Self-regulated Learning in a Hybrid Science Course at a Community College

by

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ABSTRACT

Community college students are attracted to courses with alternative delivery formats such as hybrid courses because the more flexible delivery associated with such courses provides convenience for busy students. In a hybrid course, face-to-face, structured seat time is exchanged for online components. In such courses, students take more responsibility for their learning because they assume additional responsibility for learning more of the course material on their own. Thus, self-regulated learning (SRL) behaviors have the potential to be useful for students to successfully navigate hybrid courses because the online components require exercise of more personal control over the autonomous learning situations inherent in hybrid courses. Self-regulated learning theory includes three components: metacognition, motivation, and behavioral actions. In the current study, this theoretical framework is used to examine how inducing self-regulated learning activities among students taking a hybrid course influence performance in a community college science course.

The intervention for this action research study consisted of a suite of activities that engage students in self-regulated learning behaviors to foster student performance. The specific SRL activities included predicting grades, reflections on coursework and study efforts in course preparation logs, explanation of SRL procedures in response to a vignette, photo ethnography work on their personal use of SRL approaches, and a personalized study plan. A mixed method approach was employed to gather evidence for the study.

Results indicate that community college students use a variety of self-regulated learning strategies to support their learning of course material. Further, engaging

community college students in learning reflection activities appears to afford some students with opportunities to refine their SRL skills and influence their learning.

The discussion focuses on integrating the quantitative and qualitative data and explanation of the findings using the SRL framework. Additionally, lessons learned, limitations, and implications for practice and research are discussed. Specifically, it is suggested that instructors can foster student learning in hybrid courses by teaching students to engage in SRL processes and behaviors rather than merely focusing on delivery of course content. Such SRL behaviors allow students to exercise greater control over the autonomous learning situations inherent in hybrid courses.

Keywords: Self-regulated learning, hybrid course development, community college

DEDICATION

This work is dedicated to my husband Nathan and children Trinity and Joaquin who have given me unconditional support and encouragement. I love you.

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TABLE OF CONTENTS

Page

LIST OF TABLES

LIST OF FIGURES

Figure Page

Chapter 1

INTRODUCTION, CONTEXT, AND PURPOSE OF THE STUDY

Distance education has undergone a great transformation; online education has become a standard approach for college course delivery (Allen & Seaman, 2011). The Babson Survey Research Group, working with the College Board, has been examining online education for the past decade. Allen and Seaman reported results from 2,512 respondents indicated three primary outcomes. First, educational institutions look to online course offerings as a strategic direction of their organization. Second, the growth rate of online course enrollment has slowed but continues to exceed the growth of enrollment in face-to-face courses. Finally, the perception of online course quality has increased since the first year of the Allen and Seaman (2011) study; with only one-third of the respondents indicating online courses are of lower quality compared to fifty seven percent in 2003. These findings are consistent with the changes in course delivery in the United States. Online education is here to stay. One of the most substantial benefits of online course delivery is that it facilitates autonomous learning. In fact, an increasing number of institutions are offering more online courses, and certain for-profit institutions are focused primarily on offering online courses. As these institutions thrive, public educational institutions must also offer online courses to remain competitive (Perry, 2009a).

Explanation of the Issue

I am a residential faculty member in the science division at Estrella Mountain Community College (EMCC) located in Avondale, Arizona. I teach biology courses for majors and non-majors. Further, I was responsible for developing the hybrid version of

BIO 160, non-majors Introduction to Human Anatomy and Physiology. My position as an instructor allows me to exert positive influences on students through teaching. My favorite part of the job is the interaction I have with my students.

Like many community college faculty members, much of my teaching experience has been learned on the job. As a community college instructor, I have the ability and responsibility to exert a positive influence in students' lives. To be effective and successful in my position, I am continually exploring opportunities to develop and enhance my pedagogical skills to ensure greater achievement by my students.

Community college teaching differs somewhat from university teaching. At the community college, class sizes are usually small which allows instructors to forge relationships with students to increase learning and retention. Further, EMCC is dedicated to being a Learning College as defined by the League of Innovation, with a focus on increasing active learning and student engagement in the classroom to address needs of our specific student constituency. As a Learning College, EMCC is committed to faculty members reflecting on their instruction and making adjustments to teaching processes to enhance student learning. The science division faculty members support the Learning College instructional model.

The faculty members in the science division are fully committed to increasing student learning, escalating course completion rates, and improving student retention. Despite the focus on supporting students and increasing student achievement, there is a general disdain for offering online science courses among the science faculty members at EMCC. Much of this concern results from the belief that the online environment is not conducive to the learning objectives of a laboratory-based curriculum. Despite the

general negative perceptions of online science courses, EMCC science faculty members support efforts to increase student success through the modification of curriculum according to student needs, including development of online courses. This support stems from professional courtesy and open mindedness. Further, there is a student-centered orientation among division members in which student success serves as the common denominator. Three of the eleven faculty members of the science division offer hybrid courses. One faculty member has developed an online geology course. There is no mandated movement for online course development. As a result, faculty members choose to make their courses available in various formats that best support student learning. The science division at EMCC previously offered only non-science major courses as hybrid courses. In the 2011 fall semester, the first hybrid course for science majors was developed.

Context for the Study

The student population at EMCC is comprised of a combination of recent high school graduates and non-graduates, adults seeking career changes, and adults returning to school. According to the 2010 EMCC Environmental Scan Report, 40% of students enrolled in spring 2010 did so for the following reasons: "to improve my career skills," "to prepare for employment," "to prepare for a career change," and "to learn new career skills" (Office of Planning and Institutional Effectiveness, 2010). In 2001, EMCC was certified as a Hispanic-Serving Institution (HSI). The student population at EMCC is a diverse population with diverse needs.

Community college students are quite different than those who enter universities directly following high school. Most community college students have additional

responsibilities at home and work when compared to typical university students. Because of these additional responsibilities, community college students may experience additional stressors including commuting; participating in extracurricular activities; and carrying out additional work and fulfilling financial, and family obligations (Bambara, 2009; Johnson, 2009). As a result, many community college students only take one or two classes they can fit into their schedule as evidenced in the disproportionately large numbers of less than full-time students. According to the EMCC Environmental Scan (2010), the percentage of students enrolled full-time in spring of 2010 was 28% and half-time enrollment was 26%. Further, less than half-time enrollment was at 30%. Consequently, the students at community colleges seek flexible class schedules. Online and hybrid class offerings provide students with scheduling flexibility because the requirement for time on campus is decreased.

In addition to flexibility, community college students require additional support to successfully matriculate. This requirement is connected to the aforementioned alternative academic paths, limited preparation, and increased extracurricular stressors. I have observed that many of my students are underprepared in mathematics, critical reading, writing, and critical thinking skills. This is evidenced by high attrition rates in courses at the freshman and sophomore levels. It is clear that community college students require additional support to ensure their success in courses and their retention at the community college.

The hybrid course format provides flexibility which benefits students who need this option. Nevertheless, as noted previously, there is a great concern about offering a course with a laboratory component in this format. Moreover, in my experience, I find

that online courses can be difficult for students with little experience in autonomous learning. As a result of these conflicting aspects of the situation, I find myself in a conundrum. The development of this course was spurred by my desire to alleviate scheduling demands for community college students; however, use of a hybrid approach may actually lead to increased academic demands on community college students who take such courses and are potentially least prepared for them. Due to the complexity of this innovation, I employed best practices approaches in the development and implementation of this course by (a) including a strong student engagement component and (b) incorporating a strong student support component which focuses on including self-regulated learning (SRL) behaviors.

Based on classroom observations, conversations with colleagues, and careful reflection, I believe that offering carefully developed and implemented hybrid science courses may ameliorate low student engagement due to their lack of preparation and personal obligations. Specifically, online materials that are made available to students have the potential to increase academic engagement outside of the classroom because they can be accessed anywhere and anytime. Online components can potentially engage students through the use of media such as videos, interactive programs, and podcasts. Additionally, the discussion can continue outside of classroom on discussion boards, chat rooms, and social media (Seng & Mohamad, 2002; Valaitis, Sword, Jones, & Hodges, 2005). Moreover, increasing student access by offering a hybrid class is one way I can address the extracurricular obligations of community college students by providing increased schedule flexibility. Further, a hybrid class can potentially overcome lack of preparedness when embedded with opportunities for SRL skill refinement (Cho, 1999).

For example, one aspect of typical SRL interventions is student monitoring of preparation. Thus, students keep records of their preparation times, how they studied, and so on to foster study time and engagement with the course materials.

Purpose and Research Questions

This action research study was conducted to examine the development and implementation of a partially online, or hybrid, science course at a community college. The course that was developed is BIO 160, Human Anatomy and Physiology for non-science majors, which includes a laboratory component.

The goal of this project is to elucidate and document SRL behaviors in a hybrid course at a community college. The research questions guiding this project are:

1. How and to what extent do community college students enrolled in a hybrid laboratory science course exhibit SRL behaviors?

Based on data for this question, I hope to create a community college student profile with respect to the use of SRL behaviors in a hybrid course. This information can be used by me, by other course developers, and by student support services personnel to better encourage and support our students.

2. How and to what extent does the use of SRL behaviors influence student performance in a hybrid course?

Data from this question can be used to assess whether including SRL components in the hybrid course benefited student learning. Moreover, it will be useful to determine which of the SRL behaviors was most beneficial.

Chapter 2

THEORETICAL PERSPECTIVES AND RESEARCH GUIDING THE PROJECT

Educational institutions are including online course delivery in their strategic plans and in their course offerings at ever increasing rates (Allen & Seaman, 2011; Chau, 2010; Perry, 2009a). In the past, before the widespread availability of the Internet, colleges and universities offered correspondence courses to increase access. Online courses are increasingly offered by many institutions to boost their distance education efforts (Perry, 2009a). Some institutions have found great success in this platform (Chau, 2010). For example, by providing large numbers of online classes, Rio Salado Community College, a Maricopa Community College asserts it is the "college within everyone's reach" (Rio Salado Community College, n.d.). This campus offers online courses that start every week. The innovation of developing a hybrid laboratory science course was spurred by the need to increase access and flexibility for community college students. Additionally, community college students, as a specific population, typically require greater levels of support throughout their coursework. In an effort to support students, I will integrate principles of self-regulated learning (SRL) into the development of the hybrid class as well as its implementation. In this chapter, information about the theoretical perspectives and research guiding the project is presented.

To foster and maintain an active learning environment, aspects of social learning theory, constructivist theory, and experiential learning theory have guided decisions about which pedagogical strategies I would use in my course. Curriculum was developed using principles of differentiated learning and Understanding by Design (UbD) as frameworks.

Social Learning Theory

Learning occurs when one engages with others. Bandura (1977) asserts that there are three mutual components of learning: cognition, behavior, and environment, each mutually influencing one another. Our thoughts influence our behavior, which in turn influences our environment, which in turn will influence both our thoughts and behavior, reciprocally. Therefore, actively participating in the group and environment is essential to learning. Wenger (1998) affirmed the importance of social engagement with others in learning by characterizing learning as "social participation as a process of learning and of knowing" (p. 4). Online, as compared to face-to-face, instruction has different modes of engagement and requires different ways of constructing the all-important interactions that facilitate learning (Nicol, Minty, & Sinclair, 2003; Orey, Koenecke, & Crozier, 2003). Forming these social connections in an online environment is substantially different from that which occurs in a traditional face-to-face environment. Connections that facilitate learning must be carefully considered and designed by the online or hybrid course developer to create opportunities for such interaction. For example, by employing UbD to facilitate the course design and development, the course developer must carefully design course requirements to facilitate these interactions.

