to feel motivated to meet their peers’ expectations and be accountable. Dyads’ communication impacted students’ SR behaviors positively, since students

felt that they were evaluated by their peers. Fisher and Barid (2005) highlighted the importance of collaboration and group activities in online learning environments.

Overall, studies suggest the positive impact of CR on students SR skills after working with dyads. Didonato's (2013) study supported that CRL scores mediated positively the increase in students SRL scores. De Jong, Kollöffel et al.'s (2005) studies have documented students using different regulation strategies across settings.

### **When Co-Regulation Fails**

The results of these studies indicate that students' gains increased after working in dyads with instruction scaffolding (Azevedo et al., 2004), and that CRL moderated positively learners' increased scores on SRL after working in dyads on authentic tasks (DiDonato, 2013). Students supported each other in regulating their learning while working collaboratively (De Jong et al., 2005; Winters & Azevedo 2005), but the two key elements to successful collaboration depends highly on students' use of self-regulatory skills as needed and their prior knowledge of the topic (Azevedo et al., 2004). While the previous studies indicated that CRL positively correlated with positive gains and better self-regulation, some empirical evidence suggests that this is not always the case.

Salonen, Vauras, and Efklides (2005) have proposed that co-regulation can have a negative impact on students. Instructors, for example, could contribute to unsuccessful CR due if instructors are inflexible or unresponsive. In addition, instructors' implicit theories of students' ability could affect their judgment of students' practice and learning (Salonen, Vauras, & Efklides, 2005, p. 201). Instructors, they argue, may believe that ability is something that the students either have or do not have. Instructors may choose to focus their awareness and flexibility with cues that come from students who are known to be successful, compared to cues

that come from less successful students in the online context. Moreover, a student's idea about their ability and their perception of their instructor's beliefs about them may contribute to unsuccessful CR. Instructors and students in online environments may interpret each other differently and that impacts the success of instructional scaffolding between them. Another explanation to why CR might fail between students, is the imbalance in student's regulatory forms.

Salonen, Vauras, and Efklides (2005), have proposed three different regulatory forms that block CR between students: over-controlling, intrusive, or asynchronous. Students may be over-controlling when working with their peers in which they disregard any suggestion or solutions from others in how things may be done or interpreted. Also, some students would rather work on their own and thus minimally interact with them. Lastly, asynchronous communication could be insufficient if peers did not manage their time together to coordinate their interactions. The lack of time-management in collaborative work can lead to frustration. All of these imbalances in students' regulatory forms may impact the learning process in collaborative work.

Lajoie and Lu (2012) noted that in a collaborative group work, co-regulation may decrease if there is "imbalance" between the group's members due to lack of understating the meaning of the content or due to differences in the relational balance. They further elaborated that affect is another factor that is associated with CRL. Olekalns and Smith (2005) suggested that positive affect would create a trustful partnership that results in positive gains. However, negative characterization would result to negative outcomes. In the Azevedo et al. (2004) collaborative study, low-achieving high school student's self-regulated learning behaviors had statistically significant small increase (7%) from pretest to posttest after working in dyads with the teacher scaffolding and instruction. The pretest-posttest presented seven complex questions

about the unit that was composed after consulting science teacher. Analysis of students and teacher discourse revealed that students spent more time on low-level strategies such as monitoring than on higher-level strategies such as planning. In CRL the idea of knowledge being co-constructed through students' collaboration which may or may not occur frequently. Therefore, assigning students to work collaboratively on a shared activity does not ensure that students' interaction will fit CR and collaboration (Volet, Summers, & Thurman, 2009). Students' use of regulatory processes varies depending on the situation and task they are working on.

### **Future Research on Co-Regulation**

While the research in CRL is promising, further research on CRL is needed. Three main themes that can direct CRL future research. First, similar to SRL models, CRL models tend to vary in their elements. Some CRL models focus on SR and CR processes together. Other models focus on either CR or shared regulation. Therefore, it is essential to further develop CRL models and frameworks that provide a better explanation of CRL processes and elements, in different contexts (e.g., Chan, 2012).

Second, more research is needed to advance the development of analytic methods to examine groups' processes in different contexts among dyads and groups. Different coding schemes and analysis approaches are needed to detect CRL processes that are used by learners within a social context.

Third, there is a lack of research on the quality of CRL processes that leads to successful learning. To further our understanding about CRL, an extensive description of how learners enact CRL strategies would be helpful. Teachers co-regulate students' level of involvement and learning by providing structured activities and instruction that supports student learning (Butler,



Schnellert, & MacNeil, 2014). A study conducted by Järvelä, Näykki, Laru, and Luokkanen (2007) explored possibilities to scaffold collaborative learning in higher education with wireless networks and mobile tools. The results emphasized that students' CRL can be supported by a set of instructions and guidelines, suggesting how students are expected to perform in groups. More research that investigates instructional strategies that can support CRL and SRL is needed.

The literature lacks studies that examine the impact of CRL on assigned groups' performance. Therefore, this study will focus on issues related to CRL and SRL by investigating in detail how learners engage in online environments that foster CRL and SRL. The first objective is to have a closer insight into what strategies dyad experience fosters CRL and SRL in courses directed by a community of inquiry. Moreover, it is essential to detect the relationship between CRL and SRL in relation to performance measured by dyad project grade. It is hypothesized that CRL would have a positive impact on SRL and therefore positive academic outcomes.

### **Measuring Co-Regulation**

Scholars interested in examining CRL have used qualitative and quantitative measures to detect CR processes. Two common qualitative methods used that provide a rich and context-specific description: Observational and interviews. Several coding protocols have been used to detect CR processes including: planning, monitoring, evaluation, elaboration, goal setting, and task-analysis. For example, Meijer, Veenman, and Hout-Wolters (2006) developed a qualitative scheme used to measure CRL, identifying six categories: orientation, planning, executing, monitoring, evaluation, and elaboration. Another qualitative coding scheme used to measure the CRL process, categorizes CRL by type: Shared or other (Volet, Summers, & Thurman, 2009). The shared processes includes learner's talk that is directly related to the learning content. Under

the shared processes, there are four categories that have been identified: high-level content processing, low-level content processing, individual regulation, and CR. Any talk that was not directly related to the learning content was coded as other matters. Different coding schema could emerge from different data. Researchers should be open to new coding schemes for their data, as this openness offer growth and rapid development in any field of interest.

### **Summary**

To summarize, there is a need for more empirical evidence to better understand how to promote students' use of SR and CR strategies in collaborative tasks in online learning environments. Thirty-nine percent of the total students in higher education took at least one distance course in 2014 (Allen, Seaman, Poulin, & Straut, 2016). Therefore, it is important to further investigate successful online learners' practices and identify these practices to support less successful online learners. While research on SRL and CRL suggests that students with these skill sets do better in on-line learning classes, there is still much research that needs to be done.

Next, chapter 3 describes the present study's research methodology and methods.

## **CHAPTER III**

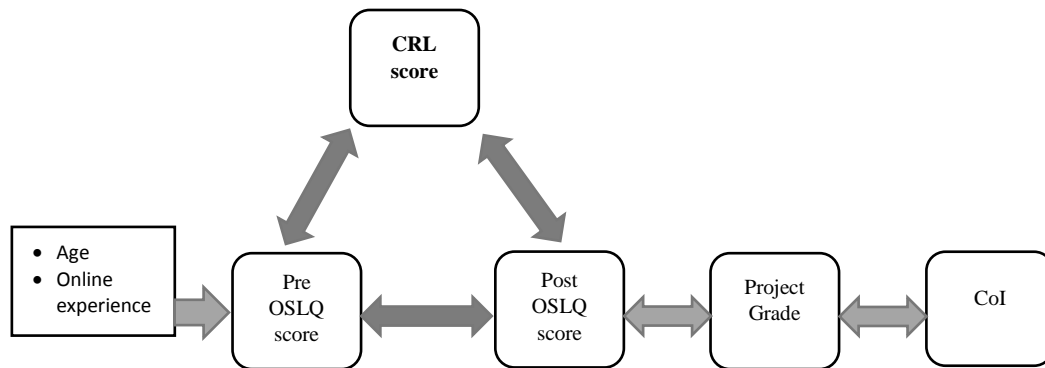
### **RESEARCH METHODOLOGY**

#### **Introduction**

The study aims to describe and explain the effects of co-regulation on students' self-regulation, which is hypothesized to lead to better learning. A mixed methods design was used, allowing the assessment of CRL and SRL processes in relation to project grades and students' sense of community, using both qualitative and quantitative methods at different stages. The use of both qualitative and quantitative data provides a unique opportunity to answer more complex research questions (Creswell, 2005). In this chapter, first the research questions are described followed by the setting and participants; then the non-experimental correlational research design is followed by a description of the interview research that complemented it.

#### **Research Questions**

This study addressed the degree to which dyads' co-regulation in classroom activities mediated the changes in students' SRL within online environments, and thereby the dyads' project grades after controlling for covariates of age and online experience. Also, the study addressed students' perceptions of the degree of CoI adoption by instructors in the online learning courses. The aim of the study was to identify the extent to which the delivery of online environments fostered successful co-regulated and or self-regulated learners. Additionally, successful co-regulated dyads cases were compared to less successful dyads cases to examine what strategies were used by each group. Figure 3.1, represents elements of the study research questions.



*Figure 3.1.* Conceptual representation of the study elements.

The following research questions and hypotheses were investigated in this study:

RQ<sub>1</sub>: To what extent do individual pre-OSLQ scores predict post-OSLQ scores?

H<sub>0A</sub>: There will be no significant relationship between individual pre- and post-OSLQ scores.

H<sub>1A</sub>: There will be a significant relationship between individual pre- and post-OSLQ scores.

RQ<sub>2</sub>: To what extent do pre-OSLQ scores predict CRL scores?

H<sub>0B</sub>: There will be no significant relationship between pre-OSLQ and CRL scores.

H<sub>1B</sub>: There will be a significant relationship between pre-OSLQ and CRL scores.

RQ<sub>3</sub>: To what extent do CRL scores predict post-OSLQ scores?

H<sub>0C</sub>: There will be no significant relationship between CRL and post-OSLQ scores.

H<sub>1C</sub>: There will be a significant relationship between CRL and post-OSLQ scores.

RQ4: To what extent is being a good self-regulator related to students' perceptions of the course CoI status?

H<sub>0D</sub>: There will be no significant relationship between good self-regulators and students' perception of the course CoI status.

H<sub>1D</sub>: There will be a significant relationship between good self-regulators and students' perception of the course CoI status.

RQ5: To what extent do individual CRL scores mediate the relationship between individual pre- and post-OSLQ scores?

H<sub>0E</sub>: Individual CRL scores will not mediate the change of individual pre- and post OSLQ scores.

H<sub>1E</sub>: Individual CRL scores will mediate the change of individual pre- and post OSLQ scores.

RQ6: Do individual post-OSLQ scores mediate the relationship between individual perceptions of CRL scores and project grades?

H<sub>0F</sub>: Individual post-OSLQ scores will not mediate the change of individual perceptions of CRL scores and project grades.

H<sub>1F</sub>: Individual post-OSLQ scores will mediate the change of individual perceptions of CRL scores and project grade.

RQ7: How do dyads' co-regulated learning processes impact students' independent SRL? What were the factors that impacted dyads' co-regulation experience?

In summary, the aim is to explore the factors that impacted the successful dyads' use of CRL and SRL processes compared to less successful dyads.

## Setting and Participants

### Setting

Many researchers in higher education have been interested in building communities of learners to support collaborative learning and interactions between students. Several studies have demonstrated that a community can be created in online learning environments (e.g., Rovai, 2002a; Thompson & MacDonald, 2005) and that these online learning environments can be associated with perceived learning benefits (e.g., Rovai, 2002b; Shea, 2006; Shea et al., 2006). For this study, the researcher collaborated with online course instructors at University of Connecticut (UConn) to adapt courses that were delivered online in Spring, Summer, and Fall of 2016.

In the recruited online courses for this study, instructors were asked to randomly assign students in dyads using the random group generator available in HuskyCT (a Blackboard™ system tailored for UConn). Dyads were assigned an intellectually challenging project related to the course content developed by course instructors; the assignments took approximately 6 weeks to complete. In the study groups, teaching presence was enhanced through: (1) the instructor's use of weekly feedback, aimed to provide support to the learners by clarifying confusions and explanation of challenging points that students encounter, and (2) direct instruction designed to make sure students were progressing in their projects, as recommended by (Anderson et al., 2001).

In addition, dyads were expected to participate in weekly 15-minute meetings on any online video platform of their choice, such as Skype® or Google Hangouts®, to discuss their assigned project and reading. Dyads were expected to take turns in writing a short summary of their meeting main points. Later, dyads posted their thoughts and ideas individually about their

weekly assigned readings and prompts then reflected on each other's posts, in addition to any questions related to the project. These weekly prompts and activities were designed to enhance each student's social presence.

### **Participants and Recruitment**

Seventy students in higher education enrolled in online courses participated. The students were recruited from an accessible population to the researcher. Participants were between the ages of 19 and 36, males and females, and enrolled in either a graduate or undergraduate online courses (see Appendix A for Institutional Review Board Approval).

Recruitment of participants started with recruitment of course instructors. In Spring 2016, only two online course instructors agreed to adapt dyad activity on any pre-existing activity of their choice. Thus, participants were recruited from Educational Psychology (EPSY 3010) and Digital Marketing (MKTG 3665). Although all the students were assigned to work in dyads as a course requirement, data were only collected from students who agreed to participate in the study, through the IRB consenting procedures.

Due to low participation rate from students enrolled in EPSY 3010 and MKGT 36650, additional participant recruitment was needed. Due to low number of participants, the researcher contacted the Center for Excellence in Teaching and Learning (CETL) at UConn, and the Director of Summer and Winter Programs, to ask for letters of support to recruit for the study again and provide help with finding more online courses offered at UConn. After meeting with Dr. Susanna Cowen, the Director of Summer and Winter program, and Dr. Peter Diplock, the Assistant Vice Provost for CETL, a letter of support from CETL was sent to the researcher (see Appendix E). Moreover, the researcher was given an Excel sheet of all the online courses offered at UConn of 53 courses in Summer 2016, with instructor names and emails.

The researcher contacted more than 200 instructors of online courses, and conducted several face-to-face and online meetings with instructors. Only four online course instructors agreed to collaborate with the researcher, and were willing to incorporate the study in their courses, including Instructional Design (EPSY 5520) for graduate students, Leadership in Sport Organizations (EDLR 5360) offered to graduate students, as well as Economic Geography (GEOG 2100) and Calculus for Business and Economics Majors (Math 1071), both of which were offered for undergraduate students. Instructors sent announcements of the study surveys, interviews, and random winners of the study participation gift cards (see Table 3.1). IRB amendments were submitted and approved before each round of recruitment and re-recruitment.

Two other courses were also recruited for the study. The instructor of Math 1071 agreed to include mathematical problem solving weekly worksheets for dyads to work on online. However, dyads had no access to embedded mathematical tools in HuskyCT that allowed them to insert their collaborative answers that included mathematical equations. Therefore, it was difficult for students to work in dyads to solve their mathematical problems. As a result, the instructor dropped out of the study. As an outcome, the researcher lost approximately 60 potential participants to be recruited in the study. In addition, approximately 20 students enrolled in GEOG 2100 course had been sent several reminders of the study survey. Only one student participated in the study.



Course Number	Course Name	Course Level	Semester Offered	Total number of students in course	Total number of research participants in course	Percent of students participating
EPSY-3010	Educational Psychology	Undergraduates	Spring 2016	33	18	54%
MKTG-3665	Digital Marketing	Undergraduates	Spring 2016	30	14	46%
MATH-1071	Calculus for Business and Economics Majors	Undergraduates	Summer Session II 2016	60	0	0%
GEOG-2100	Economic Geography	Undergraduates	Summer Session II 2016	20	1	5%
MKTG-3665	Digital Marketing	Undergraduates	Fall 2016	30	22	73%
EPSY-5520	Instructional Design	Graduates	Summer Session II 2016	18	11	61%
EDLR-5360	Leadership in Sport Organizations	Graduates	Summer Session II 2016	9	4	44%
<b>Total</b>				<b>200</b>	<b>70</b>	<b>35%</b>

Table 3.1 *The recruited courses for the study, total of potential students enrolled and total number of research study participants enrolled.*

A power analysis using G\*Power 3 (Faul, Erdfelder, Lang, & Buchner, 2012) was conducted to determine sample size estimates for each research question. The sample included 42 students, which was an inadequate sample size, and therefore underpowered for RQ<sub>1</sub>-RQ<sub>4</sub>, (minimum N= 48) for multiple regression analysis ( $f^2 = 0.25$ ,  $\alpha = 0.05$ , Power = 0.80, two-tailed). As for RQ<sub>5</sub> and RQ<sub>6</sub>, the minimum sample size to conduct a mediation analysis with a power

level of 0.80, and a moderate direct effect ( $t' = .39$ ), is 75 participants; here too the present study was under-powered.

It is important to note that the maximum student's enrollment number for online courses ranged from 25-30 students per course. Restricting the number of enrolled students in online courses is considered a positive practice that ensures instructors' ability to control and maintain a powerful instructional environment. Unfortunately, students' maximum enrollment numbers limited the number of potential online participants, and may have been a factor in the low sample size.

### **Instrumentation**

To measure students' online self-regulation, co-regulated learning, and perceptions on the course based on community of inquiry framework, three separate instruments were used (see Appendix B). In all of the study surveys, students were asked to create their own four digit code to use in all their surveys to collate the responses of individual cases across instruments. Participants were asked to send their codes to instructors. Instructors were then asked to send to the researcher dyads groups by using the same four digit code created by participants to protect participant confidentiality. Demographic questions were added in the surveys that included information about age, gender, and previous experience in online courses.

### Measuring Students' Online Self-Regulation

The OSLQ is intended “to measure a student’s ability to self-regulate their learning in environments that are wholly or partially web-based” (Barnard et al., 2009, p. 2). The long form of the instrument, which includes 86-item pool, was developed and derived from Zimmerman’s (1998) work on self-regulated learning which reflect a multi-dimensional conception of self-regulation (Lan, Bremer, Stevens & Mullen, 2004).

A shorter form of the OSLQ, that consists of six major constructs of self-regulation in online learning with better psychometrics, was created by Barnard, et al. (2009) was used in this study. The six constructs are environment structuring, goal setting, time management, help-seeking, task strategies, and self-evaluation. The short form OSLQ is a 24-item scale with a 5-point Likert response ranging from *strongly agree* (5) to *strongly disagree* (1). Barnard et al. (2009) examined the reliability and validity of the short form in online courses on two samples of students. The first sample of students took an online course and the second sample of students took blended or hybrid course. The total score obtained from OSLQ demonstrated acceptable internal consistency in the study of 434 undergraduate students taking online course ( $\alpha = .90$ ) and in the study of 628 undergraduate students who took hybrid of blended course format ( $\alpha = .92$ ). According to Nunnally (1978), the benchmark of a score’s reliability of 0.70 or higher is acceptable in social science research. There were no items that required reverse scoring.

For this study, the instrument was administered online by using Qualtrics©, a research online software as a pretest and posttest, after obtaining permission from the instruments’ authors. All 24-items in the scale were used in this study, without any modifications. Participants completed the pretest at the beginning of their online courses and filled the posttest at the end of dyad activity. The participants had a week to complete the questionnaire online.

### **Measuring Dyad Members Co-Regulation**

A CRL questionnaire was used to measure students' CRL after completing their work in dyads. The aim was to measure students' use of CR skills and processes in their collaborative activities in relation to individual dyad members' pre- and post-test scores. The scale consisting 19-items based on a frequency scale, response ranging from (1) *never* to (4) *all of the time*. The instrument was developed by DiDonato (2013), and her permission was obtained to use the instrument. The CRL instrument has a reported internal reliability of Cronbach's  $\alpha = 0.83$  (DiDonato, 2013). Items 14 and 19 in the scale are reverse coded. The scale was used without making any changes to it. For this study, participants were asked to fill in the survey during the last week of their dyad collaborative activity. Participants had a week to complete the survey online.

### **Measuring Community of Inquiry**

The Community of Inquire scale (CoI) by Arbaugh et al. (2008) was used to detect the relationship between students' levels of SR and their perceptions of their online course delivery based on CoI elements. The scale consists of 34-items Likert-type response, ranging from (1) *strongly disagree* to (5) *strongly agree* and consists of three constructs: teaching presence, social presence, and cognitive presence. Arbaugh et al. (2008) reported a Cronbach's  $\alpha = 0.94$  reliability for teaching presence, 0.91 for social presence, and 0.95 for cognitive presence based on a sample ( $n=287$ ) of students in the U.S. and Canada enrolled in graduate courses (Arbaugh et al., 2008, p. 135). There were no modifications made to the scale items. Students completed the survey at the end of the course and have one week to do so.

## Research Methods

### Quantitative Design

A non-experimental correlational research design using non-random sampling was employed after controlling for age and online experience to explore the predictive value of the following:

1. The pre-OSLQ variable in terms of the criterion variable post-OSLQ.
2. The pre-OSLQ variable in terms of the criterion variable CRL.
3. The CRL variable in terms of the criterion variable post-OSLQ.
4. The post-OSLQ in terms of the criterion variable CoI.

A mediation analysis was conducted to explore if CRL mediated the relationship between pre- and post-OSLQ scores. However, a separate mediation analysis to explore if post-OSLQ mediated the relationship between CRL and dyads' project grades could not be conducted, as there was very little variability in project grade (i.e., most students received A's). Students' post-OSLQ scores were examined with a hierarchical multiple regression (HMR) using students' pre-OSLQ scores as the independent variable. Students' age and previous online experience were entered as the covariates for RQ<sub>1</sub>-RQ<sub>4</sub>.

For the second analysis, a HMR was performed with the data to address RQ<sub>2</sub>. The HMR analysis aided in analyzing if students' pre-OSLQ scores predicted their CRL scores. Age and online experience were included as covariates. To address RQ<sub>3</sub>, HMR was conducted to analyze if students' CRL scores predicted their post-OSLQ. As for RQ<sub>4</sub>, HMR analysis was conducted to examine the correlation between pre-SRL scores and students' perceptions of the courses CoI.

Two separate mediation models were proposed in this study. For RQ<sub>5</sub>, this study examined the mediating role of CRL scores on individual pre-OSLQ and post-OSLQ. For RQ<sub>6</sub>, the mediation role of post-OSLQ scores on student perception of the CRL and project grade was planned, but could not be conducted.

### **Qualitative Design**

The purpose of the qualitative portion of my study's design was to document and describe the nature, quality, and variations in co-regulation skills displayed in dyads in the online learning environments. Qualitative data provided an in-depth description of the factors that impacted dyads co-regulation experience and how co-regulated learning in dyads' effort might lead to increases in SRL in some cases. The aim was to illuminate the development and use of co-regulation by the dyads. By looking in details at the dyads' interactions, the goal was to investigate the factors and strategies that enabled and constrained co-regulation. Overall, the focus was on the relationship between how the dyads co-regulated and their ultimate self-regulation and academic success.

As reported above, the study was designed to use a purposeful sampling method was used to select "people or groups on the basis of their potential manifestation or representation of important theoretical constructs" (Patton 2002, p. 238). This method has been used by other scholars studying SRL and CRL (e.g., Didonato, 2013). The focus of the qualitative analysis is: How do dyads co-regulated learning processes impacted students' independent SRL? and What were the factors that impacted dyads' co-regulation experience? Although a purposeful sampling method was initially proposed for the sample selection process, the interview was conducted based on participants who self-selected themselves to be interviewed.

Six interviews were conducted to answer RQ<sub>7</sub>. To measure students' experiences in online courses and working in dyads, a semi-structured interview protocol was created by the researcher, using Zimmerman and Pons' (1986) *The Self-Regulated Learning Interview Schedule* (SRLIS) as a guide. Interview questions focused on six categories of SR and CR strategies used by dyads in the collaborative work, including: goal setting and planning, environmental structuring, task strategies, time-management, help-seeking, and self-evaluation. Open-ended questions were composed to probe participants about their experience taking online courses. In addition, several questions probed interviewees about their experience working in dyads. The goal was to understand how dyad collaboration led to a successful, or less successful, scaffolding of students' self-regulation. Based on pilot interviews with two graduate students, several modifications and edits were made to the interview questions to ensure content validity.

**Data analysis.** Participants were divided into two groups: successful co-regulated dyads and less successful co-regulated dyads based on their experience working in dyads. The data was analyzed through several coding cycles. Participants' interviews were all audio recorded for analysis purposes. The researcher transcribed the interviews in NVivo Pro<sup>®</sup> (v.11). The software allows researchers to analyze different source of data such as interviews by creating codes, and themes that reflects the content. Furthermore, different tools such word frequency and visual representation of the data aided the analysis process for the study interviews.

The first cycle coding is known as "Initial Coding" (Strauss & Corbin, 1998, p. 102). This cycle guided the creation of different codes that reflected the data. The goal of this process is to "remain open to all possible theoretical directions indicated by your readings of the data" (as cited in Saldaña, 2009, p. 81). The adaptation of open coding method "Initial Coding," allowed the researcher to create codes that capture the meaning of the data (Saldaña, 2009). Fifty seven

initial codes were generated. Examples of the codes are: modeling, CRL advantages, dyad collaboration, educational background, challenges, resources, mode of communication, feeling comfortable, and technical tools. An example of the raw data and codes generated in the first cycle coding are presented below in Table 3.2.

Table 3.2

*Examples of the raw data, and the first cycle coding.*

Raw Data	First Cycle Coding
Wendy	1. Modeling
W:[1] We kind of got into a little bit of a ...like I said a little bit of a process where I would read and kind of put my thoughts in and like I said it was really helpful for me to kind of see the way she kind of took my thoughts and modified it and so you know just kind of like looking at the way she would write things I think I learned a lot just in her structure of how she would have been like sharing knowledge.	2. CRL advantages 3. Dyad collaboration
Nancy	4. Feeling comfortable
N: [2] No she was more than helpful and in fact there was one week that we were the first ones to post out there.	
N: [3] Right so I had thought scrapped together before Sunday was done I had my initial thoughts ready to work on with my partner because I was working some Mondays so by the time I get done with work it was almost time for us to get together and to be done on something.	
N [4] Having somebody that I could turn to without having to reach out to the professor I mean I could yes I know put something out there in the blackboard and hope some people will respond but It was good having that dyad buddy because I felt comfortable texting her you know and just as I was going on stuff you know after we had conversations on the phone and in between too.	



To re-organize the coded data from the first cycle coding, the data went through a second cycle coding method. The goal of the second cycle coding was to develop categories and a theoretical organization of the data from the first cycle, by deeming “redundancy” and drawing relationships between codes and sub-codes (Saldaña, 2009). An example of the raw data and codes in the second cycle coding are presented in Table 3.3.

Table 3.3

*Examples of the raw data, and the second cycle coding.*

Raw Data	Second Cycle Coding
Wendy	1. CRL: Help-Seeking
W:[1] We kind of got into a little bit of a ...like I said a little bit of a process where I would read and kind of put my thoughts in and like I said it was really helpful for me to kind of see the way she kind of took my thoughts and modified it.	
W: [2] so you know just kind of like looking at the way she would write things, I think I learned a lot just in her structure of how she would have been like sharing knowledge.	2. CRL: Self-Evaluation
Nancy	
N: [3] No she was more than helpful and in fact there was one week that we were the first ones to post out there.	3. Successful CRL
N: [4] Right so I had thought scrapped together before Sunday was done I had my initial thoughts ready to work on with my partner because I was working some Mondays so by the time I get done with work it was almost time for us to get together and to be done on something.	4. CRL: Planning
N [5] Having somebody that I could turn to without having to reach out to the professor I mean I could yes I know put something out there in the blackboard and hope some people will respond but It was good having that dyad buddy because I felt comfortable texting her you know and just as I was going on stuff you know after we had conversations on the phone and in between too.	5. CRL advantages

The aim was to fit the codes from the first cycle together by reducing the number of codes used and providing broader categories. As the number of codes accumulated during the second cycle coding process, a codebook was created that contained the codes, description of the codes, and examples driven from the data

After the second cycle coding, axial coding method was used as a final stage of analytical work to create categories that are linked to subcategories. The purpose of axial coding is to “reassemble data that were split or fractured during the initial coding process (Saldaña, 2009, p. 159). As a result, four factors were identified in regard to students’ successful and less successful dyad CRL and SRL: student, technical, environmental, and instructional. These factors are described in Chapter 4.

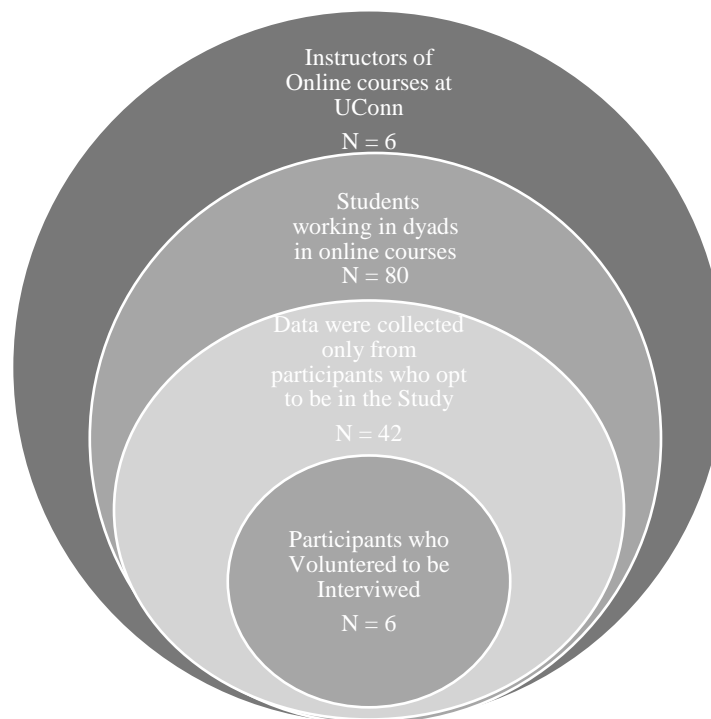
In order to establish interrater reliability, two independent and trained raters were asked to code the data individually. A training session was held with two coders. The coders were asked to rate one interview coded by the researcher, ratings ranged from (0) *disagree*, (1) *somewhat agree*, (2) *strongly agree*. The raters were given 1 score when both raters agreed on the transcribed section with its code and 0 in cases where one coder rated the data 0 and the other rated the data 2 (see Appendix H for the rating form). After summing the scores, inter-rater agreement was calculated, the raters established 89.5% agreement during the training session. The two raters and the researcher discussed the items where there were disagreement 0 versus 2. After making modifications and changes, the inter-rater agreement reached 100% between the two raters.

Each coder was then given the transcribed interviews with a sheet describing the codes created by the researcher with their definitions and examples. Coders were asked to code the interviews individually using the codes available in the coding sheet and were given the option to

create new codes under the circumstance that none of the codes in the coding sheet reflects the transcribed segments. Coders and the researcher discussed the transcribed interviews to reach 100% agreement between the two coders.

## Procedures

In order to file an IRB-1 protocol at the University of Connecticut, the researcher had to identify online courses that were offered at UConn in Spring 2016, Summer Session II 2016, and Fall 2016. Online course instructors provided a letter of support and willingness to participate in the study to be submitted with IRB-1 protocol (Appendix C). Upon the IRB-1 approval of online courses instructors to be part of the study, students were recruited from different online courses in different disciplines (see Figure 3.1). As previously mentioned, the online courses involved were: EPSY 3010, MKTG 3665, EPSY 5520, and EDLR 5360.



*Figure 3.1.* Visual representation of the study recruitment process.

The OSLQ pretest survey was administered at the beginning of the course. A week after sending the pretest, students were all assigned to dyads and were asked to participate and collaborative on their weekly tasks. The CRL survey was administered at the last week of dyads activities. The OSLQ posttest survey was administered at the fifth week. The CoI instrument was employed and participants were asked to participate voluntarily in the survey as an exit survey.

During the last week, participants were asked to voluntarily be interviewed by the researcher online for maximum 30 minutes via Skype or Google Hangouts. Six participants agreed to be interviewed and contacted the researcher to schedule the time and date. The researcher was open to any video and audio conference program interviewees wanted to use. All of the interviews were conducted online by either using Google Hangouts, or Skype programs. Interviewees were asked to sign an electronic information sheet before the interview. Then the researcher also asked for permission to audio record the interview. The interview started with questions about the participant's educational background, previous experience in taking online courses. In addition, participants were asked about their dyad activity experience and the processes that were used during their course. The interviews lasted for a maximum of 30 minutes.

### **Dyad activities in Online Courses**

In EPSY 3010, the course instructor had asked students to work in a dyad project that included two case studies that ran for six weeks. All dyads were randomly assigned to work with the same dyad member during the six weeks activity. In one group, students worked in a triad due to the uneven number of students in the course. The researcher gave out a "dyad interaction guidelines" sheet for instructor to make available for students on HuskyCT (see Appendix F). First, students had to read the case study and then post their initial thoughts on the discussion

board. Second, students had to read the course materials, the e-textbook, and go over available web-links and videos. Third, students had to discuss with their dyads in any form they want (e.g., skype, google hangouts, emails). After dyad members discussed their positions about the prompts, they posted statements that summarized their positions. In cases where dyad members had different opinions, they still posted one statement that reflected both opinions. Last, students were asked to individually read other dyad posts and individually post their final thoughts on others. Each case that dyads worked on was worth 10 points across all sets of postings.

In EPSY 3010 course, the course instructor have modified discussion activities from individual activity to dyad activity for forums 3-6. Dyads were assigned randomly by the course instructor using HuskyCT group's generator to work with their partners during forums 3-6. The same "Dyad Interaction Guideline" sheet was given to the students to direct their dyad interaction. Dyads were expected to read their weekly prompts individually, and then discuss their prompts with their partner to compose a statement that they would post in the course discussion board. Then, students were asked to provide their thoughts on two other students, individually. All four discussion posts for the course were cumulatively worth 20% of the total grade.

In EPSY 5520, dyad activity was designed to promote critical thinking. The course instructor composed three discussion threads for dyads to work on as a weekly activity. Students were given the choice to use any communication program of their choice such as Google Docs, Skype, or Facetime. Students were expected to make a minimum of two posts including a dyad initial post and individual reflection posts. The discussion threads were worth 20% of the overall grade, a rubric of the quality and criteria of students' online posts was available online.

In EDLR 5360, students were assigned randomly to dyads. Each member of the dyad had to work collaboratively during the course by composing an initial thought that combines the dyad ideas about their weekly discussion threads. During the week, each dyad member was expected to post two reflections on two other dyad groups. The activity was worth 20% of the overall grade.

In GEOG 2100, students were assigned to work in dyads for a weekly discussion thread topic. Dyads were expected to make one dyad initial post after sharing ideas and working collaboratively on their task. After the initial post deadline, each member of the dyad was expected to post a reflection on other groups post. The dyad activity was worth 20% of the overall grade.

### **Summary**

The study involved a mixed methods design, including both a non-experimental correlational study and an interview study. Results from each part of the study were used to mutually inform each other. The study results are reported in Chapter 4.

## CHAPTER IV

### RESULTS

This chapter presents the results of study. The statistical analyses conducted to answer the study's research questions will be presented. Then the results of the qualitative analyses, which report on students' perceptions of their experiences in the dyads will be discussed.

#### **Quantitative Results: Exploring the Factors Shaping CRL and SRL**

The quantitative analyses included both an exploratory factor analysis and a mediation analysis. An exploratory factor analysis was performed on the study surveys to assess the factor structure of the surveys and the possible subscales for the study's respondents (See Appendix J). Four research questions were explored using hierarchical multiple regression analyses:

- RQ1) The extent to which individual pre-OSLQ scores predicts post-OSLQ scores;
- RQ2) The relationship between individual pre-OSLQ scores and CRL scores;
- RQ3) The relationship between CRL scores and post-OSLQ scores; and
- RQ4) The relationship between the SRL scores and CoI scores.

To answer the fifth research question, a mediation analysis was conducted to detect if individual CRL scores served as a mediator between individual pre- and post-OSLQ scores. For the sixth research question, a mediation analysis was conducted to examine whether individual post-OSLQ scores mediated the relationship between CRL scores and project grades; however, because there was very little variability on project grade scores, it could not be performed.

### Data Screening

Participants with more than 5% percent of data missing were excluded from the analyses through listwise deletion procedures (Tabachnick & Fidell, 2001). Data of participants who completed only the pre-test were also excluded from the analyses. As recommended by Tabachnick and Fidell (2001), for items with less than 5% missing case data, the mean substitution method was used. After checking the data, two participants who had missing values on the pre-OSLQ (items 4 and 12). The missing values of the two participants were replaced by calculating the mean of the available cases. (See Table 4.1 for items 4 and 12 Ms and SDs).

Table 4.1 *Means and SD of Items 4 and 12*

Items	Minimum	Maximum	<i>M</i>	<i>SD</i>
Item 4	3	5	4.27	0.672
Item 12	1	5	3.76	1.044

After an initial review of the study data, thirty eight participants were excluded from the analysis because they had not completed the CRL and/or post-OSLQ, or had more than five percent missing data. As a result, the overall sample size was reduced to 42. The remaining 42 cases had less than five percent missing data. One caution in using mean substitution method is that it can narrow the variance and “change the variable’s distribution of values” (Meyers, Gamst, & Guarion, 2006, p. 53).

Several assumptions were tested to ensure the accuracy of conducting hierarchal multiple regression analysis. The data were tested for normality of distribution, linearity, and



homoscedasticity. In the case where the assumptions were not met, the analysis results may not be valid, a point that will be made explicit while reporting the results. Normality, as recommended by Stevens (2002), was checked using a Shapiro-Wilk test. Myers and Well (2010) suggested that the Shapiro-Wilk “test has good power for samples of 50 or smaller” (p. 158). For the test to be adequate, a  $p$ -value of greater than 0.05 would suggest that the data fit the normal distribution (See Table 4.2 for variables test for normality).

Table 4.2

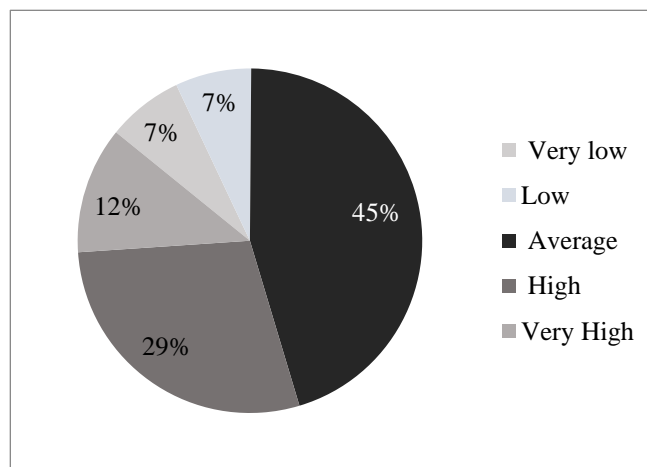
*Test for Normality on the Study Variables*

Variables	Shapiro-Wilk		
	Statistic	$df$	Sig.
Pre-OSLQ	.963	42	.187
Post-OSLQ	.956	42	.108
CRL	.970	42	.337
<b>Project Grades</b>	<b>.907</b>	<b>35</b>	<b>.000</b>
CoI	.960	28	.343

After checking the results of the initial tests for normality, the project grades variable was found to have a univariate normality violation. The sample size for the study variables was  $N = 42$  for pre-OSLQ, post-OSLQ, and CRL scores;  $N = 36$  for the students’ project grades; and  $N = 28$  for the CoI.