Results from a study by Nicol et al. (2003) showed that students in an online class had varied levels of computer proficiency which affected their performance in the course. The authors indicated more emphasis should be placed on ensuring all students were on "par," with regard to technological skills when the class started. Additionally, having an online task prior to the first meeting would be useful because this activity would help identify students with technical inadequacies. Orey et al. (2003) concluded that although

there are many technological advances in online education such as virtual classrooms and chat, students will not necessarily use these tools to engage in the class. Narciss, Proske, and Koerndle (2007) suggested that the mere volume of online resources may deter the student from actively engaging in the online material. Therefore, the class design must promote and guide students to use these tools to form online communities. Findings from this study also showed the communities that developed were artifacts from some kind of face-to-face interaction rather than being the result of the course procedures that were established to foster the development of an online community. Hybrid learning environments must be designed so that face-to-face and online activities promote learning through social interaction.

Constructivist Theory

Because face-to-face time is limited in a hybrid course, traditional didactic instruction such as lecture is not conducive to the learning environment. Rovai (2004) suggested that use of a Socratic learning environment to enhance critical thinking and application of knowledge is more appropriate for distance education. Further, assessment of learning through projects reflects a constructivist approach that has benefits for learners in distance education courses. This allows for students to demonstrate and authenticate their knowledge drawing upon the diverse talents and experiences of the students. Using project-based assessment can also alleviate plagiarism because this requires a level of personalization that cannot be easily feigned.

In a hybrid course environment, students must be able to draw upon their prior knowledge and add to this knowledge to create understanding and meaning in the class. Rovai (2004) also noted that there is much to learn about what kinds of constructivist

activities are most helpful in attaining the ultimate benefit of online course delivery, asynchronous learning. A common mistake made by course developers is to blindly place activities online, including those traditionally used in the face-to-face classroom. Knowing that the online component of instruction is different than face-to-face instruction is critical in developing online courses. Too often, educators try to merely substitute or intertwine activities from the face-to-face environment, which leads to failure. They are different and should be molded accordingly. Some assignments that are completed in a traditional class may not be practical in a hybrid learning environment. Moreover, online activities should be developed to maximize the autonomous learning environment.

Experiential Learning Theory

A fundamental aspect of the learning process is experience. William James, John Dewey, Kurt Lewin, Carl Rogers, and Paulo Freire were instrumental in the establishment of experiential learning theory (Kolb, 2005). The definition of experiential learning theory (ELT) is "the process whereby knowledge is created through the transformation of experience. Knowledge results from the combination of grasping and transforming experience" (Kolb, 1984, p. 41). ELT has been applied to the development of science hybrid classes. There are two aspects of learning, rote memorization of facts or cognition and learning by experience or experiential learning. Learning anatomy, parts of the body, lends itself well to memorization. By comparison, physiology, the function of those parts, lends itself to experiential learning. From my experience, I find that students are genuinely interested in learning about how the human body works or what can go wrong with its functions. Experiencing the course material goes hand-in-hand

with human anatomy and physiology. There is an innate curiosity about our bodies and how we function. Allowing students to learn through experience in which instructors serve as facilitators is part of educational reform accompanying the development of online distance education courses (Strait & Sauer, 2004). My role as instructor is not to lecture, but to construct situations in which students can experience the material and engage in interactions with fellow students. Thus, my role is to act as a resource, guide activities, and support student learning. Students in a hybrid class are in charge of their learning and need to be supported in understanding this perspective.

Implications for course design based on learning theories. In my previous work with students in the classroom, it was observed that frequently engagement is low. Traditionally, science instruction is often lecture based and leads to passive learning (Seng & Mohamad, 2002). Thus, it is imperative to engage my students in the online classroom. For this to occur, students must also participate in active learning outside of class. This is clearly a symbiotic relationship in which engagement in the classroom is dependent on student engagement outside of the classroom, which in turn influences student engagement in the classroom. If students are interested in the subject material during class, there is a greater likelihood that they will further investigate the subject outside of the classroom. The opposite also holds true; if during the class students are uninterested, chances are low that they will conduct further investigations outside of class.

As part of the course design, formative and summative assessments were used to refine the course. Summative assessments include four unit exams, a body project, and a research project on a disease. Formative assessment was performed in the form of weekly

blogs, think–pair-share activities in class, constructive feedback on assignments, and the use of Socratic instructional methods. These assessments will also allow me to modify the course accordingly. Other considerations included the use of consistent class procedures (Toth et al., 2008). All online work will have a consistent due date and time. The online assignments were divided into individual activities, group activities, and other resources. The class agenda was posted in advance so students will know what to expect and what readings need to be completed before the next face-to-face meeting. These elements were incorporated in the class through assignments as well as built in tools such as grade check feedback every four weeks and satisfaction surveys three times a semester. Finally, a clear emphasis on the importance of applying self-directed learning procedures and preparation for class was evident in the course implementation.

As a result of previous cycles of action research, it was determined the "lecture component," that is to say, the content dissemination component, would be offered online and the laboratory component would be offered in traditional face-to-face style. This arrangement constitutes the hybrid format. This hybrid format at EMCC has been branded as *Scibrid*, which stands for *sci*enc*e* hy*brid*. Historically science instructors have placed emphasis on the laboratory component, thus, the laboratory portion of the hybrid course is being conducted as the face-to-face component of the course.

The hands-on nature of science laboratories is the basis for experiential and constructivist learning opportunities for students. Laboratory activities can enrich science concepts by cultivating investigation, content knowledge, problem-solving skills, and manipulation skills (Hofstein & Lunetta, 1982). In 2004, Hofstein and Lunetta revisited their research on laboratory learning, in light of technological advances and paradigm

shifts over the past twenty years. Their more recent report maintains the potential for laboratory learning but emphasizes the roles of the learners in constructing their knowledge as well as authentic or contextual importance of laboratory inquiry, key constructs of constructivist and experiential learning (Hofstein & Lunetta, 2004).

In the following example, the influence of the aforementioned learning theories on the development of the curriculum for the hybrid course is described. The Body Project is a semester-long assignment developed to draw upon students' skills and curiosity. During the first meeting of class, students will receive a six foot long piece of paper, on which, they will outline their body. The students add the anatomy covered every week to the drawing. Finally, at the end of the class, they will have constructed a life sized diagram of the human body (their body) and have included every system covered in the class.

The students bring in their body projects before each examination to use as a mind mapping concept review. During the review, the body drawings were exchanged and students evaluated the drawing of another student. This project utilizes aspects of constructivism, experiential learning, and social learning theory and was designed with students' understanding as a learning outcome. The course is designed around how the body systems contribute to homeostasis. Every week a new system is covered and at the end, all body systems will be covered. The Body Project allowed students to construct a visual representation of the content. Finally, this project is an opportunity for students to be active in their learning, an underlying aspect of self-regulated learning (Barnard-Brak et al., 2010).

Self-regulated Learning Theory (SRLT)

The section on SRLT is divided into three major sections. The first section is focused on how the agentic aspect of SRLT relates to the autonomy of online course delivery. The second section is focused on the components and definitions of SRLT and self-regulated learning behaviors. The third section is focused on the incorporation of SRLT into practice. The focus is on monitoring, predicting, and reflecting because these are strategies students can use to influence their course-related behaviors with a basis in SRLT.

Agency and autonomy. Bambara (2009) reports that along with increased online course offerings, there is a 30% increase in withdrawal or failure rates at American community colleges in such courses when compared to traditional face-to-face courses. The findings of this study showed that many students felt isolated and academically challenged, which led students to operate in "survival or surrender" mode (Bambara, 2009, p. 233). In Bambara's study, students who successfully completed the course were said to have survived it. By comparison, those that did not pass the course were said to have surrendered to the course. Those who survived typically demonstrated optimism and confidence when dealing with isolation and academic challenges. They met the challenge. By comparison, those who surrendered were characterized by pessimism and disdain for the course. Students who surrendered felt isolated and alone in the autonomous learning environment.

From another perspective, those who were successful were able to take ownership of their learning process (Martin, 2004). This can be referred to as agency. In the agentic perspective, individuals who exhibit agency are able to direct their life through their

decisions and actions. This holds true for learning. A student is able to direct their learning through their decisions and actions. Agency is one aspect of self-regulated learning (SRL) (Marin, 2004). Additional research contends that SRL has its roots in the social cognitive theoretical framework (Zimmerman, 1989; Barnard-Brak, Lan, &, Paton 2010). SRL is important for asynchronous learning as well as synchronous environments. The hybrid modality enlists both face-to-face and online learning environments. Taken together, it appears that SRL behaviors are extremely important for hybrid courses.

Motivation and self-regulated learning. Learners who are self-regulated tended to be more self-efficacious (Zimmerman & Schunk, 2001; Schunk, 2005a, Schunk, 2005b). That is, they perceived themselves as being able to learn when they executed actions to foster their learning. This is important because motivation can be incorporated in all four phases of SRLT and is critical to SRLT (Pintrich, 2000). Schunk (2005b) noted that motivations for poor self-regulated learners tended to be product-based, whereas good self-regulated learners tended to use process-based motivations. A process-based motivational strategy focuses on the acts performed to learn and master the content, not the ability of the learner. Further, self-efficacious learners attributed success to effort and conversely attributed lack of success to ineffective strategies, which reflected a strong orientation toward self-regulation. These learners were able to review and revise their course preparation activities accordingly.

Motivation is the key to self-regulated learning behavior (Pintrich, 2000; Tuckman, 2003). Motivators such as course grades or scores are considered to be shortsighted, extrinsic in nature, and not effective. Strategies that have been shown to

increase motivation for learning included overcoming procrastination, building self-confidence, becoming more responsible, preparing for tests, learning from lectures, and managing your life (Tuckman, 2003). These activities exemplify self-regulated learning behaviors by stressing an active and deliberate involvement by students in their own learning processes.

Summary of agency and motivation. The processes of teaching and learning constitute a mutual relationship. There are two participants, the instructor and the students. Self-regulated learning describes one of the roles students take on during the teaching/learning process. Zimmerman and Schunk (2001) indicate that self-regulation can affect students' achievement in addition to learner skill and ability. Learning is not solely the result of intellectual functioning, but it is influenced by students' abilities to actively regulate their learning processes. Students may not realize that they direct their own learning and overly rely on the instructor. Self-regulation is especially critical in online education because the student and instructor are physically separated from one another, which can cause non-SRL students to feel isolated and helpless (Barnard, Lan, To, Paton, & Lai, 2008; Narciss et al., 2009; Hsu, Ching, Mathews, & Carr-Chellman, 2009).

Components and definitions of SRLT. Self-regulated learning theory (SRLT) is "an active, constructive process whereby learners set goals for their learning and then attempt to monitor, regulate, and control their cognition, motivation, and behavior, guided and constrained by their goals and the contextual feature in the environment" (Pintrich, 2000, p. 453). Zimmerman and Schunk (2001) describe self-regulated learning as students' ability to take charge of their learning. This does not refer to students' innate

abilities to learn but as variable, and being dependent on students' self-initiated process to increase their learning by enhancing their methods and environments for learning. Key constructs of SRLT are motivation, cognition, and behavior (Schunk, 2005b).