### Measuring Previous Online Experience

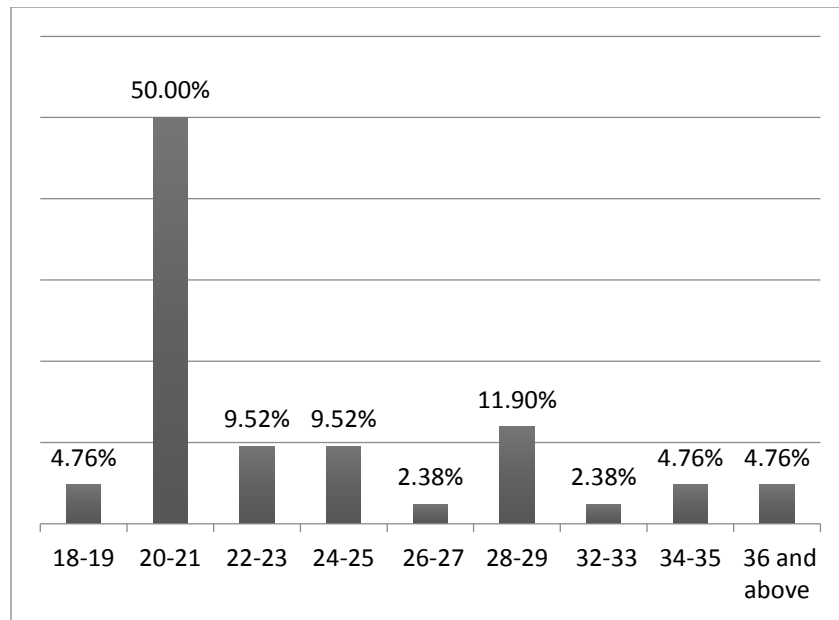
To measure students' previous online experience, one item was developed and included in the demographic questions in the first section of the pre-OSLQ questionnaire. The item stem was "How would you rate your experience in dealing with online courses?" with a Likert scaled response of 1 (very low) to 3 (very average) to 5 (very high). Forty-two participants responded and 45% rated their previous online experience as average (see Figure 4.1 for a graph of students' previous online experience percentages).



*Figure 4.1 Students' Previous Online Experience Percentages.*

### Students' Age Variable

Undergraduate and graduate students participated in the research. In the demographic questions section of the pre-OSLQ, students were asked to identify their age based on a response format having values ranging from *18-19* (1) to *36 and above* (10). Fifty percent of the 42 respondents identified their age range to be 20 - 21 years old. It is most likely that the majority of students were either juniors or seniors (see Figure 4.2 for a graph of students' age percentages).



*Figure 4.2 Age Percentages of the Study's Participants.*

### **Research Question 1 (RQ<sub>1</sub>)**

To answer the first research question a hierarchical multiple regression (HMR) was employed with pre-OSLQ total scale score, age, and previous online experience as the independent variables, and the post-OSLQ total scale scores as the dependent variable. Higher scores on the OSLQ indicates higher self-regulation. Table 4.3 presents the means and standard deviations of the pre- and post-OSLQ scores.

Table 4.3

*The Means and Standard Deviations of the Pre-OSLQ and Post-OSLQ*

Variables	N	<i>M</i>	<i>SD</i>
Pre-OSLQ	42	3.66	0.41
Post-OSLQ	42	3.67	0.54

The following research question, null hypothesis and alternative hypothesis were investigated:

*To what extent do individual pre-OSLQ score predict post-OSLQ score?*

*H<sub>0A</sub>: There will be no significant relationship between individual pre- and post- OSLQ scores after controlling for age and previous online experience.*

*H<sub>1A</sub>: There will be a significant relationship between individual pre- and post- OSLQ scores after controlling for age and previous online experience.*

As noted previously, according to the power analysis recommendation, a minimum sample size of 48 for hierarchical multiple regression with three predictors ( $f^2 = 0.25$ ,  $\alpha = 0.05$ , Power = 0.80, two-tailed) was required. After excluding missing data, the sample size was 42. Therefore, the results of these analyses should be interpreted with caution since the minimum sample size was not reached.

Before conducting the hierarchical multiple regression analysis, the correlation between pre- and post-OSLQ scores was checked by conducting a bivariate correlation analysis. The pre-OSLQ scores were strongly correlated with the post-OSLQ scores ( $r = 0.598$ ,  $p < 0.01$ ).

**RQ1 Findings.** The data were then examined with a HMR analysis. The assumption of normality of the post-OSLQ was met, as assessed by Q-Q Plot. The first block contained the age and online experience variable and the second block had the pre-OSLQ variable. The dependent variable was post-OSLQ. The analysis suggested that the regression model accounted for 40 % of the variability of the post-OSLQ scores ( $R^2 = 0.40$ ,  $p < .001$ ). The full model of age, previous online experience, and pre-OSLQ to predict post-OSLQ was statistically significant ( $F(3,38) = 8.59$ ,  $p < .001$ ,  $R^2_{\text{Adjusted}} = .35$ ). The addition of pre-OSLQ to the prediction of post-OSLQ led to a

statistically increase in  $R^2$  of 0.21, ( $F(1,38) = 13.598, p < .0005$ ). Age was not a significant predictor of post-OSLQ ( $\beta = 0.059, p = 0.093$ ). Previous online experience was not a significant predictor of post-OSLQ ( $\beta = 0.080, p = 0.326$ ). Pre-OSLQ was found to be a significant predictor of post-OSLQ ( $\beta = 0.663, p = 0.001$ ). Table 4.4 lists the coefficients for the regression model with previous online experience, age, and pre-OSLQ variables (see Table 4.5 for the correlation matrix).

Table 4.4

*Coefficients for the  $RQ_1$  Second Regression Model where Previous online experience, Age and Pre-OSLQ were the Independent Variables*

Coefficients	$\beta$	$t$	Significance (p)	95% Confidence Intervals	
				Lower	Upper
Age	.059	1.725	.093	-.010	.128
Previous Online experience	.080	0.995	.326	-.083	.243
Pre-OSLQ	.663	3.688	.001	.299	.026

Table 4.5

*Pearson Correlation Matrix among Post-OSLQ, Age, Previous online experience, and Pre-OSLQ*

	Post-OSLQ	Age	Online Experience	Pre-OSLQ
Post-OSLQ	1.000			
Age	.342	1.000		
Online experience	.063	-.505	1.000	
Pre-OSLQ	.598	.289	.098	1.000

From these results, the null hypothesis of no relationship between pre- and post-OSLQ scores was rejected. The alternative hypothesis, that the pre-OSLQ was a significant predictor of post-OSLQ scores, controlling for age and online experience, was supported. These results of should be interpreted with caution since the minimum sample size was not reached.

### Research Question 2 (RQ<sub>2</sub>)

Recall that RQ<sub>2</sub>, the following null hypothesis and alternative were examined:

*To what extent does the pre-OSLQ score predict the CRL score?*

*H<sub>0B</sub>: There will be no significant relationship between pre-OSLQ and CRL scores after controlling for age and previous online experience.*

*H<sub>1B</sub>: There will be a significant relationship between pre-OSLQ and CRL scores after controlling for age and previous online experience.*

To answer RQ<sub>2</sub>, a HMR analysis was performed on the CRL score, as the dependent variable and the pre-OSLQ, online experience, and age as the independent variables. Here too the sample size was 42. Because the power analysis recommended a sample size of 48, caution must be exercised when interpreting the results of this analysis. Table 4.6 presents the means and standard deviations of CRL and pre-OSLQ scores.

Table 4.6

*The Means and Standard Deviations of the Pre-OSLQ, and CRL (N = 42)*

Variables	<i>M</i>	<i>SD</i>
CRL	3.00	0.47
Pre-OSLQ	3.66	0.41

**RQ<sub>2</sub> Findings.** Age and online experience were entered in the first block of the HMR, and the pre-OSLQ was entered in the second block of the independent variables. The CRL score was entered as a dependent variable. Age, online experience, and pre-OSLQ only explained 12 % of

the variability in CRL ( $R^2 = 0.123$ ,  $p = 0.924$ ). The second model was not statistically significant ( $F(3,38) = 1.774$ ,  $p = 0.169$ ,  $R^2_{\text{Adjusted}} = 0.054$ ).

However, previous online experience was found a significant predictor of CRL ( $\beta = 0.189$ ,  $p = 0.033$ ). Age and pre-OSL scores were found to be not statistically significant in predicting CRL (age  $\beta = 0.049$ ,  $p = 0.186$ ), and pre-OSLQ ( $\beta = -0.018$ ,  $p = 0.924$ ) (see Tables 4.7 and 4.8).

Table 4.7

*Coefficients for RQ<sub>2</sub> Regression Model*

Coefficients	$\beta$	$t$	Significance (p)	95% Confidence Intervals	
				Lower	Upper
Age	.49	1.34	0.18	-.025	.122
Online experience	.18	2.21	0.03	.016	.362
Pre-OSLQ	-.01	-.96	0.92	-.404	.368

Table 4.8

*Pearson Correlation Matrix between CRL, Age, Previous online experience, and Pre-OSLQ*

*Variables*

Variables	CRL	Age	Online Experience	Pre-OSLQ
CRL	1.000			
Age	.048	1.000		
Online experience	.275	-.505	1.000	
Pre-OSLQ	.098	.289	.298	1.000

Based on these results, we fail to reject  $H_0$ , as age, online experience, and the pre-OSLQ, together did not significantly predict CRL scores. Therefore, the pre-OSLQ score was not a significant predictor of CRL score after controlling for age and previous online experience.

### Research Question 3 (RQ3)

Research Question 3 (RQ3) was: To what extent does the CRL score predict the post-OSLQ score?

*H<sub>0c</sub>: There will be no significant relationship between CRL and post-OSLQ scores after controlling for age and previous online experience.*

*H<sub>1c</sub>: There will be a significant relationship between CRL and post-OSLQ scores after controlling for age and previous online experience.*

To answer RQ<sub>3</sub>, a hierarchal multiple regression analysis was performed with age, previous online experience, and the CRL score as the independent variables and post-OSLQ scores as the dependent variable. Here too caution should be exercised when interpreting the results. Table 4.9 presents the means and standard deviations of CRL and post-OSLQ.

Table 4.9

The Means and Standard Deviations of the Pre-OSLQ, and CRL (N = 42)

Variables	<i>M</i>	<i>SD</i>
CRL	3.00	0.47
Post-OSLQ	3.67	0.54

**RQ3 Findings.** The data were examined with HMR analysis. Age, previous online experience, and CRL scores were entered as independent variables, using the enter method. The first block contained age and previous online experience. The CRL variable was entered in the second block. Post-OSLQ scores variable were the dependent variable. The regression model accounted for 28% of the variability of post-OSLQ scores ( $R^2 = 0.282$ ,  $p = 0.035$ ). The full regression



model of age, previous online experience, and CRL as predictors of post-OSLQ was statistically significant ( $F(3,38) = 4.963$ ,  $p = 0.005$ ), justifying the examination of the regression coefficients (Meyer, et al., 2006). The addition of CRL scores to the prediction of post-OSLQ scores led to a statistical increase in  $R^2$  of .090 ( $F(1, 38) = 4.776$ ,  $p = .035$ ). The CRL variable was a significant predictor of post-OSLQ scores ( $\beta = 0.367$ ,  $p = 0.035$ ); age was a significant predictor of post-OSLQ scores ( $\beta = 0.091$ ,  $p = 0.014$ ). Previous online experience was not a significant predictor of post-OSLQ scores ( $\beta = 0.099$ ,  $p = 0.278$ ) (see Tables 4.10 and 4.11).

Table 4.10

*The Regression Model with Age, Previous online experience, and CRL as Predictors of Post-OSLQ*

Coefficients	$\beta$	$t$	Significance (p)	95% Confidence Intervals	
				Lower	Upper
Age	.091	2.574	0.014	.019	.162
Previous Online Experience	.099	1.102	0.278	-.083	.282
CRL	.367	2.185	0.035	.027	.707

Table 4.11

*Pearson Correlation Matrix between Post-OSLQ, Age, Previous online experience, and CRL*

*Variables*

	Post-OSLQ	Age	Online experience	CRL
Post-OSLQ	1.000			
Age	.342	1.000		
Online experience	.063	-.505	1.000	
CRL	.392	.048	.275	1.000

From these results, the null hypothesis of no relationship between CRL and post-OSLQ scores was rejected. The alternative hypothesis, that CRL was a significant predictor of post-OSLQ, controlling for age and online experience, was supported. Controlling for age and online experience, for every one unit increase in CRL score, post-OSLQ scores increased by 0.367.

#### **Research Question 4 (RQ4)**

For RQ<sub>4</sub>, the following research question was proposed with a null and alternate hypothesis: *To what extent is being a good self-regulator related to students' perception of the courses CoI status?*

*H<sub>0D</sub>: There will be no significant relationship between good self-regulators and students' perceptions of the course CoI status after controlling for age and previous online experience.*

*H<sub>1D</sub>: There will be a significant relationship between good self-regulators and students' perceptions of the course CoI status after controlling for age and previous online experience.*

The total initial sample size for RQ<sub>4</sub> was 44 students; four cases had more than five percent missing data, and these cases were dropped from the sample. Cases without post-OSLQ scores were also omitted from the analysis, leaving the final sample size as N= 28. Therefore, caution should be used when interpreting the results of this analysis.

Table 4.12

*The Means and Standard Deviations of the Post-OSLQ, and CoI (N = 28)*

Variables	Mean	SD	N
CoI	3.720	.43877	28
Post_OSLQ	3.797	.46579	28

**RQ4 Findings.** The data were examined with HMR analysis. The previous online experience, age, and post-OSLQ scores entered as independent variables, and CoI scores as the dependent variable. The model accounted for 32% of the variance in CoI scores ( $R^2 = 0.324$ , adjusted  $R^2 = 0.240$ ). The regression equation was statistically significant ( $F(3,24) = 3.83$ ,  $p = 0.022$ ). The addition of post-OSLQ scores to the prediction of CoI led to a statistically significant increase in  $R^2$  of .231 ( $F(1,24) = 8.218$ ,  $p = .008$ ).

Post-OSLQ scores were found to be a significant predictor of the CoI score ( $\beta = 0.506$ ,  $p = 0.008$ ). Neither age ( $\beta = 0.007$ ,  $p = 0.851$ ) nor previous online experience ( $\beta = 0.062$ ,  $p = 0.462$ ) were found to be not statistically significant predictors of CoI (see Tables 4.13 and 4.14).

Table 4.13

*Coefficients for RQ4 Final Regression Model*

Coefficients	$\beta$	$t$	Significance (p)	95% Confidence Intervals	
				Lower	Upper
Post-OSLQ	.506	2.867	.008	.142	.870
Age	.007	.190	.851	-.066	.079
Previous online experience	.062	.748	.462	-.109	.234

Table 4.14

*Pearson Correlation Matrix between CoI, Age, Previous online experience, and Post-OSLQ*

*Variables*

	CoI	Age	Online experience	Post-OSLQ
CoI	1.000			
Age	.150	1.000		
Online experience	.131	-.575	1.000	
Post-OSLQ	.561	.371	-.007	1.000

From these results, the null hypothesis of no relationship between post-OSLQ and CoI scores was rejected. The alternative hypothesis, that being a good self-regulator as measured by the post-OSLQ was a significant predictor of CoI, after controlling for age and previous online experience, was supported. The post-OSLQ score was a significant predictor of CoI ( $\beta = 0.506$ ,  $p = 0.008$ ). However, caution should be used when interpreting this result as the sample size was not adequate.

### **Research Question 5 (RQ<sub>5</sub>)**

For RQ<sub>5</sub>, the following question was proposed with a null and alternate hypothesis:

*To what extent do individual CRL scores mediate the relationship between individual pre- and post-OSLQ scores?*

*H<sub>0E</sub>: Individual CRL will not mediate the change of individual pre-and post-OSLQ scores.*

*H<sub>1E</sub>: Individual CRL will mediate the change of individual pre- and post-OSLQ scores.*

***RQ5 Findings.*** The Baron and Kenny (1986) method was used to answer this question. In this method, a variable functions a mediator when the following are observed: variations in the independent variable, pre-OSLQ score, are related to variations in the hypothesized mediator variable, CRL scores; when variations in the hypothesized mediator variable, CRL scores, are related to variations in the dependent variable, post-OSLQ score; and when the independent variable, pre-OSLQ score, and presumed mediator variable, CRL scores, are controlled for, a previously significant relationship between the independent variable and dependent variable is no longer significant. The Baron and Kenny method requires estimation of four separate regression equations: (1) regressing the presumed mediator on the independent variable, (2) regressing the dependent variable on the independent variable with no potential mediators included, (3) regressing the dependent variable on the independent variable with potential mediators included and (4) regressing the dependent variable on the presumed mediator variable. The results of these tests provide an indication of the amount of mediation by subtracting the values obtained from equations 2 and 3. This reduction in effect can be formally tested and is approximately distributed as  $Z$  ( $H_0$ : Reduction in effect = 0).

No support was found for the mediating role of CRL on the relationship between pre-OSLQ and post-OSLQ. Specifically, results for equation (1) of the Baron and Kenny method were not significant. Results indicated that pre-OSLQ was not significant predictor of CRL, ( $b = 0.1239$ ,  $SE = 0.1867$ ,  $p = 0.5105$ ). Thus, no additional regression equations were run. As noted in the methods section, sample size is a concern ( $N = 42$ ), and the study is underpowered to detect mediation effects.

**Research Question 6 (RQ<sub>6</sub>)**

For RQ<sub>6</sub>, the following research question with a null and alternate hypothesis was examined: *Do individual post-OSLQ scores mediate the relationship between individual perceptions of CRL and project grades?*

*H<sub>0F</sub>: Individual post-OSLQ score will not mediate the change of CRL score and project grade.*

*H<sub>1F</sub>: Individual post-OSLQ score will mediate the change of CRL score and project grade.*

**RQ<sub>6</sub> Findings.** The Baron and Kenny method was planned for this research question, but could not be performed due to a lack of observed variation on the dependent variable, project grade. A plotting of the project grade variable, and the use of the Shapiro-Wilk test of normality, confirmed that grades were clustered toward the top of the grade distribution, meaning that most students received A's. No further mediation analysis was performed.

**Qualitative Analysis:****Students' Perceptions of their Dyad Experiences**

The last research question examined CRL processes and factors that influenced dyads' successful CR and explored the factors that hindered CR between dyads. In this study, six individual dyad members were interviewed to understand the phenomenon of CRL. A semi-formal interview protocol was conducted by the researcher that was designed to find out about students' educational backgrounds, online experience, nature of interaction in their dyads, and use of CRL and SRL processes. In the final coding cycle, themes were generated to represent a holistic view of CRL experience.

***RQ7 Findings.*** Overall, the qualitative data provided rich examples of how students used self-regulation and co-regulation to meet their learning needs. Dyad members, for example, used certain strategies that helped their task completion as part of their self-regulated learning. Research suggests that students who are better in SRL use multiple learning strategies that facilitate their learning to achieve their goals (Paris & Paris, 2001). One strategy that was common across dyad members was the use of an outline to accomplish the task. Another strategy that was identified was the use of color coding to differentiate different topics and to highlight important ideas. For example, Jenna liked to draft an outline of what she was expected to do in her task. By doing so, she could organize her work load and make sure to meet the task requirements. Jenna said, “usually, for this class I printed out the rubric and kind of later draft an outline like day one and kind of went from there trying to do little parts each day.” Wendy outlined her task to work on small parts on a daily basis. She stated that she was “trying to get a whole outline and going back and working on pieces of it rather than doing a chunk.” Other students highlighted and color coded their tasks to differentiate between different topics and tasks deadlines. Sarah stated, “I have three online courses right now so I use three different color pens so that's one thing I do because it helps me visualize.”

In addition, students who were better self regulators tended to reach out to others for help when faced by difficult tasks more frequently than their peers (Butler, 1998). Since students worked in dyads, it was expected that dyad members would seek help from their partners. It was

found that in less successful dyads, learners asked for help from others rather than their partners. This indicates that dyad members have used SR processes rather than CR processes either because they did not get along with their partner or because their partner did not want to be involved in helping. Jenna tried to create a group of learners who help each other with questions and concerns regarding their tasks and when she asked her partner to join, Jenna stated that “I asked my partner if he wanted to join us but he did not so it was just another small group of us.” This could be another form of CRL that occurred between students outside of the dyads.

### **Finding from Coding Cycles**

Several coding cycles were conducted to investigate the nature of CRL in dyads’ shared activities that either hindered or empowered individual students’ SRL processes. Four factors emerged from successful and less successful dyads that represented an overall view of dyads’ experiences. The factors that were identified are social, factors, environmental, and instructional.

Students’ social factors are related to dyad members’ personal traits, feelings, characteristics, and collaboration during dyads’ work on their shared task. The factor covers CRL and SRL processes that students used in their learning. While this factor includes CRL and SRL processes, the extent that the interviewed students used these processes differs dramatically from successful to less successful dyads. Successful dyad members used CRL process more often compared to the less successful dyad cases. Moreover, students’ social factors were found to be the main factor that impacted dyad members’ CRL experience.

Technical factors are related to all the programs and tools that students used during collaboration. This includes video call conference programs, web-based applications for shared documents, and time-management tools. The technical factor served as a medium in dyads’ communication.



Environmental factors frame students' online learning environment experiences, which includes their frequency of logging in to the learning platform, their ability to navigate the environment, and their attitudes towards online courses. The instructional factors are related to instructors' practices and teaching methods in delivering their course content online. This factor reflects students' perceptions and experiences of instructors' teaching practices.

After identifying the underlying factors that impacted students' CRL and SRL learning experience, two broader themes emerged from the data analyses. The themes classify dyad members with a successful dyad experience as "thrivers," and those with less successful dyads' experience as "battlers." We will first turn to the successful dyads, the thrivers, who were supported by their partners in overcoming challenges to achieve a positive co-regulation experience. In describing the thrivers, the focus will be on how the four factors above – social, technical, environment, and instructional – played out in their collaborations.

### **Thrivers**

The premise of dyad collaboration is to provide students with the opportunity to co-regulate each other's learning and, therefore, scaffold their individual self-regulation. After examining the data and analyzing it, several factors have emerged showing how successful co-regulation practice emerged from working in dyads. Students' social factors were found to be related to the practices and characteristics of dyad members that led to successful co-regulation. Three successful students -- Nancy, Mike, and Steven -- reported having positive experiences working in dyads.

When asked about their experience working in dyads, Steven stated "it was actually a great experience." Students were satisfied and pleased to have that opportunity, as they all identified that it was their first time working in dyads in an online course.

One key element in successful dyads' interaction was the level of contribution that each member of the dyad put into their shared project. For the thrivers, each member equally shared responsibility for, and contribution to, the dyad's work. This led to increased mutual scaffolding and on-going guidance. Nancy stated that "I actually feel that we are equally committed and I was extremely excited about that."

In CRL, it is not only an equal level of contribution that is important; the collaboration should also be effective. Effective collaboration, it is argued, influences the cognitive processes of the peers working together (Dillenbourg, 1999, p. 12). Mike mentioned that he and his peer contributed equally, and that their ideas and thoughts came as a result of a deep cognitive process through interaction:

It was fully 50-50, which was nice. You know, fully 50-50. We kind of gave each other roles on what we are going to do. So "okay, you look at this in more details and I will look more in this," and then we kind of came together and talked about it and then drafted something up and revisited it and posted it."

Steven's comments resonate: "I mean, overall, the work was divided up evenly, and to be honest we worked very productively."

Equal levels of contribution in a dyad led to positive attitudes toward dyad collaboration. As dyad members developed full understanding of their shared responsibilities, this helped to create positive attitudes towards collaboration and future collaboration opportunities. Steven stated that "If I am assigned somebody I was working with that is very helpful and is productive and gets their work done, it's sure be a great experience." Nancy stated:

I want to tell you how grateful I am that you have done this with Dr. Tyler and I am hoping that he goes and incorporates the dyad into his course ... I think it was a very beneficial piece for the course and I think it adds a lot of value.

Several CRL strategies that dyad members adapted and used while working on their shared task were explored. In this study, CRL strategies align with the research of Zimmerman and Martinez-Pons (1986, 1988), in their description of SRL strategies. The four strategies that have been used across successful dyads were: (1) goal setting and planning, (2) time-management, (3) self-evaluation and; (4) help-seeking.

As soon as successful dyad members started working on their shared tasks, they set their learning goals together. Dyad members agreed on a weekly plan to maintain their learning intentions and goals. Planning is related to students' actions and the effort used to pursue their desired learning goals (Boekaerts, & Corno, 2005). Nancy said, "We had the readings released on Sunday we agreed on every Monday we were going to get our posting done and we both stock and you know that was very helpful." Although setting task goals and planning was essential between dyads at the beginning of their task, it was less used at the end of the task completion stage. Mike explained the plan that he and his partner adapted:

The first thing we did when we saw the release of the work at what we had to do, we told each other, "Okay Sunday and Monday, whatever you had time to read, read the stuff." We would always come together on Tuesday for our initial post so we would read, take notes, we shared a Google doc where we put all our thoughts into and uploaded notes that we talked back and forth on and then we had Google hangout at Tuesday.

To ensure the effectiveness of CRL, both dyad members had a shared goal that guided their practice. Mike stated that, “I definitely enjoyed it and what I took away from it is being able to use a fellow colleague who is a teacher in another building and working with each other for a common goal and a common result.”

The second CRL strategy that dyads shared was time-management. Dyads made sure that they used their time effectively together. The aim was to meet their partners’ expectations since they shared equal commitment. Steven and his partner had agreed to meet every Friday: “That specific dyad day for us was on Fridays.” Nancy had to ensure that she was prepared by the time she met her partner by keeping track of her own time. She stated:

I had thoughts scrapped together before Sunday was done, I had my initial thoughts ready to work on with my partner because I was working some Mondays. So by the time I get done with work, it was almost time for us to get together and to be done on something.

The third strategy that dyads adapted while co-regulating their learning was self-evaluation. As a natural step towards successful outcomes, it was important that dyad members constantly asked their partner for feedback on their work. This helped dyad members to ensure that their understanding of the task was correct. One implied feature of successful dyads’ co-regulation and collaboration was openness. Partners had to be willing to be open, to ask each other for feedback on their work, and to check on their comprehension of the shared task. At the same time, partners needed to communicate their disagreement or correct each other’s work in a non-offensive way. Collaborative work requires dyads to have sophisticated communication skills (Ding & Flynn, 2000). Dyads were comfortable in reaching out to their partners to ask for

a second opinion and have their input on the work. Mike stated that, “We checked in daily with each other on stuff that was going on.”

Along with self-evaluation between dyads, dyad members also exhibited help-seeking behavior. Not only did dyads reach out to their partners to check their work quality, but they also asked for help when they were faced challenges in their task completion process. When Steven had a problem in writing about a topic related to the dyad project paper, he said:

I had no idea what was going on with the sort of that strategy portion of the paper. I didn't really know what to incorporate in there, and I met with Olivia and I told her, I said, “Hey listen, I had some issues here, trying to figure out how to approach this section of the paper.” She helped me through it. She discussed with me some of the topics she would recommend incorporating into the paper, and she helped explain so I could understand those topics.

This suggests that co-regulated learning occurred between the dyad members through their support of each other, with members reinforcing each other's learning on an ongoing basis. Dyads constantly evaluated their understanding of the tasks and content by reaching out to their partners. Mike stated:

If we talked about it then it clicks. If I missed something or she missed something, we would both help reinforce that material for one another and what we just read. So that was very beneficial; to have that second set of eyes on all the resources...so that was one thing I did. I asked my dyad partner, “Hey, am I on the right track with this?”

In addition, the thrivers felt comfortable reaching out to their partners because they had a positive relationship with one other. This allowed the students to engage more often with each other and have a strong learning community. Nancy claimed:

Having somebody that I could turn to without having to reach out to the professor, I mean, I could do that, yes, put something out there in the Blackboard and hope some people will respond. But it was good having that dyad buddy because I felt comfortable texting her, you know, and just as I was going on stuff, you know, after we had conversations on the phone and in between too.

Co-regulated learning in online learning occurred through the use of several collaborative tools that enabled dyad members to communicate and work together rapidly. Dyads used several programs that provided flexibility and supported their co-regulation, including Google Docs and Google Hangouts. The dyads used Google Hangouts to conduct their online meetings with their partners and used Google Docs to create a shared document while they work on their projects and to exchange outside resources that were geared towards their work. Steven stated:

I found a link from Facebook advertisements, and they were highlighting types of advertisements that they use for their social media platform. What I did is I would share that link on a Google docs that we had for our group, and [my dyad partner] would take a look at it and offer her thoughts on it.

The third factor that emerged from dyads' co-regulated learning concerned environmental factors, which related to the online learning experience and the virtual learning environment. Since all students were at UConn, they used HuskyCT – which uses Blackboard -- for their

courses. Successful dyads frequently checked their courses online by logging in multiple times a week. They were able to navigate the environment and easily locate their tasks.

The last type of factor that was found to impact dyads' co-regulated learning concerned the instructional practices of their online instructors. Dyads' co-regulated learning was found to be related to instructors' guidance, activities, teaching, and task selection. Students acknowledged the instructor's role in facilitating the dyads' leaning.

One instructional practice that was preferred by dyads was the use of video. Dyad members were able to have control over the videos of instructors by pausing and repeating part of it as needed. Also, the accessibility of instructors allowed the dyads' members to communicate their concerns and questions with their instructors. Nancy stated:

Dr. Rolando was very good if you emailed him or wrote on the discussion board, he got back right away... I liked how he uploaded videos so I was able to pause take some notes analyze stuff and then continue and resume.

The thrivers reported that instructional factors had a considerable impact on their success in co-regulated learning in their dyads. Providing clear guidance and expectations at the beginning of the course reduced the feeling of confusion between dyads. The more an instructor provided students with clear expectations, the more likely the dyads were to spend time on co-regulated learning processes rather than trying to figure out what they are supposed to accomplish. Since the courses were delivered online, the use of collaborative tools was essential in supporting dyads' communication and co-regulated learning.

**Battlers**

Three less successful dyads' members were interviewed to identify the factors that impacted their experience in CRL: Sarah, Jenna, and Wendy. Here too social, environmental, technical, and instructional factors played into their stories. The most significant factor for the battlers involved social factors, most notably experiencing negative feelings and wasting time due to a perceived imbalance between partners. Dyad members who had negative relationships did not agree most of the time. Moreover, their communication was not geared toward constructing knowledge, but rather on finding common ground.

The very nature of co-regulated learning and collaborative work requires that students build and maintain positive relationships with their partners in order to successfully communicate with each other. Failure to communicate with partners can lead to a negative relationship between dyad members that diminishes the potential and perceived value of co-regulated learning. Battlers repeatedly pointed out that they had different perspectives on their shared tasks. This created challenges between members since they interpreted their tasks differently. This led to an atmosphere of devaluing each other's ideas. As Sarah explained, we "just really did not see eye to eye, it was more like she would shoot down my ideas and sometimes we would interpret the dyad question for that week differently."

This mismatch between dyad members had a negative impact: the learning process was stressful and time consuming. Dyad members spent more time on negotiating the meaning of the prompts than sharing ideas and contributing to the work. Additionally, as Salomon and Globerson (1989) assert, to some individual members, group work was seen as a source of aggravation, a waste of time, and led to feelings of discouragement.



Sarah stated, “Lots of times it was more stressful for me and I felt like it was like wasting a lot of time each week talking with my partner.” Furthermore, dyad disagreement led partners to compromise on their work. Sarah related, “I really just felt like sometimes my work and hers was compromised because we couldn’t agree.” Dyads, in order to function, should have some level of acceptance. If a dyad member does not like or act respectfully toward their partner, this can lead to frustration. Sarah explains:

I was not a big fan of who my dyad partner was, I liked the dyad idea. But I feel I would pick a different partner next time, this could been a completely different experience for me if I [could] have had a different partner.

This suggests that the effectiveness of co-regulated learning is influenced by the choice of partners. All three of the battlers reported being open to co-regulated learning, but because of who they worked with, it was not effective r. Jenna stated, “I think it would [have] been better if I had a different partner.”

Learners have different characteristics and preferences while learning; as Sarah stated, “it depends on the personalities and the way people work and learn.” Some learners prefer to work on their tasks by themselves and have full autonomy and control over what to do and when to work. When paired with students who have different preferences, instructors need to use strategies to help dyad members negotiate productive relationships. Left to their own devices, the dyads can simply become dysfunctional.

Moreover, students who are working with each other need to take the same level of responsibility and contribute equally. When students are assigned to groups, members need to find a common ground; otherwise, the collaboration can be stressful. Both members, for

example, should understand their respective duties and should work hard to accomplish their work. It is especially true if both dyad members are receiving the same grade for the work. As Sarah explained: “there are always people who don’t do their share and, you know, sometimes when you disagree with people you kind of worry about your grade if you don’t get enough of your ideas.”

A second theme in the battlers’ stories was related to the fact that students were in different locations and time zones around the world. Therefore, working with a partner on a shared task could cause difficulties if dyad members did not find a time slot that worked for both members. This did, at times, lead to minimized co-regulated learning between members. When Jenna was asked about the challenges she faced working with a partner, she stated that part of the problem lay in “being in a different time zone than my partner was... he was actually out of the country for the first half of the online course which was a struggle for us to get together and communicate.” Although the difference in time zones caused some challenges, this did not devalue later work quality between dyad members. Jenna followed up and claimed that the discussion’s depth was not impacted by the earlier lack of communication. She stated that, “Content wise, I feel like everybody kind of have the same discussions with their partners based on what level they teach.”

A third theme in the stories of the less successful dyads concerned the way that co-regulated learning strategies were implemented by the dyads. Less successful dyads reported more use of goal setting and planning, as well as time management, and less use of other CRL strategies such as help-seeking. As stated earlier, a dyad’s relationship had an impact on the type of co-regulation processes used. Dyad members who did not have positive communication with their partners contacted other students in their course or found other resources to help

themselves. Research demonstrates that reciprocal engagement of ideas is an important aspect for dyads' progress (Phelps & Damon, 1989). If dyads did not engage and were not open to accept each other's ideas, co-regulation fails.

Among the less successful dyad members, problematic relational issues often occurred when one dyad members did not show interest or intent to collaborate. This could decrease the use of co-regulation learning processes and limit the benefit of CRL. Students who do not show a strong commitment to collaboration have been identified as having an "intersubjective attitude" (Crook, 1996, p. 116).

Dyad members in less successful dyads focused more on their own self-regulation skills such as goal setting, planning, environment structure, task strategies, time-management, and help-seeking outside of the dyad. Less successful dyad cases have used words such as "I" instead of "we" to represent their disconnection and lack of co-regulation with their partners. For example, Jenna said that one thing she did as part of her goal setting and planning was to try to finish her readings before working on any task:

I try to set specific times like I would make myself like a schedule for the day and kind of as if I had to go to class I say like, "This is my window on when I am going to try to study and get all my online stuff done." So I tried to plan it around other stuff that I wanted to do.

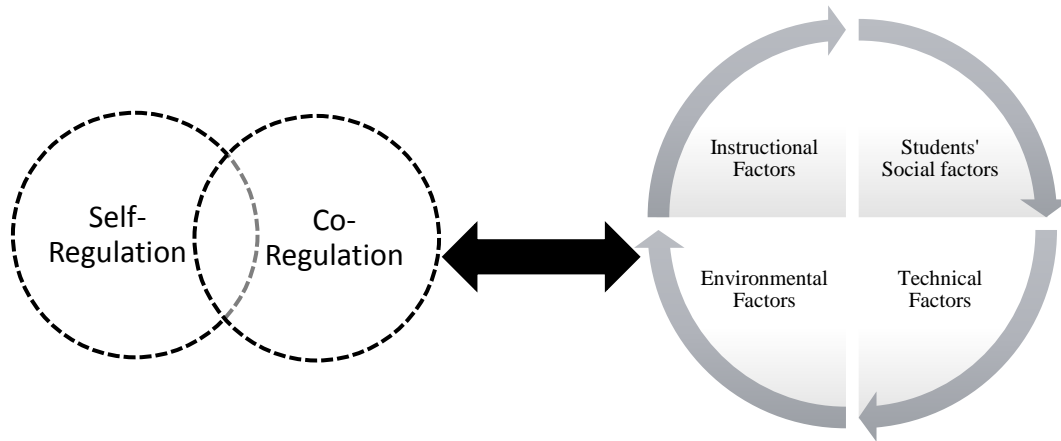
Dyad members were aware of their environment while learning. By the nature of online course work, students were aware of their surroundings and thus avoid places where distractions could occur. When it came to self-evaluation, less successful dyad members did not contact their

partners. Instead, they either reached out to other class colleagues or reached for their instructor's guidelines.

### **Self-Regulation Time-Management**

In any learning environment, whether a traditional or online learning environment, time management is an important skill of which learners should be aware. Since the online students are at a distance, there is a need to constantly dedicate sufficient time for task completion. Learners should use available tools to enhance their ability to manage their time. There are several tools that students could benefit from, such as traditional calendars and electronic calendars. Sarah stated "at the beginning of the semester I like write down on a calendar all the deadline - like things that are due." Wendy mentioned that "originally in class we set up a google calendar for the class."

In sum, in order to understand the complex nature of CRL processes, several coding cycles were conducted to explore what factors may have impacted dyads' CRL experiences. It was found that there were four main factors that have emerged from data analyses: social factors, technical factors, environmental factors, and instructional factors. These factors impacted, directly or indirectly, dyads' CRL and SRL experiences. Although all of these four factors mattered, students' social factors were found to be the main factors that contributed to dyads' successful or less successful experiences (see Figure 4.3).



*Figure 4.3* Factors that were found to have an impact on dyads' CRL.

Thoresen and Mahoney (1974) suggested that SRL is not a fixed trait because it varies in degrees based on the social and physical context. In this study, co-regulated learning was found to differ across dyads, depending on a variety of factors that influenced dyads' interactions. In addition to the environmental, personal, and behavioral influences on students' SRL (Zimmerman, 1989), it was found that the students' social factors impacted learners' degree of effective CRL within dyads. Students' characteristics and traits during dyads' collaborative task had a great impact on CR effectiveness.

### **Limitations**

This is a preliminary, exploratory study of a larger program of research designed to focus on characteristics of successful regulation processes that may lead to greater retention, academic achievement, and student satisfaction in online courses. Several limitations of the study should be noted.

First were limitations associated with the sample size, including the threat of mortality, or the loss of study subjects. Students were recruited from a university setting and participation attrition was expected. The researcher made every possible effort to have a robust sample size so as to decrease the effects of anticipated attrition. The researcher provided \$200 in raffle cards to participants upon the completion of the study questionnaires. The researcher contacted up to 200 online course instructors at UConn to ask them to support the study and allow data collection in their courses. Only six instructors agreed to be part of the study. Within the first week of the study implementation, one instructor with 60 potential participants withdrew from the study due to technical limitations that hindered students' mathematical collaborative work. Although, the researcher suggested different solutions and alternatives, the course instructor's decision to withdraw did not change. The researcher then contacted different faculty members face-to-face and online, in Saudi Arabia and in the U.S., to expand participant pool. No additional instructors agreed to participate.

In the end, the total number of students recruited for the study from the four courses was approximately 80 participants. After including only the complete cases of students, the sample size dropped to 42 students. As noted throughout this dissertation, the sample size was below the minimum for adequate statistical power.

A second limitation of the study concerns the use of self-report instruments, which raise questions about reliability and validity, including social desirability effects (Thorndike, 2005). Participants might have intuited the appropriate responses and reported what they thought the researcher (or their instructors) wanted to hear.

A third limitation concerns the researcher's effect on participants. To reduce the potential for researcher influence, the participants were not contacted by the researcher during the study

implementation. Courses instructors communicated with participants and sent out study announcements and surveys. However, this also raises issues about the study fidelity. The researcher was not able to monitor any of the online courses due to students' confidentiality issues and concerns.

Another important limitation in this study concerned the characteristics of the participants, which included graduate and undergraduate students in higher education. For future studies, it is recommended to examine only undergraduate students' SRL and CRL enrolled in the same subject area to eliminate any confounding factors that could have impacted the study results. For example, the study results could differ if the study sample included only undergraduate students and if the online courses were all in the same subject area. Therefore, future work could enrich the field of SRL and CRL by investigating dyad activities that are designed for undergraduate students in similar subject areas.