According to Pintrich (2000), there are four phases of SRLT: (a) forethought, planning, and activation, (b) monitoring, (c) control, and (d) reaction and reflection. Zimmerman (2002) condenses SRLT to three phases: (a) forethought, (b) performance, and (c) self-reflection. The phases are not linear and may be simultaneously employed. For example, when participating in forethought, learners may outline their goals. These goals can also constitute an important part of their motivation. In the execution of SRLT, not all phases are required. Execution of the different phases is learner dependent and specific to the learning activity. For example, implementing the control phase by seeking a tutor may not be necessary for short-term activities.

Barnard-Brak et al. (2010) define self-regulated learning (SRL) as, "those active and volitional behaviors [taken] on the part of individuals to achieve in their learning" (p. 62). This can include such activities as time management, goal setting, and resource management. Additionally, metacognition is significant to the process of self-regulated learning (Zimmerman & Martinez-Pons, 1988). Metacognitive strategies are those in which the students are aware of and deliberate in their use of learning strategies. Evidence of such metacognitive efforts includes assessment and revision of learning strategies through planning, organizing, and adjusting course preparation (Barnard-Brak et al., 2010; Kumrow, 2007; Puzziferro, 2008; Zimmerman & Schunk, 1989).

Three components of metacognitive strategies include goal setting, self-monitoring, and self-reflection (Cho, 1999). All are necessary for students to use

metacognition skills in effective ways. Goal setting, directly linked to motivation, serves as impetus for continual effort and as an indicator for self-monitoring (Zimmerman & Schunk, 1989). Self-monitoring activities are those in which comparison of achievement and behavior/strategies takes place. Self-reflection constitutes an evaluation of self-monitoring. During self-reflection, the learner decides what strategies to continue, modify, and whether additional effort is needed. Self-reflection is closely tied to self-monitoring (Cho, 1999).

Results from a review of the literature also suggest the importance of resource management for self-regulated learning (Pintrich, 2000). During the self-monitoring and reflective phase, the learner decides what resources are needed, time and effort adjustments need to be made, and the environmental modifications that are needed. Schunk (2005b) placed emphasis on the careful and thoughtful management of resources by the learner. Thus, taken together, self-regulated learning is based on the following components: motivation for learning or predictions, resource management or monitoring, and metacognition of learning or reflections (Zimmerman, 2002; Pintrich, 2000; Cho, 1999).

Incorporation of SRLT into practice. Involving the learner as a strategic participant during the learning process incorporates SRLT principles. Consequently, positive effects on student achievement can occur. Tuckman (2003) described metacognitive learning strategies in a cycle of three phases, pre-action, action, and reaction. In the study, activities for each phase of the cycle were implemented in one class section and compared to a control section. Student achievement, as measured by grade point average (GPA) in the class with embedded metacognitive strategies was

significantly higher (Tuckman, 2003). Three data points were measured. At the first data collection, prior cumulative grades indicated a similar GPA for both classes. All subsequent data points showed a significantly higher GPA for students who received strategy training. Thus, it was clear that self-regulation of learning at the college level positively influenced student achievement.

In a recent study, Jensen and Moore (2008) found students in introductory biology courses did not have realistic perceptions of their class performance. Students were asked what they thought their final grade was going to be after every examination. Results showed that although many were failing the examinations, they still believed they were going to pass the class. In addition to these findings, student behaviors that contributed to poor academic performance included absences, and unwillingness to do extra work and failure to attend review sessions. Jensen and Moore (2008) concluded that, "academic success depends largely on students' levels of academic engagement" (p. 485). Further, in other research studies, the results suggested that students who were able to regulate their own learning were more successful than those who did not regulate their behavior (Cho, 1999; Shunk, 2005a; Puzziferro, 2008; Zimmerman & Schunk, 1989).

Results from other studies of online courses showed that online course development is increasing in frequency. Public educational institutions must offer online courses to remain competitive (Perry, 2009a). As this trend continues, the need for appropriately fostering stronger SRL skills will also be necessary. As noted previously, findings from SRLT research studies indicated students had false or unrealistic perceptions of their performance in an introductory biology course (Jenson & Moore,

2008). Taken together, it is clear that strengthening SRL behaviors in a hybrid science course could positively influence student performance.

Self-regulation behaviors such as monitoring and modifying studying, engagement, and motivation are even more critical in online courses where students have to assume more responsibility for their own learning. Thus, in the current study, it is anticipated that students who demonstrate more well developed SRL skills are likely to be more successful in an online learning environment.

In this action research study, SRL behaviors were elucidated and documented to create a community college student SRL profile for hybrid courses and to examine how SRL influences student achievement in an online course. Puzziferro (2008) found that specific SRL attributes of time management, study environment, and effort regulation were correlated with performance in class. The components of self-regulated learning – motivation, resource management, metacognition, and learning assessment – are incorporated into the design of this research project. These components were integrated into the following three-step process: monitoring, predicting, and reflecting (MPR). The following figure shows how SRLT can be divided into six constructs: time management, environmental structuring, task strategies, goal setting, self-evaluation, and help seeking (Barnard et al., 2009). Those six constructs are then grouped into three behaviors in the study, monitor, predict, and reflect.

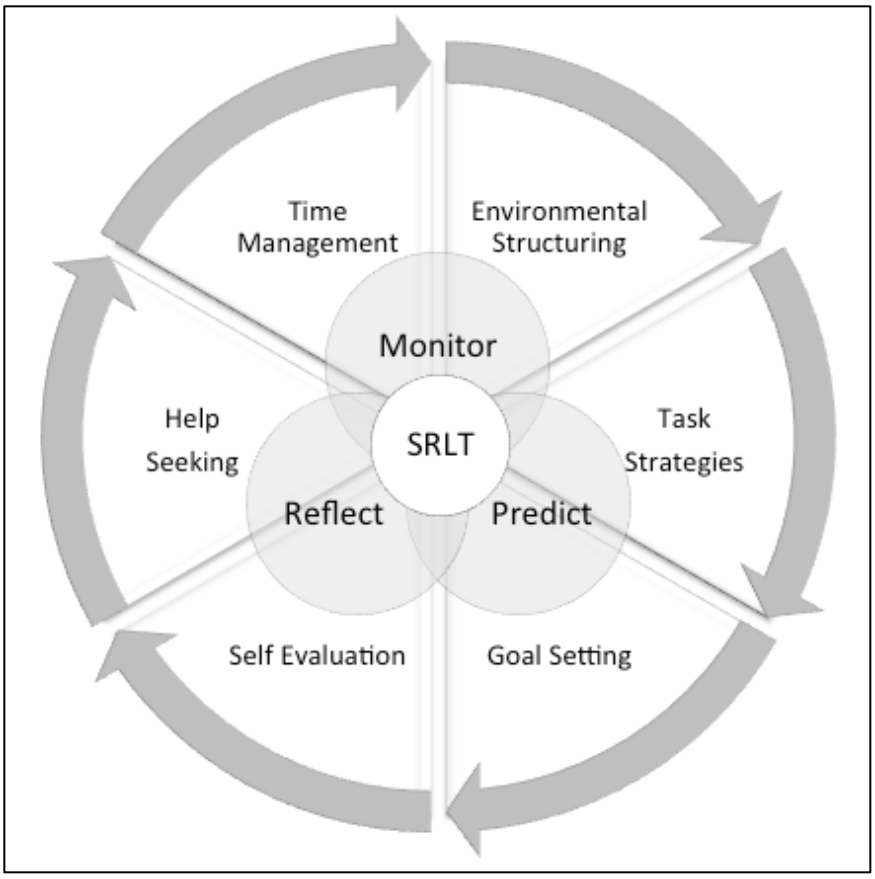

Figure 1: Self-regulated learning theory constructs and underlying behavioral components of the study.

Students were asked to monitor and document their course preparation in a Course Preparation Log (CPL). Before each examination, students were asked to predict their performance on the examination based on their perceptions of preparation for the unit. Finally, after each unit, students will write a learning reflection to assess their learning and how their performance in the class is related to their course preparation.

Implications for the Study and Course Design

Successful student completion in my general biology course ranges from 50 to 70 percent. Many of my students have full time jobs, children, and other obligations making it difficult for students to be physically present on campus. To combat this problem, a

hybrid class was developed. Because this class has an online component, there was less face-to-face seat time. This solution provided students with flexibility of scheduling and increased resources. This hybrid class has potential to enhance student engagement because students must take ownership of their learning to succeed. The decreased amount of face-to-face time in the class will force students to work outside of class on the subject and will also force me (the instructor) to navigate away from traditional lectures for presentation of material. This shifts the responsibility of learning to the student. When the responsibility of learning falls on the student, SRL behaviors are critical to student success (Schunk, 2005b).

Research Guiding the Project

In this section, research and design considerations that were instrumental in the development of the course, course materials, and course procedures are described. Concerns such as general considerations for online courses, need for supporting students, class procedures and training, and so on are considered.

General considerations for hybrid courses. Perry (2009a) suggested that it is no longer a question of whether online instruction should be compared with face-to-face instruction. Rather, the question has become, 'What courses are we willing to offer online?' The primary reason for this change of questions is that online instruction allows institutions to meet the needs of students. Consistent with the previous rationale, institutions have offered and continue to offer distance education in the form of online classes to stay competitive with their peer institutions. Perry noted that faculty members realized this and although they do not necessarily embrace online courses they acknowledged that online classes were here to stay. The Sloan Foundation has been

funding research to study online education and a report of their findings has shown that faculty perceptions about online education has increased from a 57% favorable response rate in 2003 to a 67% favorable response rate (Allen & Seaman, 2011).

In addition to staying competitive, hybrid course delivery also referred to as 'blended' delivery is on the rise because of other advantages. According to the *Community College Times* (2009), hybrid course offerings can help institutions like EMCC, where enrollment is increasing and physical spaces are limited. Thus, faculty members can offer two or more sections of the same class and use the same physical space that one class had used in the past. In essence, colleges can multiply their course offerings without increasing physical classroom space which provides a huge financial incentive.

There are some disadvantages to online instruction. First, there continue to be concerns about the quality of online courses. In addition to other findings, Perry (2009a) notes that some faculty members felt online classes were 'inferior' to traditional face-to-face classes. Moreover, results from several studies showed online courses required more preparation, on the part of the instructor, than traditional face-to-face courses (Perry, 2009a; Seng & Mohamad, 2002). In addition, technological infrastructure problems can greatly inhibit online course delivery (Seng & Mohamad, 2002).

There were other drawbacks associated with offering online and hybrid classes, as well. Perry (2009b) noted both online and hybrid classes cost the students more because of attached technology fees, but he mentioned that proper strategic planning to include needed infrastructure can alleviate these costs. For example, in the current context, the EMCC library holds few physical books, but instead offers many online resources.

Incorporation of technological advances has been included in the strategic plan of the college.

Perhaps, the greatest drawback to including an online component in a course also provides the greatest benefit. Online courses force students to take responsibility for their learning. Students must have actively participated in their learning. This obligation may require too much of typical community college students and in that case, students have been set up for failure. Successful completion of online courses requires students to engage in SRL behaviors which may be lacking in typical community college students.

Need for student support. After conversations with my colleagues, it is clear that lack of student preparedness is a major factor in student failure in our division and college. Large numbers of students in Arizona are not college ready as evidenced by their disproportionate placement in remedial mathematics courses (Kossan, 2009). Frequently, the courses taught are remedial, introductory college level courses.

As a result of these and other shortcomings, community college students need a great deal of support. A learner analysis performed in previous cycles of this project showed that EMCC students are a heterogeneous group. Most personal characteristics including socioeconomic status, ethnicity, expertise, and life experience yielded great diversity. In cases of such classroom diversity, students benefit from differentiated instruction (Tomlinson, 1999). According to Tomlinson (1999), content, process, and product should be closely linked during curriculum development to ensure effective teaching and learning. Additionally, Wiggins and McTighe (2005) propose the use of essential questions and backwards design when designing curriculum.

Results from other research studies have shown that not all students are successful in an online learning environment (Seng & Mohamad, 2002). Students were more successful when they were aware that in exchange for less in-class time, they would be doing more work outside of class on their own. This meant that they had to take responsibility for their learning and implement self-regulatory behaviors such as accessing the course at their own volition, engaging in appropriate time management processes, and monitoring their learning processes (Puzziferro, 2008; Vaughn, 2007).

Increasing student learning through course design. In other research on effective components of online and hybrid courses, Toth, Foulger, and Amrein-Beardsley (2008) found that successful hybrid courses needed to include key components such as a class procedure protocol, training allowances for students and faculty, continual evaluation, and clear expectations and requirements. The authors suggested that these components should be incorporated into the course design to facilitate student learning.

With respect to implications for the present action research study, during the first class meeting, it was important to establish class expectations and model the required skills necessary to use the online course platform, Blackboard. Toth et. al. (2008) also noted when offering a hybrid class, concessions needed to be made to provide support of technology skill acquisition. Embedded in the course are links and details for resources provided by EMCC for online students. In addition, during the face-to-face time, activities were modeled. Students will not be the only ones acquiring new skills; faculty members also need support in technological training. During the offering of the pilot section, the teacher-researcher met with an instructional technologist at EMCC and

worked with the Center for Teaching and Learning on campus to incorporate effective instructional processes.

Finally, two separate university case studies, a chemistry course and courses in nursing and midwifery, reported that having an online class component gave students additional resources and time to better prepare for the face-to-face instructional component (Seng & Mohamad, 2002; Valaitis et al., 2005). These benefits of incorporating online instruction along with traditional methods allowed students to actively engage in their learning processes. Both studies reported an increase in student-to-student communication as well as student–to-instructor communication. Seng and Mohamad (2002) found that because course materials are readily accessible to students online, this allowed students to spend more time in the classroom learning as opposed to being consumed by note taking.

Implications of the Other Research for the Study

Taken together, the findings from these research studies suggest general considerations such as convenience and access, providing student support, and careful consideration of course design were helpful in increasing student performance in online or hybrid courses. For example, increases in student-to-student and student-to-instructor communications can be accomplished in appropriately designed hybrid courses. Thus, the course was developed based on best practices for independent learning and those that encourage community building as guiding principles. Key instructional design components included continual evaluation and consistency (Toth, et. al., 2008), increased communication (Valaitis et al., 2005), and additional time (Seng & Mohamad, 2002).

Finally, backwards design and Understanding by Design (UbD) principles were incorporated in the course development as well (Wiggins & McTighe, 2005).

Online course delivery can be a contentious topic for science faculty members (Perry, 2009a). In this action research study, the researcher will attempt to integrate technology to support student needs while at the same time attempting to conserve the academic engagement typical of face-to-face laboratory science courses. Additionally, student use of self-regulated learning (SRL) behaviors were emphasized because they are important for overall student success. The relevance of this project extends beyond my classroom and discipline. The findings from this project can inform course development for the college and student support services. SRL behaviors that enhance student performance in online learning environments are not limited to online courses. Use of these behaviors is important in all learning environments. As such, SRL behaviors can benefit students throughout their academic career and beyond. Further, because community college students have different needs, documenting SRL behaviors will help the college address those needs.

The purpose of this project is to continue to support the needs of community college students by offering flexible course delivery while increasing academic engagement. Nevertheless, there are concerns about offering a science course in a hybrid format. Typically online courses are not recommended for students lacking basic skills and who are in need of additional support. Thus, I find myself in a conundrum. The development of this course was spurred by my desire to alleviate schedule demands of the community college student; however, this course format may create increased demands for the community college student. Due to the complexity of this innovation, the

inclusion of activities that support students to develop and refine their SRL behaviors is essential to their success because no instructor is physically present during the online component to the hybrid course. The success of the student is highly dependent on their ability to regulate their own behavior to control their learning (Kumrow, 2007; Zimmerman & Schunk, 2001).

Chapter 3

METHOD

In this chapter, the methods used for this research study are described. Details are provided about the intervention, use of mixed methods, setting and participants, role of the researcher, instruments, data collection procedures, and data analysis procedures. Recall, this study was conducted in an attempt to answer the following research questions:

1. How and to what extent do community college students enrolled in a hybrid laboratory science course exhibit SRL behaviors?
2. How and to what extent does the use of SRL behaviors influence student performance in a hybrid course?

Intervention

The intervention consisted of the incorporation of a self-regulated learning process of monitor → predict → reflect (MPR) into a hybrid-learning environment using a suite of activities. These activities included recording course preparation logs; making exam predictions; conducting learning reflections; and engaging in three SRL-based assignments including writing responses to a vignette, developing a photo ethnography, and devising a student generated individual course preparation plan.

Students were asked to monitor their preparation for class by keeping a self-report log of their course preparation activities, the course preparation log (CPL), including a description of the activities and time spent on those preparation activities. The CPL was given to every student at the beginning of the course. On this form, students recorded the time spent preparing for class as well as the type of preparation that was carried out.

Different types of preparation might include reading, taking notes, making an outline, studying individually, studying with a another student or group of students, gathering additional information from books, gathering additional information from the Internet, and so on. The CPL chart with some examples filled in for students is shown in the Appendix C. This component of the intervention suite was designed to engage students in monitoring the behavior phase of SRL.

Predicting grades was part of the intervention. At the end of every unit, before students took the unit examination, they were asked to predict their performance on the unit examination. This prediction was made the day of the examination, before the examination was administered. Students were asked to think about their preparation for the examination as they made their prediction. This exercise was based on the metacognition and motivation components of SRL.

After the examination has been graded, the students reviewed the results and reflected on their performance in relation to their course preparation activities. This activity comprised the learning reflections wherein students were asked to engage in self-reflection, a key component of SRL. In the learning reflections students were asked to write about their grade and how their grade was or was not consistent with their learning preparation behaviors. The following prompts were used for the learning reflections: How and in what ways does your grade on the examination reflect your preparation for this unit? Is there anything you would do differently to prepare for the next unit? Why or why not?

Additionally, students completed three assignments rooted in SRL theory as part of the intervention suite. The assignments included writing responses to a vignette,

developing a photo ethnography, and devising a student created individualized study plan. These assignments represent exercises in metacognition and self-reflection.

The students were asked to respond to open-ended questions following a vignette. The vignette was a contrived scenario that conveyed an example of a student exhibiting poor SRL behaviors. See Appendix D for the composite vignette. For the photo ethnography assignment, students were asked to do the following: "Take ten pictures that represent your preparation for this class. Upload the pictures on the blog and below each picture write a description of the picture and how it represents your preparation for this class." For the final SRL assignment, students were asked to create an individualized study plan. As part of the study plan, students listed their strengths, weaknesses and strategies for learning. These activities were designed to engage students in self-evaluation, a critical part of SRL.

This action research intervention was concerned with fostering a mental or psychological shift in responsibilities in which students were to take on greater personal self-regulation responsibilities for studying and preparing for class to be successful in an online course. The intervention was not concerned with teaching students specific SRL strategies. Rather, it was designed to engage students in the self-reflection phase of SRL and induce SRL behaviors. Here, self-regulated learning referred to the activities they employed to monitor, predict, and reflect on their individual learning actions that were related to the online class.

Mixed Method Approach

This action research study employed a mixed method approach resulting in qualitative and quantitative data. Appropriate representation, interpretation, and

presentation of legitimate claims constitute the rationale for a mixed methods data collection and analysis (Onwuegbuzie & Johnson, 2009). To accurately represent the social phenomenon of interaction in the class, results were not solely based on quantitative data. The rich qualitative data of the student reflections were used to complement the quantitative data of the student surveys and grade predictions. The descriptions in the qualitative data were used to triangulate the survey results and the grade prediction data to facilitate convergence and validity (Greene, 2007). According to Smith (1997), "The standard of a valid account rests on establishing coherence across multiple lines of evidence and argument" (p. 77).

Certain considerations were taken into account in an effort to ensure this study was valid and trustworthy. Directions for student reflections were clear and not biased with no reference to required preparation activities or length of entry. Students were asked to be honest in their reports. The survey questions were taken from a previous study and have been validated and piloted (Barnard et al., 2009). Narrative responses were prompted with unbiased language.

Setting and Participants

This action research project took place at Estrella Mountain Community College (EMCC). EMCC is one of ten colleges in the Maricopa Community College district and it is located in Avondale, Arizona. The course in which the project was launched is BIO 160, Introduction to Human Anatomy and Physiology, which is a one-semester anatomy and physiology course. This course fulfills a general education non-science major's laboratory science requirement for graduation. In addition, BIO 160 is required for the certificate program in respiratory therapy and imaging.

Participants of this study were students enrolled in BIO 160 in the fall 2012 semester. This was a convenience sample as students self select the course during registration and hence they must be disposed toward taking online courses. Nevertheless, students in this convenience sample were expected to be representative of community college students because they have the same roles and responsibilities that other students have such as work responsibilities, family obligations, and so on. There was no added pressure to conform to a specific approach. Students were expected to be honest with their feedback and to maintain objectivity.

Typically, students in BIO 160 are heterogeneous in most respects due to the fact that this is a general education course not designated for science majors. In a previous cycle of action research with a similar group of students, I administered a learner analysis survey to obtain demographic data. Fifteen students took the survey. There were three more students in the class however; this group appears to be a representative sample. A majority of the students were female, with 10 females (66.7%) and five males (33.3%). Additionally, a majority of the students in this class indicate this was not their first semester of college (86.7% or thirteen out of fifteen). This generally tends to be true because many students take their lab sciences toward the end of their time at EMCC. Additionally, a majority of the students were employed either full time or part time. Only two students in the class were not employed.

The following table shows the demographic data collected from the students in this study. There were more female students than male students with twenty-two females (75.8%) and seven males (24.1%). All students indicated they were taking additional

classes and working during the study. These demographics are consistent with the general community college population.

Table 1

Demographic Data of Participants

n=25 (nr=4)	Age	# of semesters completed	# of previous courses taken with online component	# of credits currently taking	# of hours working per week
Mean	22.28	4.56	2.08	11.02	29.14
Median	20	5	2.0	12	30
Minimum	18	1	1	6	10
Maximum	37	9	6	15	49

The class was diverse in ethnicity, participants consisted of 11 Caucasians, 38%; 8 Hispanics, 28%; 2 African Americans, 7%; 1 Asian American, 3%; 3 other, 10%; and 4 not reported, 14%.