Finally, testing was a threat in this study because participants may have been affected in anticipated responses on their posttest due to the pretest. The same items on the pre-OSLQ were in the post-OSLQ in a short period of time. This might have impacted participants' performance on the post-OSLQ, rather than the dyads' CRL activity. It is recommended that scholars should expand the study design from one a one group-design to a two-group design. This would decrease testing as a threat to the study.

### **Summary**

Several analyses were conducted to answer the study's seven research questions. From these results, pre-OSLQ score was a significant predictor of the post-OSLQ score, after controlling for age and previous online experience. In RQ<sub>2</sub>, pre-OSLQ score was found to be not a significant predictor of CRL score, after controlling for age and online experience. Results of

RQ<sub>3</sub> suggested that CRL was found to be a significant predictor of post-OSLQ, after controlling for age and online experience. However, with regard to RQ<sub>4</sub>, results revealed that post-OSLQ score was a significant predictor of Community of Inquiry.

Exploratory mediation analyses did not confirm the mediating role of CRL in the relationship between pre-OSLQ and post-OSLQ. Moreover, post-OSLQ was not found to be a mediator between CRL score and dyads' project grade since CRL was found not significantly related to project grade. In RQ<sub>7</sub>, six interviews were analyzed to detect factors that impacted dyads collaborative work online, it was found that four main factors have impacted dyads' interactions: social factors, technical factors, environmental factors, and instructional factors, although social factors appeared to be of higher import than the others. Theoretical implications of the findings are discussed in next chapter.



## **CHAPTER V**

### **DISCUSSION AND CONCLUSIONS**

#### **Introduction**

This chapter summarizes the results of the study, presents conclusions that could be drawn from the study results, and offers several recommendations and directions for future research. The overall purpose of this study was to investigate characteristics of online learning experiences that may lead to further learning and higher completion rates. This study examined the correlation between dyads' co-regulation (CR) in a collaborative task designed by online instructors, and individuals' self-regulation (SR) and academic achievement measured by dyads' project grades. Furthermore, the study investigated the correlation between dyad members' self-regulation and their perception of the online course delivery based on CoI framework elements. Six online courses were recruited for this study. The Digital Marketing course (MKTG-3665), was recruited twice, in Spring and Fall of 2016. The other four online courses were taught by different instructors in different subject areas: Educational Psychology, Instructional Design, Leadership in Sport Organizations, and Economic Geography.

Theoretical frameworks and epistemologies have directed the study development and implementation. The work of the Soviet sociocultural theorist Vygotsky (1980) has directed the study framework. According to sociocultural theory, knowledge is constructed through the interaction that takes place in a social cultural context (Lave & Wenger, 1991). In order to create the social cultural context in the online courses, students were assigned to work collaboratively together in the virtual environment HuskyCT. To align with sociocultural theory, views of co-regulated learning by McCaslin and Hickey (2001) were adopted for this study. As a result, joint activities that fostered dyads' interaction were developed. The aim of dyads' shared activities

was to provide shared goal coordination opportunities that could foster CRL and SRL. A correlational analysis was conducted to better assist in understanding the relationship between students' SRL and their views of the effectiveness of their online course based on CoI framework elements (Garrison, Anderson, & Archer, 2000). The aim was to understand how students viewed their online learning context and to provide insight on how the course delivery hindered or helped students' development of their SRL skills. Students' interaction with each other through CR, their individualistic SR, and their perception of the online course delivery all contributed together to provide a holistic understanding of how educators can promote students' use of SRL and CRL processes to succeed academically.

### **Findings**

Researchers have suggested that CR provides social and cultural enrichment that helps in the development of SRL (McCaslin, 2009, McCaslin, 2004; McCaslin & Burross, 2002). While there may not be enough evidence and connections in the literature between students' SRL before and after CRL activities, it is hypothesized that students' SRL, prior to the dyads' activity and after, would be correlated and that the pre-OSLQ will predict the post-OSLQ.

In the online learning environment, autonomy and self-regulation are critical factors for succeeding in online learning environments (Barnard et al., 2009). Students' SRL skill was measured before working in dyads to detect their entry SR in online courses. In promoting students' self-regulation, sociocultural theories emphasizes the role of students' prior knowledge, processes and skills (Harris & Pressley, 1991; Vygotsky, 1978). Therefore, pre-OSLQ was administered to measure students' prior processes and OSLQ was administered as posttest to measure students' current skills and processes after working with a partner. Although students' SRL was measured at the beginning of the online courses, it should be noted that SRL is not a

static trait. Therefore, scholars should adopt different measures to detect students' SRL in different stages of their task completion. For example, adopting time series analysis by which time correlations of students' SRL before, during, and after working on their task (Shumway & Stoffer, 2016) would provide more insight into what SRL processes were adopted at different stages.

After students' SRL was measured, students were randomly assigned to work collaboratively in dyads in their online course. Students were not assigned to work with each other according to any parameters such as their prior knowledge or experience; instead, they were randomly grouped in dyads. The course instructors gave dyads the option to use any collaborative communication program or tool to work with their partners during their shared activity. Dyads were encouraged to meet on a weekly basis for 15-20 minutes through video conference calls. This suggestion offered students the ability to build their social presence and reduce the lack of facial and emotional expressions typical to online learning environments. Dyads used several collaborative tools such as Google Docs, and discussion boards, and blogs in HuskyCT, to plan and share their ideas and responses. Although the recruited courses for this study were offered in different semesters and sessions, the study duration in all the online courses did not exceed a 6-week period. Instructors were asked to follow up with students and to provide their feedback in a timely manner. As part of protecting the study participants, the researcher was not added to any of the online course platforms. After students worked in dyads for a 6-week period, their SRL was measured again. Several researchers suggest that peers could provide regulatory scaffolding to their partners (Perry, Vandekamp, Mercer, & Nordby, 2002).

Online course instructors are advised to create critical thinking activities and problem based learning cases in online learning environments for dyads to work on. The development of

such activities would support CoI framework by fostering teaching presence, social presence and cognitive presence. Teaching presence is linked to the clear and consistent guidelines of the course activities, deadlines, and content. Instructors are expected to be SR in their own teaching by managing, directing and facilitating students learning. The instructor presence is critical in facilitating online learning by modeling discourse and providing feedback (Fabro & Garrison, 1998). Instructors should ensure that their activities are clear and explicit with specifications related to the time and date of the activities and a rubric that set the expectation of the task.

Students' interaction with each other through the shared activity and video conference programs reduces the sense of isolation that online learners might encounter. Shared activities offer students CR opportunities. To ensure the shared responsibility between dyads members and trust, shared activities should be graded as a group work. This would ensure that the dyad members have a shared goal and communicate with each other. The aim is to create deep level of learning opportunities and allow dyads to negotiate and discuss the task, rather than surface level of communication such as dividing the task.

Shared activities allows students to move through the learning process by sharing their knowledge and understanding of the content with a community of learners. This is clearly related and linked to the third CoI key element which is cognitive presence.

### **Self-Regulation Strategies**

Researchers have suggested that SRL processes can help students to develop better learning habits and skills (Wolters, 2011), improve their achievement level (Boekaerts et al., 2000), and control their education. Creating shared tasks and activities for students to work on allowed students to collaborate and work toward a shared goal by regulating their learning as well as their partners' learning. Examples of forms of regulatory support between students are;

goal setting, planning, elaboration, evaluation, and monitoring. Although the goal of this study was to examine the correlation between CRL and SRL, students' use of SRL processes during a task completion should be examined in future research. By identifying SRL strategies that are strong predictors of students' academic achievement, instructors could benefit from these findings by creating optional activities that support students' use of these SRL strategies. For example, instructors could create short multiple choice questions at the end of their weekly online module to ask students about their task completion for that week. This activity would provide online learners with several benefits: 1) opportunity to evaluate their work and progress; 2) reinforce their participation in case they missed any tasks and 3) adjusting their goals and constantly monitoring their learning.

Although dyads were randomly assigned in this study using HusyCT group generator tool, the importance of grouping students based on their prior SRL levels have been emphasized in previous studies. Scholars found that low SRL students could improve their learning by working with high SRL students (Pintrich, 2000; Winters & Azevedo, 2005). To be able to succeed academically, students in groups should have mutual and shared responsibility in their learning. The heterogeneity of the group members allow group members to be better fitted for a complex learning environment (Rozendaal, Minnaert, & Boekaerts, 2005). For future studies, it is recommended to examine students' prior SRL skills and processes and then group students based on their SRL levels. This grouping mechanism would provide lower SRL students the opportunity to scaffold their partners' use of SRL skills, and learn to be better regulators in the future. In this study, the dynamic of groups was found to be an important factor in CR. In future studies, it is recommended that groups should be generated based on students choice and preference to who they want to work with. This technique could result in a different CRL

experiences for students, as they may feel they have prior knowledge and experience of working with their partners, as it was found in this study that students' social factors have impacted dyads' experiences.

A considerable body of research has examined different methods and ways to better assess students in adapting SRL skills, from training students on think-aloud protocol (Azevedo & Comley, 2004) to adapting support tools (Narciss, Proske, & Koerndle, 2007). However, there is a lack of empirical evidence about examining how SRL is affected by fostering social interactions through CRL. Thus, further research is needed to explore the role of CRL on the development of students' SRL. It is important to investigate the role of the social context and interaction between students measured by CRL and its impact on students' SRL (McCaslin & Good, 1996; McCaslin & Hickey, 2001).

### **CRL within Shared Activities**

In SRL, students are expected to employ processes that direct their learning by taking control over their learning (Zimmerman, 2008). However, CRL occurs between two or more members working together toward a shared goal (De Jong et al., 2005; Winters & Azevedo, 2005). In CRL the control and autonomy are expected to be shared between students in the same group (Volet et al., 2009). Students' prior experience could be one factor that may have influenced the relationship between students' SRL and CRL in a collaborative task. Students in this study might not have prior experience working in dyads in online courses before, therefore the relation between pre-OSLQ and CRL was found to be not significant. Students' CRL requires their active engagement with their partners that includes communication skills and openness to other perspectives that are less used in individual SRL. The effectiveness of collaboration is linked to "openness" and "non-defensive reactions to other group members

(Vauras et al., 2003). It is possible that students' previous SRL was related to their own control and autonomy of their learning, rather than a shared control with others. Students may not had enough experience and opportunities to collaborate with others in online courses before. The lack of collaboration skills in online learning may hindered the transfer and relationship between students' SRL to CRL.

Another explanation could be that the CRL questionnaire only measured students' individual perception about working in dyads collaboratively, but did not measure students' social factors that was found in the qualitative analysis of this study to have an impact on CRL adaptation. There is a need for on-going development of CRL instruments that investigates the social aspects of learners' interaction with each other along with CRL processes. The use of self-report measures have significantly advanced the field in understanding SRL but there is a lack of self-report that measured CRL. Advantages of self-report measures are their efficiency and affordance which make them more favored by researchers. One disadvantage of self-report measures is that they do not fully unfold the dynamics of SRL and CRL adopted by learners in their learning context. Using self-report measures only in investigating SRL and CRL does not emphasize the contextual variability of learners (Patrick & Middleton, 2002). Aspects of SRL and CRL such as students' interaction, instructional context, and the nature of the learning task are contextually embedded. On top of using self-report measures, methods such as observation and interviews can provide answers to how students' use and implement SRL and CRL processes in their learning (Patrick, Middleton, 2002). According to researchers (e.g., McCaslin & Good, 1996; Paris, Byrnes, & Paris, 2001; Pressley, 1995), CRL occurs within learners' involvement in the social support from their partners and then CRL is internalized. That in turn enables learners to be SR during learning. Students who lack the experience and SRL skills first have to be

involved in a socially interactive context to be able to internalize the support and processes that fosters their SRL.

While there was no correlation between students' pre-OSLQ and CRL, research supports the transfer of SRL from individual to group in the form of CRL (Volet et al., 2009). Further documentation of what regulatory processes used by individuals and what regulatory processes used by group members would represents an important venue for future work on groups' CRL and practices. Identifying the patterns used by individual students and the patterns used by group members could potentially lead to a better understanding of the link and relationship between SRL and CRL.

### **Fostering Students' SRL through CRL**

Previous research supports the positive relationship between CRL and students' SRL(e.g., DiDonato, 2013; Patrick & Middleton, 2002). Scholars suggested that creating shared activities and assigning students to work in groups would provide opportunities for students to internalize SRL skills and behaviors. In this study, students' internalizing SRL is supported by finding that CRL predicted students' post-OSLQ score. Several benefits of CRL in a collaborative activities have been identified in previous studies. CRL was found to lead high quality learning and help students to control task challenges (Vauras et al., 2003; Järvelä et al., 2008).

Despite the potential academic benefits of CR, the quality of the processes used in CRL is of a great importance. In a study conducted by Kempler and Linnenbrink-Garcia (2007) on sixth grade students working collaboratively on a mathematical task, researchers found that processes which were regulative of group members' cognition and behavior were employed by students.



The quality of these regulative processes were low-level, unlike cognitive CRL, which is a higher level cognitive process. In order to understand how dyads' CRL processes were employed, an examination of dyads' interaction patterns is needed. This kind of analysis provides exploration of CRL processes that were most used at different stages of task completion. Dyad members in this study engaged in numerous planning and goal setting processes. The most common goal across dyads who were interviewed was to get their work done on time, based on the word count feature. The word cloud is a tool available In Vivo program that generates word frequency count of the most used words in the data. Results of the most frequent word used in the interview, was represented in a "word cloud." The most used word is placed in the center of the word cloud (See Figure 5.1).



*Figure 5.1* Word cloud of the most frequently used words in dyads' goal setting.

One common goal across the interviewed students was to finish their task with their partners, this does not necessarily reflect employing higher levels of CRL processes. It is unknown if dyads were engaged in higher-levels of CRL such as critical thinking skills and elaboration, or if dyads' interaction and CR were limited to dividing their task. One way to examine what CRL and SRL processes dyads employed is by further collecting data such as dyads' shared documents and by observing their interaction online. Successful dyads are expected to go above and beyond dividing the task by being fully involved and engaged in co-constructing knowledge related to the content and activity.

There is a great line of research on students' negative group work experience, and how it might hinder students' interaction with each other (Livingstone & Lynch, 2000; Pauli, Mohiyeddini, Bray, Michie, & Street, 2008; Volet & Mansfield, 2006). Therefore, it is important to further investigate and observe dyads' engagement beyond self-report measures. The processes and forms of interaction between dyads are critical factors that should be examined to better help us understand how and what triggers CRL. Video footage of dyads' interactions could provide more information about dyads' interactions and negotiation processes. High-level cognitive processes such as elaboration and justification were not detected by self-report measures used in this study. One way to explore students' use of cognitive processes, low or high, is by collecting students' online shared documents and blogs for analysis. Blackboard online course system that was used in the study provides users with several options as a means of interaction. There are several features within the system that allow instructors to use, as a means of communication between the students with each other and their instructors. Instructors could create their prompts and questions for students within the learning management system. The use of discussion boards, blogs, and other collaborative tools could be a great source of further data.

collection. For example, dyads were asked to use blogs in HuskyCT, and were given the option to use their own collaborative tool, such as Google Hangouts, for their written interaction.

Analysis of dyads' discourse would provide further exploration as to what are the most frequently used CRL processes dyads adapted during their collaboration. Certain CRL processes might be used more than others during dyads' collaboration in different stages of the task. The aim of CR activities is to promote joint meaning construction that foster higher-level learning between dyads (O'Donnell & King, 1999).

### **Students' Perception of the Online Courses**

Students' perceptions of the online course are expected to be positively associated with their SRL skills and academic achievement. Garrison's et al. (2000) CoI model utilizes its philosophical basis to depict learning as a process that takes place in the social and individual levels (Boris & Hall, 2005). The CoI focuses on articulating the social, technological, and pedagogical process that promote collaboration, knowledge construction between online students, and epistemic engagement between learners (Shea & Bidjerano, 2010).

The better the students are in self-regulating their learning, the more likely that their perception of the online course delivery would be positive (Howland & Moore, 2002). Dyad activity offered students a sense of community and belongings. Research supports the idea that a sense of community could be created in online courses despite the isolated nature of this kind of learning. Creating sense of community was found to be significantly associated with perceived learning (Rovai, 2002; Shea, 2006; Shea, Li, & Pickett, 2006).

Course instructors recruited in the study had dramatically different subjects. Students have pointed out some of the instructional practices that were most effective for them. The use of short audio/videos mini lectures for a maximum of 10 minutes was favored by students. Creating

short videos about the course topics allowed the students to have control over their learning by replaying and pausing the short videos as needed and taking notes as they watched the video.

Dyad activity helped students to immerse themselves in a social context and interaction.

Research on student group cohesiveness and interaction in online learning environments suggests that activities that require social engagement and interaction enhance the learner's satisfaction (Arbaugh & Benbunan-Fich, 2006). The use of collaborative activities that are designed to create social presence and foster online community increases students' satisfaction with their learning and the online course delivery (Benbunan-Fich & Hiltz, 2003). Research suggests that there is a strong relationship between social presence and positive learning outcomes (Arbaugh, 2005; Hwang & Arbaugh, 2006; Williams, Duray, & Reddy, 2006). Examples of group activities in the study-recruited courses are a collaborative digital marketing strategy plan, an online simulation tool for digital marketing, a pedagogy statement, and different discussion threads. The design of learning environments that fosters teams improve the quality of group outputs (Lea, Rogers, & Postmes, 2002)

Having a common goal or object of inquiry between students creates a sense of community. Although social presence is of a great value, without cognitive and teaching presence, sufficient learning may not occur.

Teaching presence is emphasized as a way to foster students' success in online learning environment. According to Anderson et al., (2001) teaching presence has three main components: (1) instructional design and organization; (2) facilitating discourse; and (3) direct instruction. Instructors created explicit guidelines for dyads activity by providing a rubric with specifications such as length and quality of the task. Instructors specified due dates at the beginning of their course and used tools such as Google Calendar in their online course to better

assess students on their time-management. The best activities are designed to be clear and specific, in order to decrease students' confusion about the task. Activities that are well designed also provoke students' thinking and challenge them. According to Meyer (2003) "faculty may need to be more directive in their assignments for threaded discussions, charging the participants to resolve a particular problem, and pressing the group to integrate their ideas..." (p. 8).

Facilitating discourse in an online learning environment requires instructors to guide and direct students' discourse. Instructors in the study constantly checked the discussion board and provided on-going comments and follow-up questions to maximize the potential benefit of discourse. Instructors answered students' questions and emails in a timely manner.

The third element in a CoI framework is cognitive presence, defined as students' ability to move beyond understanding the task to a practical inquiry cycle of exploration, integration and application. One issue with the cognitive presence element is that students in group work have difficulties moving from information exploration phase to exploration phase or integration phase. In a study conducted by Lee and Lee (2006), the authors suggested that students with different personalities working in groups could be more effective in developing metacognitive interaction than a group of students with the same personality such as a group with only extroverted members.

Findings from this analysis suggested that students' SRL processes and skills were guided by instructional practice. There was a significant correlation between SRL and the students' perception of the online course as a community. One premise of SR is to enable lifelong learning skills which aligns with online education philosophy. Therefore, instructors play an important role in facilitating students' learning processes in online learning environments. Future studies should examine in-depth instructors' course design and practices in

online learning environments and how they impact students' SRL skills and processes. Further data should be collected to explore instructors' role in facilitating students' SRL and CRL.

Interviews with online course instructor in addition to students would expand our knowledge by providing a whole picture of how instructors support students' SRL and CRL through guidance, activities, and course overall design. Input from both students and instructors would provide explicit guidance of successful learning and teaching practices.

### **Recommendations for Online Instructors**

The study examined CRL processes and factors that influenced dyads' successful CR and explored the factors that hindered CR between dyads. In this study, six individual dyad members were interviewed by the researcher to understand the phenomenon of CRL. Several recommendations for online course instructors are described.

Several coding cycles were conducted to investigate the nature of CRL in dyads' shared activities that either hindered or empowered individual students' SRL processes. Four factors emerged from successful and less successful dyads that represented an overall view of dyads' experiences. The factors that were identified are students' social factors, technical factors, environmental factors, and instructional factors.