Role of the Researcher

The researcher was both the investigator and participant in this action research project. I was the instructor of the class participating in the study. I also administered the data collection instruments as well as delivered instruction in class. I was the administrator of the Blackboard learning management system. As a researcher, I was cognizant of my instructional role during this study. Participants were not be forced or coerced in order to avoid bias in the results. Students were given the opportunity to opt out of the study. Course activities were required for the course but students had the right to request their data not be included in the report of this study.

Data Collection Procedure

Monitoring, predicting, and reflecting data, the most critical data with respect to SRL components being assessed in this study, were collected throughout the semester. The course consisted of four units each consisting of four chapters. Unit examinations were held every four weeks. Monitoring, predicting, and reflecting intervention activities were integrated into the course curriculum. Pivotal data collection times occurred around the unit examinations.

Data for predicting was collected before the unit examinations. Data for reflecting was collected after the examination scores was returned and gathered at four different times throughout the semester. These learning reflections coincided with the unit examinations.

Instruments

A mixed method approach was used, combining qualitative and quantitative methods. The qualitative data instruments included (a) individual student interviews (b) online learning reflections, and (c) student generated study plans. The quantitative data included responses to a pre- and post-intervention Likert scale survey, grade predictions, examination statistics, and course grade statistics.

Qualitative instruments. Students were asked to write learning reflections in an online journal at key times throughout the semester. These reflections were in the form of a private blog on Blackboard. The learning reflections included a series of open-ended questions designed to assess their preparation for the class. The following prompts were used for all four learning reflections: How and in what ways does your grade on the examination reflect your preparation for this unit? Is there anything you would do

differently to prepare for the next unit? Why or why not? In addition, students were asked to create an individualized course preparation plan (ICPP). The ICPP required students to write about their SRL behaviors. This ICPP is specific to their learning characteristics and objectives. Finally, a random sample of students was interviewed. See Appendix A for the interview protocol.

Quantitative instruments. Quantitative student performance data was gathered as well. These data included predictions of examination scores, actual examination scores and course grades, and scores from the Online Self-regulated Learning Questionnaire (OSLQ).

Students were asked to predict their score on the examinations before taking them. The examinations consisted of two parts, an online portion and a face-to-face portion. The scores from the two parts were combined to create a total score for the examination. The participants in the study were asked to predict their total score for the examination. The online portion of the examination consisted of multiple-choice questions. The face-to-face examination consisted of applied components including activities such as labeling, drawing, and various free response questions. In addition, actual scores and grades were recorded. Previous cycles of this action research project showed that students were motivated by the grade in the course. I proposed that student metacognition could be evidenced by accuracy of grade predictions. Metacognition and motivation were underlying components of self-regulated learning.

To measure student SRL behaviors, a pre- and post-intervention survey was administered. The survey used in this study was the Online Self-regulated Learning Questionnaire (OSLQ) developed specifically to assess SRL in online learning

environments (Barnard et al., 2008). The constructs assessed on the OSLQ are environmental structuring, goal setting, time management, help seeking, task strategies, and self-evaluation. These constructs are representative of SRL behaviors for online courses. The reported internal consistency for the 24-item instrument, $\alpha = .90$ indicates scores on the instrument are considered to be reliable. With respect to the six constructs assessed by the OSLQ, Cronbach's alpha coefficients ranged from .67 to .90 (Barnard et al., 2009). To illustrate the nature of the OSLQ, some examples of items are: "I set goals to help me manage studying time for my online courses," and "I don't compromise the quality of my work because it is online." See the Appendix B for the full version of the OSLQ.

Data Analysis

Quantitative data analysis. Quantitative data such as examination scores, grades, six OSLQ scores, and grade predictions were analyzed using descriptive statistical procedures. Means and standard deviations are reported. SIS was used to calculate *p* values in order to determine significance. Finally, repeated measures analyses of variance was conducted on the six OSLQ scores from the pre- and post-intervention assessments. Collectively, these analyses were helpful in beginning to develop responses to research questions 1 and 2.

Qualitative data analysis. Qualitative data including learning reflection entries and qualitative ICPP data were analyzed to determine emerging themes using the constant comparative method (Strauss & Corbin, 1998). In this procedure, open coding was used to initially identify concepts. Subsequently, the data was collected into larger categories that represent phenomena related to the initial codes. These categories were

gathered into theme-related components, which were collected into emerging themes with assertions. After an assertion was constructed, quotes from various qualitative data sources were used to substantiate and support the assertion. The qualitative data were used to help answer research questions 1 and 2, as well as explaining and supporting the quantitative data. Finally, to ensure unbiased interpretation of the data, three methods that foster credibility (Guba, 1981; cited in Mills, 2011) were used including engaging in persistent observation, practicing triangulation, and conducting member checks.

Chapter 4

RESULTS

In this chapter, results from the project are presented. The quantitative results are reported in the first portion of the chapter. In the subsequent section, results for the qualitative data are presented. These data were collected in order to aid in answering the following research questions:

1. How and to what extent do community college students enrolled in a hybrid laboratory science course exhibit SRL behaviors?
2. How and to what extent does the use of SRL behaviors influence student performance in a hybrid course?

Results for Quantitative Data

The quantitative data are presented in two parts. Data for the OSLQ survey are presented first. The second section provides results about students' grades and grade predictions.

Survey reliability. Prior to conducting an analysis of the results for the OLSQ quantitative data, the reliability of the subscales from the instrument were assessed using Cronbach's alpha reliability coefficient. The reliability of the goal setting subscale was .70. For the environmental structuring subscale, the reliability was .82. The task strategies subscale showed a reliability of .58. With respect to the time management subscale, the reliability was .49. For the help seeking subscale, the reliability was .84. Finally, the reliability for the self evaluation subscale was .65. Generally, Cronbach's alpha coefficients exceeding .70 indicate acceptable levels of reliability (Nunnally, 1978). Thus, the reliabilities of the goal setting, environmental structuring, and help seeking

subscales were viewed as being acceptable, whereas the other scales were viewed as being somewhat suspect with respect to their reliabilities.

Analysis of the OSLQ data. A multivariate repeated measures analysis of variance (ANOVA) was conducted on the six subscales of the OSLQ survey. The multivariate repeated measures ANOVA was not significant, $F(6, 12) = 1.11$, $p < .42$. This result showed there were no differences between the pre- and post-test scores for the six subscales of the four point Likert scale OSLQ survey. Inspection of the means clearly demonstrated that means only increased minimally with the range of increases being between 0.01 and 0.26 points. Means and standard deviations for these data are presented in Table 2.

Table 2

Means and Standard Deviations for Pre- and Post-test Scores on the OSLQ Survey

	Pre-test		Post-test	
Subscale	*M*	*SD*	*M*	*SD*
Goal Setting	3.26	0.41	3.29	0.47
Environmental Structuring	3.10	0.58	3.31	0.55
Task Strategies	2.64	0.59	2.65	0.64
Time Management	2.81	0.57	3.07	0.60
Help Seeking	2.48	0.78	2.57	0.87
Self Evaluation	2.57	0.70	2.72	0.79

A repeated measures ANOVA was conducted on the pre-intervention scores of the six subscales on the OSLQ to determine whether students indicated differences in the extent to which they used SRL behaviors before the intervention. The RM ANOVA for the subscales was significant, $F(5, 115) = 8.46$, $p < .001$, $\eta^2 = 0.27$. Follow-up post-hoc analyses showed the means for goal setting and environmental structuring were significantly different for the means of the other four subscales, which did not differ from each other. Thus, it's clear this group of students employed goals setting and environmental structuring to a greater degree than the other SRL behaviors prior to the beginning of the project. The three lowest subscale scores, task strategy, self evaluation, and help seeking, indicated that respondents were ambivalent about their use of these SRL behaviors because the scores were approximately 2.50 on the four point Likert scale as shown in Table 3.

Table 3

Means and Standard Deviations of OSLQ Subscales

OSLQ Subscale	Means (SD)
Goal Setting*	3.22 (0.43)
Environmental Structuring	3.07 (0.59)
Time Management	2.78 (0.60)
Task Strategies	2.59 (0.53)
Self Evaluation	2.56 (0.63)
Help Seeking	2.50 (0.82)

*Note: the sample *n* is different for this analysis than the one in Table 2.

Grade predictions and exam scores. Students were asked to predict their grade on the first three examinations as A, B, C, D, or F. These grades were then converted to a four-point scale, with an A being four, a B being three, and so on. A paired *t*-test showed a significant difference in the predicted scores and actual scores for examination one, $t(27) = -2.20$, $p < .036$. Most students over predicted for the first examination scores indicating they predicted they would receive higher scores on the examination than they actually obtained. There were no significant differences between the prediction scores and actual scores for examination two, $p < 0.73$, and examination three, $p < 0.80$.

To assess whether there were differences among groups of students in their ability to make predictions about their performance on examinations, a repeated measures (RM) ANOVA of predicted and actual grades across three examinations was conducted for two groups of students. The first group consisted of students who received end-of-course grades of A or B; whereas the second group consisted of those who received end-of-course grades of D or F. The RM ANOVA for the effect of examination time (1 vs. 2 vs.3) was not significant, $F(2, 44) = 1.04$, $p < .37$. Similarly, the RM ANOVA for the interactions of examination time by end-of-course grade group was not significant, $F(2, 44) = 2.56$, $p < .09$. Nevertheless, given the small power of .49, these latter data were suggestive of a difference in the ability to predict examination grades between the end-of-course grade groups.

The RM ANOVA for the effect of predicted versus actual grades was not significant, $F(1, 22) = 2.55$, $p < .13$. In the same way, the RM ANOVA for the interactions of predicted versus actual grade by end-of-course grade group was not significant, $F(1, 22) = 3.35$, $p < .09$. Nevertheless, given the small power of .42, these

data were suggestive of a difference between the end-of-course grade groups with regard to differences in their performance between actual and predicted grades.

The RM ANOVA for the interaction of examination time by predicted versus actual grades was not significant, $F(2,44) = 1.34$, $p < .28$. Similarly, the RM ANOVA for the interaction of examination time by predicted versus actual grades by end-of-course grade group was not significant, $F(2, 44) = 1.34$, $p < .28$.

Taken together, these data are suggestive that there are interactions that result from differential abilities between the end-of-course grade groups in their abilities to predict their grades as compared to their actual grades. For example, the examination time by end-of-course grade group interaction showed the A/B group trended upward slightly, whereas the D/F group declined. Of more interest, the interaction of the end-of-course grade group showed they were equally over predicting on exam 1. The A/B group under predicted on subsequent exams (=0.54, -0.42, and -0.29), whereas the D/F group remained constant in their over prediction of exam grades (-0.57, -0.57, and -0.57).

Table 4

Means and Standard Deviations for Predicted and Actual Examination Grades by End-of-course Grade Group

	Examination 1		Examination 2		Examination 3	
End-of-course grade group	Predicted	Actual	Predicted	Actual	Predicted	Actual
A/B	2.94	2.35	2.35	2.77	2.71	3.00
n = 17	(0.83)	(1.06)	(0.70)	(0.90)	(0.69)	(1.12)
D/F	2.43	1.86	2.00	1.43	1.71	1.14
n = 9	(1.13)	(1.07)	(1.15)	(1.51)	(1.11)	(1.46)

Table 5 below shows the differences between the predicted and actual grades for examinations one, two, and three. The difference was calculated by subtracting the predicted score from the actual score. A negative difference indicates over prediction of the examination score. Note that the D/F group consistently over predicted their scores as compared to their actual performance. By comparison, the A/B group over predicted on the first examination, but the transitioned to under predicting their examination scores on examinations 2 and 3.