There are several recommendations for online course instructors to better assess their students learning. In creating shared activities, instructors should be aware of the affordance of tools and programs that enable students to collaborate in their learning. An important finding during the study implementation was that collaborative tools could hinder or support dyads CRL. In the study, the lack of sufficient collaborative tool in solving mathematical problems created

challenges to dyads in Math-1071 course. Students had to put extra time on solving the mathematical problems online through shared collaborative programs such as Google Docs than they would usually spend if they were to do it on their own. Shared activities differ from one subject to another, therefore, course instructors should take into account the collaborative programs that allow dyads for sufficient communication. Technical factors were found to be essential in dyads' collaboration.

Another recommendation for online course instructors is to monitor students' activity within the learning management environment. There are tools available that could track student activity within the online course by providing analytical data of student engagement. Instructors could reinforce students to engage by sending reminders and announcement to what they are expected to accomplish on a weekly basis. The environmental factor was found to play an important role in fostering dyads CRL and SRL. Dyad members need to navigate their learning environment to explore the course content and follow up with the course requirements.

Instructional factor was found to impact dyads' CRL within online courses. Feedback from instructors is essential in creating successful dyads' CRL. The more feedback the students received from their instructors, the more dyads were aware of their progress, which in turn directed their use of SRL process. Teaching presence within the community of learners guide dyads' learning.

A major finding of dyads' CRL experience within online courses was the impact of students' social factors in creating successful or less successful dyads. The interaction between dyads was found to have a great influence on CRL. Dyads can control and regulate certain aspects of their cognition, motivation, and environment. But there are biological, developmental, contextual, and individual differences that will impact dyads' CRL and SRL. Therefore, future

research should investigate different mechanism in grouping students together as a mean of identifying feature of successful dyads in CRL. More research is needed to examine CRL processes used by students during collaboration. It could be that students may only use lower-level CRL by dividing their shared task and not engaging in a high-level cognitive process. Observation of dyads' interaction and analysis of data used by dyads during their engagement would provide more in depth information about the CRL strategies used at different stages of the task completion process.

### **Educational Implications and Conclusions**

There is a need to improve students' self-regulation skills and co-regulation skills in online learning environments in order to promote students' successful academic achievement (Liu et al., 2012).

More research is needed to examine different teaching practices, methods and activities that would promote students' successful learning in online learning environments. This study examined the impact of collaborative activities on students' CRL and SRL in online learning courses. The study focused on understanding the relationship between SRL, CRL, and the online course delivery based on a CoI framework over a 6-week period. In this study, it was found that the CRL score was correlated with post-OSLQ, and that post-OSLQ was correlated with CoI. Future research should also consist of further collection of data on dyads' interaction, such as the discussion boards and Google Docs to look at what SRL and CRL processes dyads adapted in their interaction during their shared task. Given that the dyads were randomly grouped together, future research may need to examine different methods in grouping dyads. One method could be that the students would be grouped in dyads based on their prior SRL measured by pre-OSLQ.



This would allow the researcher to detect the effect of high SRL students on low SRL students. Another method would be allowing students to select their partners, in order to examine if that helped or hindered or dyads' CRL and SRL processes. The examination of gender difference in regard to dyads can be explored by generating dyads based on gender or by controlling dyads to consist of males and females. Further investigation should carefully consider the social desirability aspect in course selection. Students may perform better in an Educational Psychology course than in a Digital Marketing course because of their personal preference, which could impact the study results.

Since this study was conducted over a 6-week period, the effect of time should be taken into account. The pre-OSLQ was administered immediately in the first week of the online courses. Expanding the length of the time between the administration of the study surveys may provide an opportunity for more to transpire between students pre-OSLQ and CRL.

This study focused primarily on the relationship between students SRL and CRL processes. Future research needs to examine CRL by creating scales that includes students' social factors. In any collaborative work, students' characteristics, perspectives, and prior knowledge may impact the nature of collaboration and CRL. Expanding CRL scales to include students' social factors would allow research on CRL to grow.

Results from this study indicate that CRL was not a statistically significant mediator between students' pre-OSLQ and post-OSLQ. However, CRL was correlated with students' pre-OSLQ. It is possible that inadequate sample size in the mediation analysis impacted the results. A future study should measure the mediation role of CRL on students pre-OSLQ and post-OSLQ on a larger sample size ( $N = 100$ ). In this manner, there might be different results that could support the mediation role of CRL between pre-OSLQ and post-OSLQ.

At the end of the study, students' post-OSLQ and the course design based on CoI were closely related. This is an important consideration that online course instructors should be aware of when creating their online courses to support students' SRL and CRL. Online course instructors would need to ensure that CoI elements are present in their courses. Creating social, teaching, and cognitive presences will create a better online learning environment and in turn, would help students to SR and CR their learning.

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## Appendices

### Appendix A

#### IRB-Approval and Information Sheet



**DATE:** February 16, 2016

**TO:** Scott Brown, Ph.D.  
Rasis Alanazi, Student Investigator  
EPSY

**FROM:** Brandi Simonsen, Ph.D. *BSI/nw*  
Vice-Chair, Institutional Review Board  
FWA# 00007125

**RE:** Protocol #H16-016: "Learning to Self-Regulate: Crafting Co-Regulation Experiences in an Online Learning Environment"  
*Please refer to the Protocol# in all future correspondence with the IRB.*  
Funding Source: Investigator Out-of-Pocket  
*Approval Period: From: February 16, 2016 Valid Through: February 16, 2017*  
*"Expiration Date"*

The Institutional Review Board (IRB) approved this protocol on February 16, 2016. The research presents no more than minimal risk to human subjects and qualifies for expedited approval under category #7: Research on individual or group characteristics or behavior (including, but not limited to, research on perception, cognition, motivation, identity, language, communication, cultural beliefs or practices, and social behavior) or research employing survey, interview, oral history, focus group, program evaluation, human factors evaluation, or quality assurance methodologies. Enclosed are the validated information sheets, which are valid through February 16, 2017. **A copy of the approved, validated information sheet (with the IRB's stamp) must be used to consent each subject.**

Per 45 CFR 46.117(c)(2), the IRB waived the requirement for the investigator to obtain a signed consent form for the subjects because it found that the research presents no more than minimal risk of harm to subjects and involves no procedures for which written consent is normally required outside of the research context. The principal investigator must notify the IRB immediately of any changes that may affect the status of the research study referenced above.

All investigators at the University of Connecticut are responsible for complying with the attached IRB "Responsibilities of Research Investigators."

**Re-approval:** It is the investigator's responsibility to apply for re-approval of ongoing research at **least once yearly**, or more often if specified by the IRB. The Re-approval/Completion Form (IRB-2) and other applicable re-approval materials must be submitted **one month** prior to the expiration date noted above.

**Modifications:** If you wish to change any aspect of this study, such as the procedures, the consent forms, the investigators, or funding source, please submit the changes in writing to the IRB using the Amendment Review Form (IRB-3). All modifications must be reviewed and approved by the IRB prior to initiation.

**Audit:** All protocols approved by the IRB may be audited by the Research Compliance Monitor.

Office of the Vice President for Research  
Research Compliance Services  
438 WHITNEY ROAD EXTENSION, UNIT 1246  
STORRS, CT 06269-1246  
PHONE: 860.486.8802  
FAX: 860.486.1044  
compliance.scom.edu

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## Interview Information Sheet and Protocol

### Information Sheet for Participation in a Research Study



**Principal Investigator: Scott Brown, Ph.D.**

**Student: Rasis A. Alanazi**

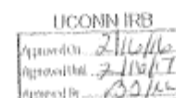
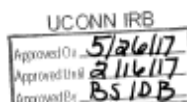
**Study Title: Learning to Self-Regulate: Crafting Co-Regulation Experiences in an Online Learning Environment.**

**Protocol Number:**

You are invited to participate in this survey regarding **learning to Co-regulate**. I am a graduate student at the University of Connecticut, and am conducting this survey as part of my dissertation. Your participation in this study will require completion of the attached questionnaire. This should take approximately 5-10 minutes of your time. Your participation will be anonymous, and you will not be contacted again in the future. You will not be paid for being in this study. We believe this survey does not involve any risk to you. Although you may find it interesting to participate in this study, there will be no direct benefit to you from your participation. You do not have to be in this study if you do not want to be. I will be happy to answer any questions you have about this study. If you have further questions about this project or if you have a research-related problem, you may contact me, Rasis A. Alanazi (the student) at 860-771-3131 or my advisor Scott Brown, at 860-486-0181. If you have any questions about your rights as a research participant you may contact the University of Connecticut Institutional Review Board (IRB) at 860-486-8802. The IRB is a group of people who review research studies to protect the rights and welfare of research participants. Please complete the attached survey and return it as soon as possible. Thank you.

- ☐ Accept (1)
- ☐ Reject (2)

Q2 Please enter a four digit code that you create and will use in all of the study surveys



## Interview Protocol

### Interview Questions

Interview Date: \_\_\_\_\_ Location: \_\_\_\_\_

Interviewer: \_\_\_\_\_

Interviewee's four digit : \_\_\_\_\_

Current Position/Title: \_\_\_\_\_

Interview Start Time: \_\_\_\_\_ Interview End Time: \_\_\_\_\_

### INTRODUCTION

Thank you for taking time to talk with me today. As you know, you have agreed to participate in a research study examining different aspects of being a successful online learner. In particular, the purpose of the study is to document and better understand how working in dyad hinder or help in your learning process, and the process that makes you a better online learner. The main purpose of today's interview is to get a better sense of your perspective of taking an online course as a students and to get to know your insight on that experience.

In this interview I will be asking you questions about:

- ☐ your educational background;
- ☐ your ideas and thoughts about your own experience in regard taking online courses,
- ☐ your insights about working with your peer on different tasks in online learning environment
- ☐ your strategies used to learn in online environment
- ☐ your time management procedures for this online course

I want to remind you that this interview is voluntary. You may stop the interview at any time or refuse to answer any question without penalty. Feel free to let me know if you would like me to repeat or explain a question. I also want to remind you that what you share will be confidential and your privacy will be protected to the fullest extent possible.

Do you have any questions before we begin?

OK, let's begin.

Please say your first and last name, today's date, and your current position and/or title.

## BACKGROUND

### **1. Can you tell me more about your educational background?**

Let's get started with a little background.

How long have you been in the university? When did you come?

Is this your only online course?

Probes: Can you describe your experience in using an online platforms (eg., HuskyCT, Blackboard)?

That's very helpful.

## ONLINE LEARNING EXPERIENCE

1. Tell me more about your experience in this online course?
  - a. Did you enjoy it or not?
  - b. Did you feel that you learned more than face to face courses, if so explain?
  - c. How often did you check the online plat form (eg.blackboard, HuskyCT) "system"?
  - d. Where do you study for online course? Bed, coffee shop etc? describe the environment.
2. Do you consider yourself someone who prefer online courses? Or you prefer the face to face courses? Explain why
3. What do you think was the most beneficial for you in constructing your knowledge?
4. What was the most challenging thing for?

5. Have you worked in pairs, dyad, or group in online course?

Probes: Tell me more about your experience working with others?

- a. Tell me about a time where working with your peer helped you
- b. Can you think of an incident when you were working with your peer but you didn't meet the course requirement as you anticipated? Describe.
- c. Can you think of a time when working with a peer hindered your ability to get your work done or completed to your satisfaction?
- d. Anything else?

## TECHNIQUES AND PROCESSES USED

1. Sometimes learners find it hard to complete a task or assignments due to other more interesting things to do such as watching your favorite TV show, reading book, watching sports, or another more interesting course requirement. Do you have a specific technique that keeps you motivated "focused" to finish your online assignment?
2. If you had 10 page assignment to submit within two weeks, how would you best prepare for it?
3. Is there a specific method you use to prepare for your online course?
  - a. How you manage your readings for the course?
  - b. Do you try to find other websites and resources to better assist you? What about your peer level of involvement with you for the course?
  - c. How you keep track of due dates? Do you share important due dates with your peer?
  - d. Tell me more about you and your peer level of contributions and commitment?
  - e. Do you seek help from others?
  - f. Tell me about your communication with your classmates? Do you try to find out how you are doing in your online classes in comparison to them?
- a. Do you feel that other students in the online course would face the same obstacles you do?
4. If you had a very complicated task to do with your peer in an online class, how do you manage working on it?
5. Name some skills you have taken away from online learning? and how would you use them in your future?
6. Do you think that your habits or strategies have changed over time having taking online classes?

Probes: if No, So what kind of learner you think are you?

Probes: if yes, tell me more about this change.

Dyad project:

Can you tell me what your dyad project grade is?

**Thank you again for your time and for sharing your ideas with me today.**

## Appendix B

### Study Instruments- Online Self-Regulated Learning

Barnard, L., Lan, W. Y., To, Y. M., Paton, V. O., & Lai, S. L. (2009). Measuring self-regulation in online and blended learning environments. *Internet and Higher Education*, 12, 1-6. doi: 10.1016/j.iheduc.2008.10.005

Online Self-regulated Learning Questionnaire Items	Subscale
1- I set standards for my assignments in online courses.	Goal Setting
2- I set short-term (daily or weekly) goals as well as long-term goals (monthly or for the semester).	Goal Setting
3- I keep a high standard for my learning in my online courses.	Goal Setting
4- I set goals to help me manage studying time for my online courses.	Goal Setting
5- I don't compromise the quality of my work because it is online.	Goal Setting
6- I choose the location where I study to avoid too much distraction.	Environment Structuring
7- I find a comfortable place to study.	Environment Structuring
8- I know where I can study most efficiently for online courses.	Environment Structuring
9- I choose a time with few distractions for studying for my online courses.	Environment Structuring
10- I try to take more thorough notes for my online courses because notes are even more important for learning online than in a regular classroom.	Task Strategies
11- I read aloud instructional materials posted online to fight against distractions.	Task Strategies
12- I prepare my questions before joining in the chat room and discussion.	Task Strategies
13- I work extra problems in my online courses in addition to the assigned ones to master the course content.	Task Strategies
14- I allocate extra studying time for my online courses because I know it is time-demanding.	Time Management
15- I try to schedule the same time every day or every week to study for my online courses, and I observe the schedule.	Time Management

**Study Instruments- OSLQ Continued**

<b>Online Self-regulated Learning Questionnaire Items</b>	<b>Subscale</b>
16- Although we don't have to attend daily classes, I still try to distribute my studying time evenly across days.	Time Management
17- I find someone who is knowledgeable in course content so that I can consult with him or her when I need help.	Help Seeking
18- I share my problems with my classmates online so we know what we are struggling with and how to solve our problems.	Help Seeking
19- If needed, I try to meet my classmates face-to-face	Help Seeking
20- I am persistent in getting help from the instructor through e-mail.	Help Seeking
21- I summarize my learning in online courses to examine my understanding of what I have learned.	Self-Evaluation
22- I ask myself a lot of questions about the course material when studying for an online course.	Self-Evaluation
23- I communicate with my classmates to find out how I am doing in my online classes.	Self-Evaluation
24- I communicate with my classmates to find out what I am learning that is different from what they are learning.	Self-Evaluation



### Study Instruments- Co-regulated Learning

DiDonato, N.C. (2013). Effective self- and co-regulation in collaborative learning groups: An analysis of how students regulate problem solving of authentic tasks. *Instructional Science*, 41, 25-47. doi: 10.1007/s11251-012-9206-9

DIRECTIONS: I am going to read you some statements, and I would like you to circle the choice that best describes HOW OFTEN YOUR GROUP DOES what the statement says. Your choices include:

4 All of the time

3 Most of the time

2 Sometimes

1 Never

1. Each day we read our plans carefully before we began working on our project.
2. In our group we looked over each other's work to see if we understood what each member was doing.
3. In our group we checked each other's work to make sure each other's research was correct.
4. At the end of each day, we left enough time to plan for the next day.
5. Before we started working on our project our group would read over our plans for the day.
6. We made sure everyone understood before we moved on to the next part of our project.
7. We double-checked each other's work to make sure we were all doing it right.
8. If someone in our group became distracted, we were able to refocus everyone's attention back on our project.
9. We worked hard on our project even if we didn't like all the parts.
10. Our group stuck to our planned schedule for completing our project.
11. When we planned, we talked about if our plans were realistic.
12. In our group we all paid attention to what each other was working on.
13. I knew what my other group members were working on during our project.
14. Our group did other things when we are supposed to be working on our project. (reverse coded)
15. We managed our time efficiently so we were not rushing around to finish at the last minute.
16. We made sure the number of plans we set for the day was manageable.
17. In our group, one group member knew what another one was working on.

18. We used charts or diagrams in our project.

19. Members of our group were often distracted, which got in our way to work well on our project. (reverse coded)

### **Study Instruments- Community of Inquiry**

Arbaugh, J. B., Cleveland-Innes, M., Diaz, S. R., Garrison, D. R., Ice, P., Richardson, J. C., & Swan, K. P. (2008). Developing a community of inquiry instrument: Testing a measure of the Community of Inquiry framework using a multi-institutional sample. *Internet and Higher Education*, 11(3-4), 133-136. doi:10.1016/j.iheduc.2008.06.003

#### ***Teaching Presence***

##### ***Design & Organization***

1. The instructor clearly communicated important course topics.
2. The instructor clearly communicated important course goals.
3. The instructor provided clear instructions on how to participate in course learning activities.
4. The instructor clearly communicated important due dates/time frames for learning activities.

##### ***Facilitation***

5. The instructor was helpful in identifying areas of agreement and disagreement on course topics that helped me to learn.
6. The instructor was helpful in guiding the class towards understanding course topics in a way that helped me clarify my thinking.
7. The instructor helped to keep course participants engaged and participating in productive dialogue.
8. The instructor helped keep the course participants on task in a way that helped me to learn.
9. The instructor encouraged course participants to explore new concepts in this course.
10. Instructor actions reinforced the development of a sense of community among course participants.

##### ***Direct Instruction***

11. The instructor helped to focus discussion on relevant issues in a way that helped me to learn.
12. The instructor provided feedback that helped me understand my strengths and weaknesses.
13. The instructor provided feedback in a timely fashion.

#### ***Social Presence***

##### ***Affective expression***

14. Getting to know other course participants gave me a sense of belonging in the course.
15. I was able to form distinct impressions of some course participants.
16. Online or web-based communication is an excellent medium for social interaction.

##### ***Open communication***

17. I felt comfortable conversing through the online medium.

18. I felt comfortable participating in the course discussions.

19. I felt comfortable interacting with other course participants.

*Group cohesion*

20. I felt comfortable disagreeing with other course participants while still maintaining a sense of trust.

21. I felt that my point of view was acknowledged by other course participants.

22. Online discussions help me to develop a sense of collaboration.

***Cognitive Presence***

*Triggering event*

23. Problems posed increased my interest in course issues.

24. Course activities piqued my curiosity.

25. I felt motivated to explore content related questions.

*Exploration*

26. I utilized a variety of information sources to explore problems posed in this course.

27. Brainstorming and finding relevant information helped me resolve content related questions.

28. Online discussions were valuable in helping me appreciate different perspectives.

*Integration*

29. Combining new information helped me answer questions raised in course activities.

30. Learning activities helped me construct explanations/solutions.

31. Reflection on course content and discussions helped me understand fundamental concepts in this class.

*Resolution*

32. I can describe ways to test and apply the knowledge created in this course.

33. I have developed solutions to course problems that can be applied in practice.

34. I can apply the knowledge created in this course to my work or other non-class related activities.

5 point Likert-type scale

1 = strongly disagree, 2 = disagree, 3 = neutral, 4 = agree, 5 = strongly agree

**Appendix C**

## Course Instructors Willingness to Participates letters



Neag School of Education  
Department of Educational Psychology  
Graduate Program in Cognition, Instruction &  
Learning Technology

February 13, 2016

TO: Ms. Rasis Alanazi  
FROM: Scott W. Brown, Ph.D.  
RE: Willingness to Participate in Your Study

I am writing to confirm that I am prepared to include having students working as dyads in my online course EPSY 3010 Educational Psychology for one of the case studies in the course. I currently have had the students working individually and in groups of 5, the dyad group is one of the formats I want students to experience as they incorporate their own learning online with the course content (Educational Psychology – learning, motivation, cognitive theory, cognitive development, assessment). They will all be participating as dyads for one online case in the course.