Table 5

Differences between Predicted and Actual Examination Score by Examination and End-of-course Grade Group

End-of-course Grade Group	A/B *n*=9	*D*/F *n*=9
Exam 1	-0.59	-0.57
Exam 2	0.42	-0.57
Exam 3	0.29	-0.57

Table 6 shows the averages for course scores, homework scores, online quiz scores, and exam scores separated by grade group. The D group had a C average for their exams however their average homework score was low. The F group had the lowest online scores in all categories that were used in determining grades. The face-to-face and online portion of examinations are separated and reported for examinations one, two, and three. There were very few students that took examination four because an examination score could be dropped, therefore, scores were not reported for examination four. However the table shows total examination scores, which reflects all four examinations

as part of the grading scheme including one dropped examination score. The data also showed students in the D group increased their examination scores the greatest with the dropped examination.

Table 6

Student Performance on Various Course Components End-of-course Grade Group

Grade Group	Course Score	F2F Portion of Exams 1, 2, 3	Online Portion of Exams 1, 2, 3	Exams 1, 2, 3 Score	Total Exam Score (1exam dropped)	F2F Homework Score	Online Homework Score
A	93.35	81.43	91.50	86.47	87.36	96.16	95.62
B	86.59	71.86	83.90	77.88	80.60	88.91	90.86
C	75.77	63.28	80.44	71.86	72.70	76.60	79.27
D	66.27	62.89	62.89	62.89	75.93	58.47	84.27
F	41.98	54.89	58.67	56.78	57.15	31.02	62.85
Entire Class	76.47	69.83	78.77	74.30	76.78	75.01	84.82

From this study, grade levels were created to explore whether there were differences in groups related to end-of-course grade. A grouping of A and B students and D and F students was completed to examine any differences in the subscale means of the OSLQ. The results are shown in Table 7. Generally speaking, as shown in Table 7, the means for the A/B group are higher than those in the D/F group at the two time points, pre- and post-intervention assessments. This phenomenon warrants further exploration and will be considered in the Implications for Research portion of the Discussion.

Table 7

OSLQ Subscale Means by End-of-course Grade Groups A/B and D/F

	A/B Grade Level		D/F Grade Level	
	Pre	Post	Pre	Post
Total Score	2.92 (0.40)	3.10 (0.38)	2.65 (0.25)	2.59 (0.50)
Goal Setting	3.30 (0.42)	3.44 (0.44)	3.07 (0.47)	2.75 (0.28)
Environmental Structuring	3.12 (0.57)	3.36 (0.54)	3.00 (0.75)	2.85 (0.76)
Task Strategies	2.78 (0.45)	2.86 (0.61)	2.21 (0.50)	2.25 (0.64)
Time Mgmt.	2.90 (0.56)	3.25 (0.56)	2.57 (0.65)	2.73 (0.54)
Help Seeking	2.60 (0.71)	2.81 (0.86)	2.24 (1.13)	2.27 (0.83)
Self Evaluation	2.67 (0.69)	2.94 (0.78)	2.33 (0.43)	2.40 (0.83)

Results for Qualitative Data

To better understand and examine how contextual factors influenced the outcomes of this study, qualitative data were collected. These data were used to explore students' perceptions, circumstances, and transformations that occurred during the study. In this section, the qualitative data that were collected are presented along with the codes, theme-related components, themes and assertions that were developed based on the qualitative data from this study. Finally, each assertion is presented along with its associated theme and theme-related components.

Description of qualitative data collected. Qualitative data that were collected included three learner reflections, student interviews, and personal study plans. Descriptive statistics for the qualitative data sources are provided in Table 8.

Table 8

Description of Qualitative Sources

Data Source	Number	Word Count
Learner Reflection 1	17	16,223
Learner Reflection 2	21	11,947
Learner Reflection 3	20	11,308
Student Interviews	14	70,321
Personal Study Plan	20	18,156
Total	92	127,955

Results from three learner reflections, interviews, and personal study plans were collected and coded together using the constant comparative method (Strauss & Corbin, 1998). The initial coding resulted in 165 codes. A series of iterative steps were taken to group these codes into larger, meaningful categories. Continuing in this iterative fashion categories were combined into theme-related components, then six emergent themes which led to assertions. Table 9 shows the themes, theme-related components and assertions resulting from the qualitative data analysis.

Table 9

Themes, Theme-related Components and Assertions

*Themes** and Theme-related Components	Assertions
Other Life Commitments 1. In addition to the class, students juggled a work schedule resulting in a lack of time. 2. Students had additional responsibilities with respect to their families.	Students indicated a presence of barriers impeding their performance in the class.

3. Students were taking additional classes and these classes competed for study time.	
Course-related Challenges 1. The amount and difficulty of course materials were challenging to students. 2. Challenges inherent to the online portion of the hybrid class were evident.	The course was demanding for students due to challenges associated with the course.
Learner-specific Challenges 1. Students expressed the feeling of exam anxiety. 2. Many students were unable to manage time resulting in procrastination. 3. Self-doubt and lack of confidence were expressed by students.	The course was demanding for students due to challenges associated with concerns specific to the individual learner.
Course-related Support 1. Practice activities were available to students online as well as during lab activities. 2. Students indicated that the instructor provided support including organization of the LMS, lecture presentations, answering questions, giving feedback, and maintaining open communication. 3. Students depended on peer support in the class such as study groups and study buddies.	Students indicated supportive measures emanated from the course.
Support Provided by the Learner 1. Personal drive and motivation for success provided students with support. 2. Students indicated they established self-standards when taking the class. 3. Students suggested it was important to know their strengths and learning styles.	Support for learning also came from the students, themselves.
Indicators of Self-regulated Learning 1. Students noted the need to be self reliant and responsible for college success. 2.When goals were evident, students were able to focus on courses and that provided additional motivation. 3. Knowledge of performance in the course (grades) was an important tool for self-reflection. 4. Students used a variety of study strategies, notably, reading, writing their own words, getting help, and organization. 5. Students were aware of their abilities and noted the importance of confidence.	Students reported aspects of self-regulated learning were helpful to their learning.

*--Note: Themes are in italic print.

Other life commitments. Assertion 1—*Students indicated a presence of barriers impeding their performance in the class.* The following theme-related components were found which supported the theme leading to this assertion: (a) in addition to the class, students juggled a work schedule resulting in a lack of time; (b) students had additional responsibilities with respect to their families; (c) students were taking additional classes and these classes competed for study time.

The course studied was a human anatomy and physiology course including a laboratory component. Barriers were present for students that affected their performance in the course. According to data collected, all students in the class were employed. Students reported their jobs as a barrier to their success in the class. One student claimed, "I'm working full time and it kinda put [*sic*] a barrier toward me being able to study as much time as I want to" (Student interview, December 4). Another student maintained,

> In the beginning of the semester I was working part-time and it was nothing I was making less than $200 a paycheck which wasn't bad, but um in the middle of the semester I started working at um a car dealership. So I worked 4 days 13 hours for those four days it was 8 in the morning to 9 at night, yeah, I would say my grades really did falter from that. (Student interview, December 4)

A third student also suggested work was a barrier as it competed for time when she/he asserted, "The first exam was when I first got my job and they were like they needed someone so I worked and didn't study" (Student interview, December 4).

Another barrier that students faced was familial obligations. During the interview, one student related,

> Well barriers [include] my family because I live at home and they are family oriented and so I would allow them to distract me easily, so if they wanted to watch *X-Factor*, I would put aside my work to watch with them. (Student interview, December 4)

A second student commented that familial obligations were challenging,

> Unfortunately another crisis has hit and my daughter who just had a newborn by C-section and is 18 years old was just diagnosed on Thursday as having shingles … This is just another set back for the semester for me. (Student learning reflection, December 3)

A third averred, "My family, there is a lot of things that came up at home this semester which um kinda hindered me from putting forth the effort and being able to do what I needed to do for my schoolwork" (Student interview, December 3).

A third kind of barrier students encountered was the demands of taking additional classes. One student declared,

> I try to do something in that free time, just make sure I catch up especially someone like me who is taking many classes. I don't have time so I have to use every little bit of my time for me to be able to catch up with every activities [*sic*] I have to fulfill in class. (Student interview, December 4)

A second student offered, "I don't have a lot of spare time with all my other classes I'm taking" (Student interview, December 6). A third declared, "another thing that impeded my performance is that I had um, thirteen credit hours this semester" (Student interview, December 4). Taken together, the students in this study indicated they were subjected to

various barriers due to their multiple roles as employee, family member, and student in other classes.

Course-related challenges. Assertion 2 – *The course was demanding for students due to challenges associated with the course.* The course explored in this study was a biology course for non-majors that was offered in a hybrid format. This presented some unique learning situations. Students were taking a laboratory science course, possibly for the first time, and students were required to complete online activities in addition to the face-to-face work. The following theme-related components were found which supported the theme leading to this assertion: (a) the amount and difficulty of course materials were challenging to students; and (b) challenges inherent to the online portion of the hybrid class were evident.

Students indicated that the course work was difficult as well as abundant. The course was a four-credit class and included a laboratory component. Typically, in a full face-to-face class, students would spend two-and-one-half hours a week in lecture and two hours and forty minutes in lab. Because this class is offered in a hybrid format, students in this study spent two hours and forty minutes in class in the laboratory component. An online component was in place that provided the remaining time that typically would be lecture time. In an interview, one student stated,

> I came into the class thinking it wasn't going to be that much work. I soon realized that there is a lot more work to do with only one class [face-to-face] and the rest is on you [because it is online]. I didn't realize this [at first], but after that I started to improve in class. (Student interview, December 6)

Another student noted, “the course has been somewhat difficult and so I had to work hard” (Student interview, December 6). A third mentioned, “[the assignments] were very hard to so I had to actually study and actually read the chapters to know what I’m doing” (Student interview, December 3).

A second challenge from the course was related to course delivery modality, namely, the hybrid format. Students discussed difficulties regarding the online component of the course. One student asserted there was difficulty in communicating with the instructor when she/he noted, “It’s frustrating because you can’t really talk, make sure that even though you’re online there’s still communication” (Student interview, December 6). A second student suggested difficulty with the hybrid modality,

> I didn’t put as much effort as I should have especially in this course thinking I had time to make it up, but in reality I didn’t because this is a hybrid course you need to have the discipline to do the work on your own time. (Student interview, December 3)

A third noted, “I think because this is the first hybrid course [I have taken], it definitely threw me off” (Student interview, December 6). Based on these data, it was clear students perceived that the course was challenging due to the nature of the content as well as the hybrid delivery modality.

Learner-specific challenges. Assertion 3– *The course was demanding for students due to challenges associated with concerns specific to the individual learner.* In addition to challenges inherent to the course, students experienced challenges arising from within themselves. The following theme-related components were found which confirmed the theme leading to this assertion: (a) students expressed the feeling of exam

anxiety; (b) many students were unable to manage time resulting in procrastination; and (c) self doubt and lack of confidence were expressed by students.

A component of learner specific challenges was that students reported they had exam anxiety. In an interview, one student maintained, "I have had a problem with in-class exams and I find myself freezing when it comes to taking the test" (Student interview, December 6). In a learning reflection another student suggested, "I am not a good exam taker." A third declared, "Although I know the material I am always challenged when it comes to tests" (Student interview, December 5).