Further, I am prepared to participate in your study by sending out announcements of the opportunity to participate and links to permission/consents and data gathering. When the course is completed, I will provide you with the student data of only those who fully consented to all parts of your study. The students' grades will NOT be impacted by their decision to participate or not.

Sincerely,

A handwritten signature in blue ink that reads "Scott W. Brown".

Scott W. Brown, Ph.D.  
Board of Trustees Distinguished Professor of Educational Psychology

249 GLENBROOK ROAD, UNIT 3054  
STORRS, CT 06269-3054  
PHONE 860.486.0181  
Email: scott.brown@uconn.edu

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## Course Instructors Willingness to Participates letters-Continued



University of Connecticut  
*School of Business*

Marketing Department

February 14, 2016

TO: Rasis Alanazi

FROM: William M. Ryan

RE: Willingness to Participate in Your Study

I am writing to confirm that I am prepared to include having students working as dyads in my online course MKTG 3665 Digital Marketing for five discussion forums and a team paper in the course. I currently have the students working individually and in groups of 3 for a digital marketing simulation. And, the dyad group is one of the formats I want students to experience. They will all be participating as dyads for five discussion forums and a team paper submission.

Further, I am prepared to participate in your study by sending out announcements of the opportunity to participate and links to permission/consents and data gathering. When the course is completed, I will provide you with the student data of only those who fully consented to all parts of your study. The students' grades will NOT be impacted by their decision to participate or not.

If you should have any questions, please do not hesitate to contact me directly at 860.951.1775.

Regards,

*Bill*

William Ryan

UConn School of Business

Instructor in Residence, Marketing Department

Director, Program for Sales Leadership, Sales and Marketing Leadership Programs

860-951-1775 (cell), [William.Ryan@business.uconn.edu](mailto:William.Ryan@business.uconn.edu)

Connect with me at: <http://www.linkedin.com/in/billryanuconn>



PROGRAM FOR  
**SALES LEADERSHIP**

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2100 Hillside Road Unit 1041  
Storrs, Connecticut 06269-1041

Telephone: (860) 486-4133

Facsimile: (860) 486-5246

web: <http://www.business.uconn.edu>

## Course Instructors Willingness to Participates letters- Continued



Michael F. Young, Ph.D.  
Neag School of Education  
Coordinator, Learning Technology Program  
Department of Educational Psychology

9 May 2016

Rasis Alanasi  
Graduate Student  
Neag School of Education

Rasis,

I am writing to confirm that I am prepared to include having students working as dyads in my online course EPSY 5520 Instructional Design for one of the activities in the course. The course is designed with several weekly projects and I am willing to have the students post in dyads for at least 1 of these.

Further, I am prepared to participate in your study by sending out announcements of the opportunity to participate and links to permission/consents and data gathering. When the course is completed, I will provide you with the student data of only those who fully consented to all parts of your study. The students' grades will NOT be impacted by their decision to participate or not.

A handwritten signature in blue ink, appearing to read "Michael F. Young", is written over a light blue rectangular background.

Michael Young, Ph.D.  
Coordinator, Learning Technology Program  
Neag School of Education  
249 Glenbrook Rd., Unit 2064  
University of Connecticut  
Storrs, CT 06269-2064  
W: (860) 486-0182  
C: (860) 604-4052  
e: myoung@uconn.edu

249 GLENBROOK ROAD, UNIT 2064  
STORRS, CT 06269-2064  
PHONE 860.486.0182  
FAX 860.486.0180

## Course Instructors Willingness to Participates letters- Continued



5/12/2016

Dear Ms. Alanazi:

I am writing to confirm that I am prepared to include having students working as dyads in my online courses EDLR 2001 and EDLR 5360 for summer session 1 for 2016. For the weekly on-line discussion forums, I currently have had the students working individually and in groups of 5, the dyad group is one of the formats I want students to experience as they incorporate their own learning online with the course content. They will all be participating as dyads for each module discussion forum.

Further, I am prepared to participate in your study by sending out announcements of the opportunity to participate and links to permission/consents and data gathering. When the course is completed, I will provide you with the student data of only those who fully consented to all parts of your study. The students' grades will **NOT** be impacted by their decision to participate or not.

I look forward to providing this opportunity to my students.

Best regards,

A handwritten signature in black ink, appearing to read "LJ Burton", is written above the printed name.

Laura J. Burton, Ph.D.  
Associate Professor, Sport Management



## Course Instructors Willingness to Participates letters- Continued

3/21/2017

University of Connecticut Mail - Your research concerning online courses



Rasis Alanazi &lt;asis.alanazi@uconn.edu&gt;

---

**Your research concerning online courses**

2 messages

---

Hanink, Dean <dean.hanink@uconn.edu>  
To: "Alanazi, Rasis" <asis.alanazi@uconn.edu>

Wed, May 11, 2016 at 11:50 AM

To: Rasis Alanazi  
From: Dean M. Hanink, Professor of Geography, University of Connecticut

I confirm that I will ask students to work in dyads for at least one of the activities in my online course GEOG 2100 Economic Geography. I will send students announcements of the opportunity to participate and links to permissions/consents and data gathering. Upon the course's completion I will send you the data of only those students who fully consented to all parts of your study. Students grades will not be affected by their decisions with respect to participation in the study.

Sent from my iPad

---

Rasis Alanazi <asis.alanazi@uconn.edu>  
To: "Hanink, Dean" <dean.hanink@uconn.edu>

Wed, May 11, 2016 at 1:39 PM

Dear Dr. Hanink,

Thank you for your memo.

Rasis

[Quoted text hidden]


—

Rasis A. Alanazi  
Ph.D Candidate, Cognition, Instruction, & Learning Technologies  
GlobalEd2 Project  
"Find us on Facebook (GlobalEd2) and Twitter (@GlobalEd\_2)  
Department of Educational Psychology,  
Room125, 249 Glenbrook Road  
University of Connecticut

**Appendix D****IRB-Preapproval Letter**

**DATE:** May 26, 2016

**TO:** Scott Brown, Ph.D.  
Rasis Alanazi, Student Investigator  
EPSY

**FROM:** Brandi Simonsen, Ph.D.   
Vice-Chair, Institutional Review Board  
FWA# 00007125

**RE:** Protocol #H16-016: "Learning to Self-Regulate: Crafting Co-Regulation Experiences in an Online Learning Environment"  
*Please refer to the Protocol# in all future correspondence with the IRB.*

The request for approval of an amendment received May 18, 2016 for the above-referenced protocol was approved by the Institutional Review Board (IRB) on May 26, 2016. This amendment is eligible for expedited review under 45 CFR 46.110(b)(2): minor changes in previously approved research during the period (of one year or less) for which approval is authorized. The amendment includes:

1. Addition of new research question. Addition of a related survey.
2. Change in study timeline.
3. Change in participant compensation. A raffle will be conducted. Eight randomly selected participants will each receive a \$25 Amazon gift card. In addition, a random drawing for 12 t-shirts will also be conducted. Participants in some courses, at discretion of the course instructor, will be provided with an opportunity to earn extra credit. The IRB determined that the amount and method of compensation is appropriate.
4. Revisions to the demographic questions.
5. Addition of courses where the research will be conducted.
6. Revisions to the survey instrument.

The amendment does not change the IRB's previous determination regarding a waiver of signed consent. Per 45 CFR 46.117(c)(2), the IRB waived the requirement for the investigator to obtain a signed consent form for the subjects because it found that the research presents no more than minimal risk of harm to subjects and involves no procedures for which written consent is normally required outside of the research context. The principal investigator must notify the IRB immediately of any changes that may affect the status of the research study referenced above.

Amendment Approval Date: May 26, 2016

Approval is Valid Until: February 16, 2017

Office of the Vice President for Research  
Research Compliance Services  
438 WHITNEY ROAD EXTENSION, UNIT 1248  
STORRS, CT 06269-1248  
PHONE 860.486.8802  
FAX 860.486.1044  
compliance.uconn.edu

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## Appendix E

### Letter of Support from the Center for Excellence in Teaching and Learning (CETL) at UConn



29 April 2016

Dear Faculty,

CETL was contacted this month by faculty in the Neag School of Education regarding an interesting and potentially beneficial research project that will be conducted this summer. Drs. Mike Young and Scott Brown asked that the Center for Excellence in Teaching and Learning, and specifically its eCampus and Summer Programs units, review the doctoral study being conducted by Rasis A. Alanazi. Upon reviewing the project and discussing it in more depth with Ms. Alanazi, we feel that this project has the potential to effect several positive outcomes in the field of online teaching and learning.

Specifically, this study facilitates through the creation of student dyads two practices that have proven positive impacts on online learning: self-regulation and the Community of Inquiry (COI) model. Based on our awareness of the importance and benefits of these practices, we are in support of Ms. Alanazi's study.

Recognizing that this study is dependent on faculty making adjustments to their Summer courses, eCampus staff will be available to assist faculty who choose to participate in the study in adapting their courses and curriculum to meet the study guidelines.

Please feel free to contact any of us should you wish to further discuss our views and support of this study.

Sincerely,

Peter Diplock  
*Assistant Vice Provost CETL*

Desmond McCaffrey  
*Associate Director, eCampus*

Susanna M. Cowan  
*Director, Summer & Winter Programs*

## Appendix F

### Dyad/groups Interaction Guidelines

1. In this course, you will be expected to work with in dyads on a weekly basis.
2. You are expected to find a time slot every week that works for you and your peer to communicate with each other in your own blog about your assigned task.
3. In your blog, you are going to discuss your weekly tasks, share your ideas, thoughts and confusions with your peer.
4. Make sure that your weekly communication in your blog follows one or more of the following themes (you can use the same theme more than once):
  - a- **Goal setting**, “What is your goals for your assigned task?” Ex. Learn thoroughly about the course assigned task. Get an A+ in your task etc.
  - b- **Strategy use**, “What strategies will you be using to accomplish you and your peer goals?” Ex. Read more about the new learned concepts. Take notes from other colleague discussion posts to help you when you work on your task. Revisit the challenging tasks and work on them.
  - c- **Planning and monitoring**, “How you and your peer will plan for your assigned activity. Ex. Divide the assigned weekly readings and discuss them with your partner in your own blog. Ex. Monitor your learning by looking back at the previous sections that you did not do well in your quizzes.
  - d- **Time management**, “How are you going to plan your time?” Ex. Create a fixed time line for you and your peer to submit you assigned tasks on time. Ex. Create a shared calendar such as google calendar with all the course deadlines.
  - e- **Help seeking**, “What will you do if you were faced with challenges?” Ex. Reach out other colleagues for help. Contact the TA etc.
  - f- **Evaluation, and reflection** “How are you going to evaluate your work?” Ex. Check the feedback you get from your instructors constantly.

## **Appendix G**

### **Dyads' Activities**

#### **Educational Psychology course (EPSY3010) - Undergraduate Course**

The course instructor had asked students to work in a dyad project that included two case studies that ran for six weeks. All dyads were randomly assigned to work with the same dyad member during the six weeks activity. In one group, students worked in triads. The researcher gave out “Dyad interaction guidelines” sheet for instructor to be available for students on HuskyCT. First, students had to read the case study and then post their initial thoughts on the discussion board. Second, students had to read the course materials; E-textbook, and go over available web-links and videos. Third, students had to discuss with their dyads in any form they want (e.g., skype, google hangouts, and emails), the following three promotes:

1. What are the pros and cons of schools requiring school uniforms for all students from the point of view of the school administrators and teachers?
  - a. Be sure to identify both pros and cons.
2. What are the pros and cons of schools requiring school uniforms for all students from the point of view of the students and their families?
  - a. Be sure to identify both pros and cons.
3. What are the outcomes of school uniforms that would justify their requirement from your position as an educational psychologist in the school district?
  - a. What kinds of data would you need to see that justifies this policy or refutes the policy?

After dyad members have discussed their positions about the prompts, they had to post a statement that summarized their positions. In cases, where dyad members have different opinions they still had to post one statement that reflected both of their opinions combined. Last, students were asked to individually read other dyads posts and individually post their final thoughts on others. Each case that dyads worked on was worth 10 points across all sets of postings.

#### **Digital Marketing Course (MKTG-3665) - Undergraduate Course**

Similar to EPSY 3010 courses, the course instructor have modified discussion activities from individual activity to dyad activity for forum 3 to 6. Dyads were assigned randomly by the course instructor using HuskyCT group's generator to work with their partners during forum 3-6. The same “Dyad Interaction Guideline” sheet was given to the students to direct their dyad interaction. Dyads were expected to read their weekly promotes individually, and then discuss their prompts with their partner to compose a statement that they would post in the course discussion board. Then, students were asked to provide their thought on two other students

individually. All the discussion posts for the course were worth 20% of the total grade. Following are the prompts that were used for dyad work:

#### Forum #3 – Website Strategy & Design

- Which is more important in web design - functionality or “look & feel”?
- What role does a website play in an overall digital marketing strategy?
- Why would designing and coding with a mobile first or desktop first approach be beneficial?

#### Forum #4 – Digital Communications Strategy

- When writing for digital, why are descriptive titles better than titles which play on words?
- Why should users dictate your content? List some ways that users’ needs determine content.
- Why does web copy need to be easy to read?

### **Economic Geography (GEOC-2100) - Undergraduate Course**

Students were assigned to work in dyads on a weekly discussion thread. The discussion threads were up to 20% of the total grade.

Following are two examples of the dyads weekly prompts:

- Should local governments intervene in urban land markets? Why, or why not? Because your peers will be posting responses at different times, return to this topic more than once to read and respond to other postings.
- Do you think central place theory is relevant to contemporary conditions? Give examples in support of your answer.

### **Leadership in Sports Organizations (EDLR 5360) - Graduate course**

Students were assigned to work in dyads to compose their weekly assigned statements in response to their weekly prompts. Then, each student had to provide two response to other groups statements. Student’s postings on discussion board are worth up to 20% of the total grade.

Following are some examples of the dyad activity prompts:

#### Module 1

After reviewing the TED talk by Roselinde Torres, develop answers for each of the following questions:

- Where should leaders in sport organizations be looking to anticipate change? You can identify one type of sport organization (e.g., FBS Division I intercollegiate athletics) and discuss.

- What are the major issues facing that organization? How are leaders successfully addressing those issues, or conversely, how are leaders failing to address those issues?

## Module 2

After you have completed the reading "Assuming the Mantle: Unpacking the process by Which Individuals Internalize Leadership" use the information from that chapter to answer the following discussion questions:

- Consider a time you claimed a leadership identity. What were the conditions under which you claimed that identity?

## **Instructional Design course (EPSY-5520) - Graduate Course**

Students were assigned to work in dyads to compose their statement in raged three threaded discussions and responded individually to at least two other posts. Dyads were asked to choose any method of communication that worked best for them to collaborate in. Dyad activity was worth 20% of the total grade. Following are some of the course prompts that was used for dyad activity:

### Week 1 Formative Evaluation

As we read about the purpose of Formative Evaluation, namely the iterative improvement of instruction, the challenge becomes how to implement classroom technology so the lessons can be scaled up, data-driven decisions can be made about students and the lessons, the lesson materials can be modified and adapted, and RETRIED. Design work is not one-shot, it takes time and iterative improvements. Design-based research <[http://edutechwiki.unige.ch/en/Design-based\\_research](http://edutechwiki.unige.ch/en/Design-based_research)> is a alternative to the idea of a doing a classic experiment on the students in your classes. With you dyad partner discuss how a design-based study might be done in your classroom, and what resources and constraints might be in place for such a process.

### Week 2 Constructivism

Back in 2002 Mark Windschitl described 4 types of dilemmas that emerge when teachers adopt a constructivist theory and pedagogy. His article is there for you in the Course Content tab of this course. Review the 4 potential dilemma areas, Conceptual, Pedagogical, Cultural, and Political. With your dyad partner, select an example from your own problems of practice when attempting to integrate technology wisely in your classroom circa 2016, with Smarter Balanced, BYOD, and Common Core now well established. Present the example for group discussion and moderate the replies... Also read and contribute to those posted by the other dyads.

## Appendix H

## Code-Book

Themes	Definition	Examples	Construct
<b>Goal setting Planning</b>	Student's motives to achieve and accomplish their learning is what Zimmerman identified as goal settings. It answer the question "why" students are learning, this dimension is effective when Students are " <i>capable of choosing whether and how much to study</i> " (Zimmerman, 1998, p. 74)	Getting A in an assignment	<p>-Please note the themes could be either related to self-regulation. This means that the student individually used for example: goal setting or planning etc.</p> <p>Or it could be related to co-regulation. This means that the students worked with his dyad to plan for their activity or managed time with their dyad partner.</p> <p>So please make sure to identify at first is themes is related to Self-regulation or Co-regulation and then identify what theme fits the best with the transcribed text.</p>
	Planning happens in three phases: when setting the educational goals, adapting strategies in attaining the educational goals, and making decisions on how much time will be needed to accomplish the goals (Zimmerman, 2011, p. 10).	Weekly plans to finish tasks.	
<b>Environment structure</b>	"to the way that students regulate their physical environment" (Zimmerman, 1998, p. 75), it is the place and setting where students choose to study at.	Turning off mobile phones. Turning off TV. Studying at a quiet room.	
<b>Task Strategies</b>	It refers to the strategies that learners use in order to reach their desired goals. This dimension is associated with "how" students learn.	For example, some students would highlight the major topics that they go over when reading for their task. Others, would write down the main points and summaries their readings or use concept maps while studying to have a better understating of the content	
<b>Time management</b>	This dimension answers the questions "when" learning happen,	Use of calendar to set dates for deadlines. Estimation of time needed to finish an assignment.	
<b>Help seeking</b>	It answer the question "with whom" learning if most effective	Seek others for help when needed.	
<b>Self-evaluation</b>	"Learners must be able to choose, modify, and adapt their form of response particularly from the feedback it produces."	Checking the rubric.	



## Code-Book-Continued

Themes	Definition	Examples	Construct
Co-regulation	Working with a partner on a shared activity	Me and my partner	
Co-regulation advantages	Advantages of working with a partner	My partner was always there to re assure my thinking.	
Co-regulation disadvantages	Disadvantages of working with a partner	My partner was not responsive and wasted my time.	
Dyad collaboration	Instances of dyad working with each other	Me and my dyad had a weekly meeting to talk about the readings. Me and my dyad made sure that we finish things by Saturday.	
Dyad level of contribution	Member of the dyad perception of the level of contribution of their partners.	I think that my partner contributed 50 percent to our work.	
Resources	The use of resource in learning	I google things that I don't understand.	
Outside of the dyad	Working with other students.	I contacted other students to work on the assignment.	
Course delivery preference	Online course mode or face to face mode	I think I prefer online courses since it saves me time. I like face to face courses because of the social aspect of it.	
Current experience after taking online course	What the students learned after taking online course.	I have learned to log in every day.	
Devices used for online learning	What devices students used	Laptop/Desktop/iPhone	
Tools used/ programs	The tools students used or program	Google hangouts Skype	
HuskyCT experience	Students experience in using HuskyCT.	I think HuskyCT is a user friendly.	
Most beneficial in online learning	What the learners liked in their experience in the online course experience	Working with my partner.	
Most challenging in online learning	What learners disliked or found to be the most challenging in the online course experience	Having to do multiple postings.	
Online course expectation	What is the student expectation of the online course	I did not know what we are signing up for.	
Overall performance	The student performance in the online course	I got an A in the course.	
Instructional weakness	Negative opinion about instructor teaching method	I think the instructor activities were not clear.	
Instructional strength	Positive opinion about instructor teaching method	The use of videos in the course helped me a lot.	