Another learner-related challenge that students experienced was lack of time due to their inability to manage their time effectively. One student asserted in the interview (Deceber 5), "I would consider a barrier was me procrastinating [on] things. Certain weeks I fell behind because of work sometimes, and I would get home late and not do my work until the next day. I was rushed sometimes." A second student listed procrastination in their personal study plan when she wrote, "I am a big procrastinator, time management is something I need to work on" (Personal study plan, no date). A third also alluded to how procrastination negatively affected her/his performance when she/he wrote, "This time my grade reflected how big of a procrastinator I am; I didn't take the time to study and left everything for the night before the exam" (Student learning reflection, October 28).

Finally, the data showed that students felt their lack of confidence was a learner-related challenge. Students noted their inability to ask questions because they were shy, embarrassed, or afraid. On the personal study plan, one student listed as a weakness the fact that she/he was not confident while taking exams, "doubting myself when testing

when I should just trust myself" (Student personal study plan, December 2). Another student mentioned lack of confidence in describing the grade prediction component of the study when she/he declared, "The first one [exam] I under predicted and I just under predicted each time. I think I don't have enough confidence in my abilities and I suck at tests so I just aim low" (Student interview, December 3). A third said, "I don't think for like bio[logy] or math personally I can't take them solely online because I need someone to help me and show me" (Student interview, December 3).

Course-related support. Assertion 4 – *Students indicated supportive measures emanated from the course.* Supporting this assertion are the following theme related components: (a) practice activities were available to students online as well as participation during lab activities; (b) students indicated that the instructor provided support including organization of the learning management system (LMS), lecture presentations, answering questions, giving feedback, and maintaining open communication; and (c) students depended on peer support in the class such as study groups and study buddies.

Students were able to find support for their learning from components within the course. One such support was content practice through online and laboratory activities. Engaging with the course content helped students practice their knowledge. There were several opportunities embedded in the class for practice including online learning modules and weekly quizzes that were available for students to engage with the course content. These opportunities for engagement were described by one participant during a student interview (December 4) when she/he said, "The [online] connect modules were very helpful too and helped me to understand the text book because I just don't want to

just read. Those online labs were good. I really liked them, way better than reading alone." A second student suggested, "The learning modules helped me out a lot and it was a way of completing an assignment while studying at the same time" (Student learning reflection, October 28). A third noted, "I strongly believe that the [online] McGraw Hill Connect Learn Smart reviews are a tremendous help in applying and understanding the material" (Student learning reflection, September 30).

In addition to online activities, students perceived they were supported when they engaged with the content during class. One student discussed class participation in the learning reflection (September 30) when she/he penned, "Participate in class discussions, you learn better if you're an active participant instead of just filling a seat in the classroom." A second student suggested class participation was helpful when she/he averred, "I also think going to every class was part of my preparation because I was involved in physical activities such as the labs and I was able to hear every lecture" (Student learning reflection, December 2). A third noted, "[Students] have to participate, to be part of it to get the full experience of the teaching process" (Student interview, December 4). Through online practice and classroom engagement, students found support for their learning.

In this study, students also reported they obtained support for learning from their instructor. The instructor was able to provide students support in many ways such as maintaining and presenting organization of the LMS, lecture presentations, answering questions, giving feedback, and maintaining open communication. Students noted that organization of the online course was helpful. One student asserted, "I think the overall layout of the online portion, where each chapter was and find [*sic*] all the resources, it

was all there and properly laid out. I think that that was helpful. Things were easy to find" (Student interview, December 4). A second student noted organization of the online materials was helpful when she/he maintained, "the directions because everything was there and organized and you just click on it and it was in folders so it was easy to locate" (Student interview, December 3). In addition to the class organization, students felt that the instructor supported their learning through class presentations or lectures. One student remarked in an interview, "[the instructor] would come in and recap the main themes that we needed to go over and like really incorporated the labs so that it went so well with our reading" (Student interview, December 4). A second student noted how the instructor presentations supported their learning. She/he averred,

> You put up the PowerPoint and focused on the key points and you pointed out and exaggerated the items on the test and you wrote on the board and that helped the students. For example, the heart conductions system, I remembered it because you used the square diagram and it was so much easier and wasn't as hard because you went through and actually explained it. (Student interview, December 4)

Learning in the class was also supported by instructor feedback and open communication. Students felt comfortable asking questions and approaching the instructor for help. One student expanded on this when she/he testified, "The emailing back and forth was real helpful. You kept communication open so I didn't have any problems with that" (Student interview, December 3). A second student said, "I have to do all my assignments, if I forget something, I email the teacher and find out what I've missed" (Student interview, December 3).

Another source of support connected to the course was peer support. Students depended on peer support in the class such as study groups and study buddies. One student wrote in the personal study plan (December 2), "[I] have study groups for the classes that are a little challenging." Another student listed peer support as a strategy in their personal study plan (December 2), "Me [*sic*] and a classmate started an accountability system this semester where we would text each other and make sure we were doing the required work" (Student personal study plan, December 2). Much of the in-class time was used for group collaboration. Some students found that working in groups allowed them to receive peer support. In an interview (December 3), one student suggested that working in a group helped the learning process, "The group that was really good. Because you got to interact with others and they would say something in a different way and that would make sense or they would tell how they studied and that would make sense." Another student discussed the importance of working in a group when she/he asserted, "I love working with others, teaching each other helps a lot" (Student interview, December 4). Further, other students found peer support to be helpful if an absence occurred. One student related the importance of having this type of support in the class, "[you] always have someone you can depend on to tell you what work you have if you miss a class" (Student interview, December 3). Taken together, peer support and its perceived value were evident in this study.

Support provided by the learner. Assertion 5 – *Support for learning also came from the students, themselves.* The following theme-related components were found to support this assertion: (a) personal drive and motivation for success provided students with support: (b) students indicated they instituted self-established standards when taking

the class; and (c) students suggested it was important to know their strengths and learning styles. It was evident from the personal study plans, learning reflections, and interviews that students were able to support their learning in various ways.

Motivation to succeed was reported as being helpful for students. Some students described this as their personal drive or hunger for success. One suggested,

> I started class with the mindset that I need to get out of this class with an A. When I take a class that is challenging even if it is hard, I need an A. I can't do just minimal. I am an A student, I work very hard for it. (Student interview, December 4)

A second student avowed, "You have to be motivated to get the best grade in class or do as good as you want to do in the class" (Student interview, December 3). A third student also discussed a personal drive to succeed when she/he affirmed, "If I sign up for it, I know I have to pass it" (Student interview, December 4).

Students indicated they instituted self-established standards when taking the class. These standards varied among the students. Some students set standards of excellence whereas others set standards of passing. For example, in an interview (December 4), one student described the influence of the learning reflection component of the research study when she/he related, "The amount of studying I did was enough to make me confident I would pass the test but I could have aimed for exceeding." Another student wrote in the learning reflection (October 28), "I know I could have done better, but [I] was shooting for like a C." This comment was in stark contrast to one offered by another student who wrote in the learning reflection (October 28), "Although I received a good grade on the test, I always strive for higher scores." Another student characterized her self-established

standards as a means to work hard when she/he wrote in her/his personal study plan (December 2) that she cared, "about my grade and how my work reflects on the kind of person I am."

Students suggested it was important to know their strengths and learning styles. Students' self-awareness for strengths and learning styles was evident from the qualitative data. This knowledge of self assisted in providing support for student learning. In an interview, one student remarked,

> I can read really well and pronounce well but sometimes I get so caught up in just reading that I don't absorb the material so I had to dedicate more time to writing notes and making sure that I'm taking good notes and using the outline in the back of the book. I know that I needed that extra help. So I had to give it an extra hour to know a portion of it. (Student interview, December 5)

A second student declared, "You just have to know what works for you and if something's not working or your not getting a good result, take it upon yourself to make a change or try something different" (Student interview, December 5). A third student also discussed the importance of self-awareness when she/he expressed, "I take my own notes and try to write whatever I read in my own words. For me it's just easier, I'm a visual person so I have to do lots of steps" (Student interview, December 3). Having an awareness of self made it possible for students to adjust their preparation for the class to support their learning.

Indicators of self-regulated learning. Assertion 6 – *Students suggested aspects of self-regulated learning were helpful to their learning*. The following theme-related components substantiated this assertion: (a) students noted the need to be self-reliant and

responsible for college success; (b) when goals were evident, students were able to focus on courses and that provided additional motivation; (c) knowledge of performance in the course (grades) was an important tool for self reflection; (d) students used a variety of study strategies, notably, reading, writing their own words, getting help, and organization; and (e) students were aware of their abilities and noted the importance of confidence.

Students in this study employed a variety of self-regulated learning behaviors. Students found self-reliance and a sense of responsibility to be helpful. During interviews, students were asked what it meant to be a self-regulated learner. One student responded, "I think its crucial to be a self-regulated leaner because it means that you are holding yourself accountable and that will help a lot more than if you are relying on somebody else." This student also added, "This hybrid course is a lot more responsibility" (Student interview, December 3). A second student also discussed the importance of self-reliance when she/he suggested, "Whether you are ready or not, it's up to you" (Student interview, December 3). A third maintained, "You need to be a whole thing, you don't depend on someone to say ok this is what you need to do now. You need to be able to prioritize what is expected of you" (Student interview, December 4).

When goals were evident, students were able to focus on courses and that provided additional motivation for them. Students mentioned motivation for several reasons including avoiding failure, obtaining admission to a program, and maintaining a high grade-point average. In an interview (December 4), a student who was aiming to attend pharmacy school expressed, "Not just passing it [the course], I need a better grade because what I'm getting into is so competitive you have to be on top of your game so I

have to make sure I'm always on point." The same student followed that comment with the following one, "I'm very hungry. Yeah, I'm very hungry because I know why I'm taking the course." A second student suggested, "I want to be a respiratory therapist so when we go to that chapter I devoured it" (Student interview, December 3). A third noted, "I'll probably hopefully work out of being lazy. Its not as bad I guess as other people it's just not a good habit especially because I want a masters and doctorate and lazy is not going to help" (Student interview, December 3). When the students were able to express their reasons for taking the course, they expressed motivation to succeed.

During the study, as part of the intervention, students were asked to write learning reflections after being given a grade check after each exam. Students used their grade as a way to gauge their progress in the class as well as to assess their study practices. Knowledge of performance in the course (grades) was an important tool for self-reflection. Students tended to see the grades as evidence of effective or ineffective study habits. For example, one student wrote the following in a learning reflection, "I would not change anything about my study habits for these tests because they seem to work very well for me and help me get the grade I am shooting for." Additionally, another student commented during the interview (December 4), "In the end I got an A on the test and I believe that was in thanks to my detailed study technique." Students in this study used grades as a self-reflection tool. A third student indicated the use of grades in gauging her/his behavior when she/he affirmed,

> I can tell the times that I really studied and I got into the lesson I performed a lot higher than the times when I slacked off and I would read more pages so the next

day I wouldn't have to read I can see that on my test I didn't score as high and the quizzes were not as easy. (Student interview, December 5)

Students used a variety of study strategies, notably, reading, writing their own words, getting help, and organization to try to improve their performance in the course. In addition to the learning reflections, students listed specific study strategies they found to be useful on their personal study plans. Reading the textbook was a common study strategy described by students. One student emphasized the importance of reading by saying in an interview (December 4), "To understand you must read, the instructor goes over the important stuff, but you still have to go and read on your own the details." In addition to reading, students conveyed other strategies such as taking notes, making flashcards, making outlines, reading aloud, and working on practice questions. Students found it important to write their own words and move beyond reading. In the second learning reflection (October 28), one student discussed changes to her/his study habits when she/he declared, "The only thing that I did differently is [sic] this time I made study cards and the knowledge actually sunk in while writing them rather than going through the stack over and over." A second student suggested, "The chapters have so many pages so I will divide that by four days and take every night read a set number of pages so its not overwhelming and not a lot of information" (Student interview, December 3). A third noted the need to refine her/his study strategy when she/he asserted, "I want to incorporate the flash card method as a new approach to see if it helps more on the next test" (Student learning reflection, October 28). Taken together, these findings suggested students were not only aware of their behaviors, but also willing to assess and refine those behaviors.