## Code-Book-Continued

Themes	Definition	Examples	Construct
Educational Background	Student's current and previous degrees and position.	I am a second grade math teacher. I have MA in Education.	
Previous online experience	Students previous experience in taking online course	This is my first fully online course.	
Frequency of logging to HuskyCT	How frequently students logged online	I check HuskyCT twice a day.	
Learner characteristics	Learner personal characteristics	I want to post the first. I am an introvert.	
Feeling pressure	When working in dyads push one dyad member to work hard.	I feel that because of my partner I have to do more	
Level of Learning	Statements about the level of learning in Online courses	I feel that the level of learning in online course is as same as the level of learning in f2f course.	
Modeling	Any reference to looking at other posts before submitting their dyad combined posts	We waited for other to post to make sure we are on the right place	
Community of learners	Any reference to other group of learners characteristic	You know they are all graduate students who god know how much they are paying to get educated	

## Coding Scoring Sheet

File Name:

**Training Session On / /16 The inter rater agreement between Kealey & Marissa**

**Choose one of the available themes or come up with a theme that matches the transcription section. Feel free to create new themes as they emerge. Please leave columns 0-2 empty as they are for me to check later on, as well the last column. Just make sure to insert your Initials.**

**Thank you**

Transcription Section	Suggested Theme (RA)	0	1	2	Total Scores

## **Appendix I**

### Qualitative Data analysis

#### **First Cycle of Coding and Organization of Coding – Survivors**

Survivor 1

##### **Code: Educational Background**

Sub code: Previous degrees

Sub code: Current degree

##### **Code: Online Experience**

Sub code: HuskyCT experience, frequency of logging in and ability to navigate the virtual environment.

Sub code: Current experience after taking the online course.

Sub code: Level of learning in online courses compared to face to face courses.

Sub code: Most beneficial aspect in constructing knowledge online.

Sub code: Most challenging aspects in online courses.

##### **Code: Co-regulation**

**Sub code:** Advantages working with a partner.

Sub code: Dyad collaboration

Sub code: tools, and programs used for collaboration.

Sub code: Dyad level of contribution.

Sub code: performance.

##### **Code: Co-Regulation strategies**

Sub code: Goal setting

Sub code: time management

Sub code: self-evaluation

Sub code: help-seeking

##### **Code: Self-regulation**

Sub code: environment structure

Sub code: goal setting

Sub code: planning

Sub code: help seeking

Sub code: time management

Sub code: self-evaluation

## Second Cycle of Coding and Organization of Coding -- Survivors

Survivor 1

### **Code: Co-regulation**

Sub code: Advantages working with a partner.

Sub code: Dyad collaboration

Sub code: tools, and programs used for collaboration.

Sub code: Dyad level of contribution.

Sub code: performance.

### **Code: Co-Regulation strategies**

Sub code: Goal setting

Sub code: time management

Sub code: self-evaluation

Sub code: help-seeking

### **Code: Self-regulation**

Sub code: environment structure

Sub code: goal setting

Sub code: planning

Sub code: help seeking

Sub code: time management

**Category:  
Students'  
Factors**

Sub code: self-evaluation

### **Code: Technical Tools**

Sub code: programs, collaborative tools used.

**Category:  
Technical  
Factors**

### **Code: Online Experience**

Sub code: HuskyCT experience, frequency of logging in.

Sub code: Current experience after taking online course.

Sub code: Level of learning in online courses.

Sub code: Most beneficial aspect in constructing knowledge

Sub code: Most challenging aspects in online courses.

**Category:  
Environmental  
Factors**

### **Code: Instructional practice**

Sub code: teaching strength.

Sub code: teaching weakness.

**Category:  
Instructional  
Factors**

Survivors

**First Cycle of Coding and Organization of Coding – Battlers****Battler 1****Code: Educational Background**

Sub code: Previous degrees

Sub code: Current degree

**Code: Online Experience**

Sub code: HuskyCT experience, frequency of logging in and ability to navigate the virtual environment.

Sub code: Current experience after taking the online course.

Sub code: Level of learning in online courses compared to face to face courses.

Sub code: Most beneficial aspect in constructing knowledge online.

Sub code: Most challenging aspects in online courses.

**Code: Co-regulation**

**Sub code:** Disadvantages working with a partner.

Sub code: Dyad collaboration and challenges

Sub code: tools, and programs used for collaboration.

Sub code: Dyad level of contribution.

Sub code: Dyad mismatch.

Sub code: Dyad disagreement and different interpretation

Sub code: Dyad negative communication

Sub code: performance.

**Code: Co-Regulation strategies**

Sub code: Goal setting

Sub code: time management

Sub code: self-evaluation

Sub code: help-seeking out side of the dyad

**Code: Self-regulation**

Sub code: environment structure

Sub code: goal setting

Sub code: planning

Sub code: help seeking

Sub code: time management

Sub code: self-evaluation

**Code: Co-regulation**

**Sub code:** Disadvantages working with a partner.

Sub code: Dyad challenging collaboration

- Different timeline

Sub code: Dyad level of contribution.

**Sub code: Frequency of Communication**

Sub code: Dyad mismatch.

Sub code: Tasks different interpretation

- Time consuming
- Stress
- Disagreement
- Dyad negative communication

Sub code: performance.

**Sub code: Responsibilities & different Expectations****Code: Co-Regulation strategies**

Sub code: Goal setting

Sub code: time management

Sub code: self-evaluation

Sub code: help-seeking

**Code: Self-regulation**

Sub code: environment structure

Sub code: goal setting

Sub code: planning

Sub code: help seeking

Sub code: time management

Sub code: self-evaluation

**Code: Technical Tools**

Sub code: programs, collaborative tools used.

**Code: Online Experience**

Sub code: HuskyCT experience, frequency of logging in.

Sub code: Current experience after taking online course.

Sub code: Level of learning in online courses.

Sub code: Most beneficial aspect in constructing knowledge

Sub code: Most challenging aspects in online courses.

**Code: Instructional practice**

Sub code: teaching strength.

Sub code: teaching weakness.

**Category:  
Students'  
Factors**

**Category:  
Technical  
Factors**

**Category:  
Environmental  
Factors**

**Category:  
Instructional  
Factors**

Battlers

## **Appendix J**

### **Factor Analysis and Subscale Reliabilities Estimates**

A series of exploratory factor analyses (EFA) were conducted on OSLQ pretest and posttest, CRL, and CoI. The results should be interpreted with caution, as the sample size in this study is considered inadequate for a stable factor analysis. For an adequate sample size, Gorsuch (1983) and Kline (1994) suggested that sampling of 100 subjects and approximate 5-10 participants per item. In conducting EFA, principle axis method (PAF) was used as an extraction method. According to McCoach, Gable, and Madura (2013), PAF provides an explanation of “the patterns of correlations among measured variables” (p. 119). A promax (oblique) rotation was used because this rotation “allows the axes to collapse, so that the derived factors are correlated to some extent” (McCoach et al., 2013, p. 127). It is assumed that the factors are correlated in the study surveys: OSLQ, CRL and CoI because of the theoretical frameworks used to create the scales.

### **Pre-OSLQ Exploratory Factor Analysis**

After running the EFA, the Kaiser-Meyer-Olkin (KMO) test for sampling adequacy for pre-OSLQ was 0.558. This suggests that the degree of common variance between variables is very poor (Kaiser, 1974), as suspected, due to the small sample size. Bartlett’s Test of Sphericity was significant ( $\chi^2 = 588.043$ ,  $df = 276$ ,  $p < 0.001$ ), suggesting that factor analysis is appropriate because the observed correlation matrix was statistically different from a singular matrix, confirming that linear combinations exist (Pett, Lackey, & Sullivan, 2003). Adapting Kaiser’s (1958) criterion, seven factors were extracted that eigenvalues greater than 1.0. Examination of



the scree plot indicated that six eigenvalues were above the elbow that aligns with the original scale six factors. Therefore, the decision was made to proceed with six factor solution.

Examining factor variance, the first factor accounted for 26% of the variance, the second factor accounted for 14% of the variance, the third factor accounted for 8% of the variance, the fourth factor accounted for 8% and the fifth factor accounted for 6% of the variance. The sixth factor accounted for only 4% of the variance. In determining the number of factors that should be retained, guidelines state that the factors, in total, should account for 70-80% of the variance (Field, 2000; Rietveld & Van Hout, 1993). In this study, the six factors explained 65% of the total variance, approaching 70%, as recommended.

As a step in conducting EFA, factor loadings were examined by checking the pattern matrix. As recommended by Tabachnick and Fidell (2001), items that had pattern coefficients (factor loading) of at least 0.4 were retained. As for the structure matrix, items that correlated higher than 0.5 with two or more factors were deleted. As a result, item 9 was removed because the item correlated on two factors highly (I choose a time with few distractions for studying for my online courses). After checking the pattern matrix, item 16 did not load on any factor and therefore it was deleted (item 16: Although we don't have to attend daily classes, I still try to distribute my studying time evenly across days). The new six factors that have emerged were labeled: (1) educational support, (2) learners' attitudes, (3) goal setting, (4) learners' behaviors, (5) learning standards, and (6) course mastery.

A series of Cronbach's alpha reliability estimate analyses were calculated using 42 students' pre-OSLQ data. A reliability coefficient of Cronbach's  $\alpha = 0.80$  is considered acceptable in experimental research (Cronbach, 1951). For the pre-OSLQ scale, Cronbach's alpha was 0.826. Cronbach's alpha for the first subscale (educational support) was 0.873; 0.652 for the second

subscale (learner's attitudes). During the reliability analysis, item 15 was dropped since it increased the reliability estimate (item 15: I try to schedule the same time every day or every week to study for my online courses, and I observe the schedule). As a result, the second subscale Cronbach's alpha increased to 0.702. For the third subscale (goal setting), Cronbach's alpha was 0.706, and 0.680. for the forth (learner's behaviors) subscale. Further, the Cronbach's alpha for the fifth (learning standards) and the sixth factor (course mastery) was 0.873 and 0.293, respectfully.

The subscales, number of items, items in each subscale, reliability estimates, means, and standard deviations for the pre OSLQ are listed in Table 4.1.

Table 4.1

*Subscales, reliabilities, means, and standard division from the pre-OSLQ data.*

Subscale	Number of Items	Items under the subscale	Cronbach's Alpha ( $\alpha$ )	M	SD
Factor 1 Educational Support	6	17,18,19,20,23,24	0.87	3.35	0.73
Factor 2 Learners' Attitudes	4	6,7,8,21	0.70	3.93	0.48
Factor 3 Goal Setting	2	4,5	0.70	4.23	0.57
Factor 4 Learners' Behavior	5	10,11,12,14,22	0.68	3.42	0.63
Factor 5 Learning Standards	2	1,3	0.87	4.23	0.61
Factor 6 Course Mastery	2	2,13	0.29	3.54	0.58

### Means and Standards Deviation for pre-OSLQ and post-OSLQ

To conduct a subscale score for each participant at the pre-OSLQ and post-OSLQ, scores on the items for each subscale were averaged together. For example, to create a score for each pre-OSLQ scale for subject, the mean score of the items on each subscale was calculated. Table 4.2 presents the means and the standard deviations of pre-OSLQ and post-OSLQ scores.

Table 4.2

*Factor means (M) and standard deviations (SD) for the pre-OSLQ, and post-OSLQ (42)*

Factors	Pre-OSLQ		Post-OSLQ	
	(M)	(SD)	(M)	(SD)
Factor 1 Educational Support	3.35	0.73	3.49	0.76
Factor 2 Learners' Attitudes	4.01	0.49	3.94	0.62
Factor 3 Goal Setting	4.23	0.57	4.16	0.73
Factor 4 Learners' Behaviors	3.42	0.63	3.42	0.77
Factor 5 Learning Standards	4.23	0.61	4.23	0.64
Factor 6 Course Mastery	3.54	0.58	3.61	0.61

Table 4.3

Factor Loadings

**Pattern Matrix**

	Factor					
	1	2	3	4	5	6
Item 18	.981					
Item 17	.835					
Item 4	.833					
Item 23	.814					
Item 19	.608					
Item 20	.527					
Item 7		.946				
Item 15		.531				
Item 21		.524				
Item 6		.512				
Item 8		.498	.481			
Item 9						
Item 5			1.058			
Item 4			.567			
Item 16						
Item 11				.792		
Item 10				.516		
Item 12				.462		
Item 14				.460		
Item 3					.902	
Item 1					.752	
Item 22				.406		-.662
Item 2						.630
Item 13						.420

Table 4.5  
Factor Loadings

Structure Matrix						
	Factor					
	1	2	3	4	5	6
Item 24	.894					
Item 18	.882					
Item 23	.852			.409		
Item 17	.846					
Item 19	.499					
Item 20	.421					
Item 7		.916				
Item 9		.609	.556	.608		
Item 6		.600	.461			
Item 21	.444	.528				
Item 15		.401				
Item 5			.900		.490	
Item 4			.701	.534		
Item 8		.585	.594		.421	
Item 16			.542			
Item 11				.631		
Item 10				.601		
Item 14			.551	.586		
Item 12						
Item 3			.502		.897	
Item 1		.434	.567		.832	
Item 22	.482			.554		-.665
Item 2						.621
Item 13						
Extraction Method: Principal Axis Factoring.						
Rotation Method: Promax with Kaiser Normalization.						

### CRL Exploratory Factor Analysis

After running the EFA, the Kaiser-Meyer-Olkin (KMO) test for sampling adequacy for CRL survey was 0.768. This suggest that the degree of common variance between variables is middling (Kaiser, 1974). Bartlett's Test of Sphericity was significant ( $\chi^2 = 535.309$ ,  $df = 171$ ,  $p < 0.001$ ). This suggests that factor analysis is appropriate for further processing. By examining factor variance, the first factor accounted for 45% of the variance; the second accounted for 12% and the third 6%. The CRL survey three factors explained 63% of the total variance, approaching the recommended 70% threshold. After examining the structure matrix, items 4 and 10 were removed because of correlating highly ( $r > 0.5$ ) on more than one factor (see table 4.6).

Table 4.6

#### *Structure Matrix for items 4 and 10*

Items	Factors		
	1	2	3
Item 4	0.581		0.540
Item 10	0.586	0.578	

After examining the pattern matrix, item 1 was removed due to not loading on any factor above the required threshold. Cronbach's alpha reliability estimates were calculated for the CRL survey, the reliability coefficient of Cronbach's  $\alpha = 0.90$  (0.42 - 0.94). The subscales, number of items, items in each subscale, reliabilities, means, and standard deviations for the CRL are listed in Table 4.7.

Table 4.7

*CRL reliabilities, mean, and standard deviations*

Subscale	Number of Items	Retained Items	Cronbach's Alpha ( $\alpha$ )	M	SD
Factor 1 Collaboration	12	2,3,6,7,8,9,11,12,13,15,16,17	0.94	3.04	0.57
Factor 2 Group members' commitment	2	14,19	0.75	3.44	0.70
Factor 3 Learning behaviors	2	5,18	0.42	2.33	0.69

**CoI Exploratory Factor Analysis**

After running the EFA, the Kaiser-Meyer-Olkin (KMO) test for sampling adequacy for CoI survey was 0.586. This suggest that the degree of common variance between variables is middlilng (Kaiser, 1974). Bartlett's Test of Sphericity was significant ( $\chi^2 = 1465.539$ ,  $df = 561$ ,  $p < 0.001$ ). This suggest that factor analysis is appropriate for further processing. By examining factor variance, the first factor accounted for 41% of the variance; the second 12% of the variance; and the third, 4% of the variance. The CoI survey three factors explained 57% of the total variance. Cronbach's alpha reliability estimates were calculated for CoI survey after all the necessary items deletion, the reliability coefficient of Cronbach's  $\alpha = 0.946$ . Items 27, 29, 31, and 34 were removed due to not loading on the pattern matrix.

Table 4.8

*The reliabilities, means, and standard deviations of CoI scores*

Subscale	Number of Items	Retained Items	Cronbach's Alpha ( $\alpha$ )	M	SD
Factor 1 Attitudes towards online course	13	14,15,16,17,18,19,20,21,22,28,30,32,33	0.92	3.83	0.53
Factor 2 Perception of the instructors	8	1,2,3,4,6,7,8,11	0.91	3.86	0.58
Factor 3 Facilitation and Instruction	9	5,9,10,12,13,23,24,25,26	0.91	3.57	0.60



## Appendix K

### CRL scale-Approval letter from Authors

3/22/2017

University of Connecticut Mail - Co-Regulation scale



Rasis Alanazi <rasis.alanazi@uconn.edu>

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#### Co-Regulation scale

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Nicole Barnes <barnesn@mail.montclair.edu>  
Reply-To: barnesn@mail.montclair.edu  
To: Rasis Alanazi <rasis.alanazi@uconn.edu>

Mon, Oct 19, 2015 at 10:21 AM

Hi Rasis


Yes, please see attached. Sure, as long as you cite the survey in your paper.

Thanks,

Nicole  
[Quoted text hidden]  
—  
\_\_\_\_\_

Nicole Barnes, Ph.D.  
Associate Professor, Educational Foundations  
Certificate in Educational Assessment, Co-coordinator  
Assistant CAEP Coordinator  
College of Education and Human Services  
Montclair State University  
University Hall, 2110  
Montclair, NJ 07043  
(973) 655-3028  
[barnesn@mail.montclair.edu](mailto:barnesn@mail.montclair.edu)

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 Coregulated Learning Survey.pdf  
20K

## Appendix L

### CoI-Approval letter from Authors

3/22/2017

University of Connecticut Mail - Permission to use Community of Inquiry survey



Rasis Alanazi &lt;rasis.alanazi@uconn.edu&gt;

#### Permission to use Community of Inquiry survey

Ben Arbaugh <arbaugh@uwosh.edu>  
 To: Rasis Alanazi <rasis.alanazi@uconn.edu>

Tue, Mar 29, 2016 at 12:28 PM

Hello Rasis,

Yes, please feel free to use the CoI instrument

It's been some time since I've worked with the survey, but these certainly are in the ranges I found. My last article (attached) using the instrument had SP at .88, CP at .94 and TP at .97

My administration of the survey was in the order presented in the attached article, but I know that my colleagues have worked with differing orders and have had comparable reliability measures. Karen Swan and Peter Shea's work reflect variation of question ordering.

Best of luck with your study, Ben

[Quoted text hidden]

--

J. B. (Ben) Arbaugh, Ph.D.  
 Founding Member, Society of Business and Management Education Researchers (SBMER)  
 Associate Editor, *Decision Sciences Journal of Innovative Education*  
 Interim Department Chair, Management and Human Resources  
 John McNaughton Rosebush Professor  
 College of Business  
 University of Wisconsin Oshkosh  
 800 Algoma Blvd.  
 Oshkosh, WI 54901  
 (920) 424-7189  
 (920) 203-2647  
 email: arbaugh@uwosh.edu

INTHIG494.pdf  
 459K

## Appendix M

### OSLQ-Approval letter from Authors

3/22/2017

University of Connecticut Mail - RE: Psychometric Information on OSLQ Instrument



Rasis Alanazi &lt;asis.alanazi@uconn.edu&gt;

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#### RE: Psychometric information on OSLQ instrument

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Barnard-Brak, Lucy &lt;lucy.barnard-brak@ttu.edu&gt;

Thu, Feb 4, 2016 at 9:30 AM

To: "Paton, Valerie" &lt;valerie.paton@ttu.edu&gt;, "Lan, William" &lt;WILLIAM.LAN@ttu.edu&gt;

Cc: "asis.alanazi@uconn.edu" &lt;asis.alanazi@uconn.edu&gt;, "Miller, Avery" &lt;avery.miller@ttu.edu&gt;

Hi Rasis,

Please feel free to use and modify. I believe the scale is actually a little outdated with respect to mobile learning contexts. There is no reverse scoring, please just sum items. We have a student who has developed another self-regulated learning measure for the online context that is more up to date that you may be interested in partnering with. Her name is Avery Miller. I am cc'ing her on this e-mail.

Thanks,

Lucy

Lucy Barnard-Brak, Ph.D.  
Associate Professor  
Educational Psychology & Leadership  
Texas Tech University  
PO Box 41071  
Lubbock, TX 79410

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**From:** Paton, Valerie
**Sent:** Wednesday, February 03, 2016 12:52 PM**To:** Barnard-Brak, Lucy; Lan, William**Subject:** FW: Psychometric information on OSLQ instrument

Lucy and William,

Would you be willing to respond to this request? Also look at his question regarding reverse scoring in the OSLQ.

Cordially,

Valerie