In addition to awareness of study techniques, students were aware of their abilities and noted the importance of confidence. Some students claimed to be fast readers and others noted their memory skills. One student maintained, "I learn from doing worksheets" (Student personal study plan, December 2). A second suggested, "I am a fast learner and have a constant need to expand my knowledge" (Student personal study plan, December 2). Others noted the need to see the content and they relied on writing outlines and diagrams. One student averred, "I made flash cards with questions and pictures on them and just went through them and answered them. The ones I missed I put in a separate pile and went through those ones again as well" (Student learning reflection, September 30). Another student asserted, "I made myself a practice quiz from the chapter assessments and tried to answer as many as I could without the use of the text book" (Student learning reflection, September 30). Other students recognized their abilities and were confident in their abilities, yet they were unable to perform well. In an interview (December 4), one student offered,

> I know the content. I know that I can do it. I know it, but like you can see in this class I don't do my homework and I do okay on the exams. It just goes ties [*sic*] back to the consistency of doing my homework and doing it thoroughly.

Although this student was confident in her/his abilities, she/he did not complete the work. This student continued,

> It's sad because I am a C student, but I want to be and I strive to be an A student. I feel like I can be an A student. I'm just not applying myself. I'm letting myself down, I'm not living up to my own expectations which really really sucks because I know I'm not doing what I'm supposed to.

Thus, it is clear students employed a number of self-regulated strategies to monitor and influence their work in the course and frequently those skills were related to confidence.

Chapter 5

DISCUSSION

In this chapter the results of the study, which focused on self-regulated learning in a hybrid community college course, will be discussed. There are seven parts in the discussion. First, the integration of quantitative and qualitative data will be discussed, followed by the explanation of outcomes and how they relate to previous research and theory. Next, the lessons learned will be visited followed by personal lessons learned and limitations of the study. The final portion of this chapter will discuss implications of this research for practice and future research.

Integration of Quantitative and Qualitative Data

The study employed a mixed methods approach in which qualitative and quantitative data were collected. The integration of both types of data gives the researcher a more comprehensive view of the study and allows for deeper and enhanced understanding (Greene, 2007). Greene states that the purpose of the mixed methods study should not be overshadowed by the methodology. In this study, the purpose of the mixed method approach was to enhance the credibility of the study, honor the complexity and context of learning, and advance the dialogue about learning. Learning is a multi-dimensional human phenomenon that requires a multifaceted lens to allow for thorough observation. The observation of self-regulated learning in the current study was based on two research questions:

1. How and to what extent do community college students enrolled in a hybrid laboratory science course exhibit SRL behaviors?

2. How and to what extent does the use of SRL behaviors influence student performance in a hybrid course?

Quantitative data collected include survey results, grade predictions, and course grades. To complement this quantitative data, qualitative data including learning reflections, personal study plans, and interviews were collected. The quantitative and qualitative data are complementary in the following areas. First, students demonstrate a variety of SRL behaviors. Second, students are learning to be self-reflective and adjust their SRL behaviors according to their individual needs.

On the OSLQ, the goal setting score is 3.26. On a four point Likert scale, this measure is between agree and strongly agree. Students agree that they engage in goal setting. Moreover, goal setting is present in the qualitative data where students mention they set goals to provide motivation for success. Setting goals is also one of the SRL behaviors that students describe. The purpose of using the grade prediction processes in this study is to examine student metacognition and motivation. From the results, the predictions of the higher performing students show they under predict their scores, whereas, the lower performing students tended to over predict their scores. Further, there was a significant difference in the predicted scores and actual scores for exam one, but not for the subsequent exams suggesting that students become better at predicting their performances.

Students indicate in their reflections, study plans, and interviews they support their learning using various SRL behaviors. For example, students seek help. Scores on the pre- and post-test OSLQ were consistent on this subscale, but they were not high. Nevertheless, students mentioned the use of a variety of help seeking behaviors to assist

in learning course material. This is complementary to the qualitative data that showed students discussed help seeking in the interviews and in their personal study plans. From the narrative data, students look for help in the course materials such as the text book and online tutorials. Others also look for help by using peer resources in the class such as study groups or learning partners. Finally, students use the instructor as a resource. Individual item analysis of the OSLQ subscale shows the greatest increase for the help seeking subscale to be with item three, "If needed, I try to meet with my classmates face-to-face." This item showed an increase of 0.37; however, it was not the item with the highest score. The item with the highest score for help seeking is item four, "I am persistent in getting help from the instructor through e-mail." The dynamics of these two items show that students use both peer and instructor support for their learning.

According to the grade predictions, students do not accurately predict their grade for the first exam. By comparison, the subsequent exam predictions are not significantly different from the actual scores. This indicates that students were able to make a better prediction over time. Complementing this data is the qualitative data that students' provide support for their own learning through motivation, developing self-established standards, and self-awareness. In particular, it appears that self-awareness is crucial in becoming better at grade predictions. Moreover, reflection data indicates that students are aware of their performance and how that performance aligned to their behaviors. Although the course is challenging, students use their knowledge of self to adjust their behaviors to the course, thus they are able to give better predictions on subsequent exams.

The qualitative data is complementary to the quantitative data. The qualitative data provide rich contextual dimensions and add depth to the quantitative data allowing for a better understanding.

Outcomes Related to Previous Research and Theory

Results of this study are consistent with previous research. In a study by Jensen and Moore (2008), students in a freshman biology course did not have realistic perceptions of their class performance. In the same study, it was also found that the higher performing students generally under predicted their scores compared to the lower performing students who generally over predicted their scores. In this study, the initial grade predictions show the same unrealistic perceptions.

For this hybrid course, assignments were developed from a constructivist and experiential learner perspective. Barnard-Brak et al. (2010) notes active engagement in the learning process is a critical aspect of SRLT in order to ensure the conduct of monitoring, prediction, and reflection components of SRLT. According to the narrative, qualitative data, students report class projects such as the body drawing and online learning modules induce them to engage more fully with the material. The active learning assignments were found to be opportunities for students to demonstrate SRL behaviors. Active study techniques such as practice were also gleaned from the qualitative data. One student described practicing with the material in a learning reflection, "I also made myself a practice quiz from the chapter assessments and tried to answer as many as I could without the use of the text book."

Zimmerman (2002) writes there are three phases to becoming a self-regulated learner: the forethought phase, performance phase, and self-reflection phase. The

premise, MPR, is based on these phases: *M*onitor aligns to the performance phase, *P*redict aligns to forethought phase, and *R*eflect aligns to the self-reflection phase. All three phases are evident in the results of this study. The forethought phase is evident in the goal setting behaviors students display. The performance phase is shown when students are able to personalize their study techniques through various activities such as creating flash cards, reading aloud, forming study groups, and specifying a study location. In an interview, one student asserted,

> I made sure that I was in my room and my desk was clean so I that I was organized so I could have a place to get things done and I would put the remote far away so I would not get the TV on. [I know] I would be too lazy to get the remote, my space is important.

In this example, the student is deliberate in the choice of study location and actions by removing the remote from reach. This is an example of the performance phase of self-regulated learning. The self-reflection phase is evident as students react and adapt their learning strategies. One student illustrates this aspect when she/he says, "If something is not working or you're not getting a good result, take it upon yourself to make a change or try something different." For example, students discuss the need to be better managers of time. Further, some students acted on this matter and changed work schedules to provide for extra study time for the class.

Perhaps, the most compelling finding of the study is the lack of potency of the intervention. In the present study, students were asked to engage in a variety of behaviors that were meant to induce self-regulated learning. For example, students were asked (a) to predict and reflect on examination grades, (b) engage in learning reflections on their

coursework efforts, (c) respond to a learning vignette that required them to write about SRL, (d) conduct a photo ethnography that showed their SRL behaviors, (e) keep a log of learning activities, and (f) write a personal study plan. Although the intervention activities were numerous, these activities did not appear to change students' thinking about SRL as indicated in the pre- and post-test scores on the OSLQ. The data collected were largely from the reflective phase of the SRL process. Roavai (2004) reports that a constructivist instructional emphasis should include reflection. Moreover, Roavai (2004) characterizes successful online learners as life-experienced and self-directed, making the best use of self-reflection. Further, although some students discussed specific SRL strategies they employed, in general, these strategies were limited both in terms of variety and the extent to which students used them. Thus, the activities may not have been conducted in such a way that students thought deeply about them or how these activities could influence their own performance.

Motivation and metacognition play important roles in self-regulated learning (Cho, 1999; Pintrich, 2000; Zimmerman & Martinez-Pons, 1988; Zimmerman & Schunk, 1989). Such findings are consistent with the outcomes of this study as well. Qualitative data suggest that students use goals for motivation and this motivation was an asset that influences their learning processes. For example, the use of goal setting and feedback on test performance serve as motivational components to encourage students to work harder in the course. Further, the data also suggest that students engage in metacognitive behaviors related to their learning processes which also aided in their learning. In an interview, one student related how metacognitive behaviors supported the learning

process when she stated, “logging my time made me realize how much I do study and that makes me contribute more and want a good grade more.”

Moreover, there are various levels of self-regulation that students exhibit. Zimmerman (2002) documents differences between a *novice* self regulator and an *expert* self regulator. The expert self regulator is more apt to set specific goals and systematically monitor her/his performance. In contrast, the novice engages less in forethought; thus, does not have specific goals. Moreover, the self-reflection phase of the novice is reactive in nature. In this study, students demonstrated varying levels of self-regulation consistent with Zimmerman’s (2002) characterization. Some students who tend to be more expert in their self-regulation are motivated by a specific goal and proceed to monitor their performance more closely. For example, one student who is planning on attending pharmacy school exhibits strong goals and a careful study plan. This student has a detailed schedule that shows time slots allocated every week to studying for the class. This same student could convey specific strategies for learning in order to deal with language barriers. The self-regulation of this student is not reactive in nature; rather it is proactive and is focused on the specific goal of going to pharmacy school.

In addition to SRLT, the hybrid delivery also affects student learning in ways that may not occur in face-to-face courses. Seng and Mohamad (2002) suggest that offering an online component as part of a science course can increase student engagement as well as increasing group collaboration and peer interactions. Seng and Mohamad attribute part of the increase in student engagement to the availability of course materials online giving students more time to engage with these materials. In another study, Toth et al. (2008)

conclude that providing a consistent, comprehensive class protocol is essential during online course design to facilitate student success.

Based on the reports of students, the results of this study also indicate the online component supports student engagement and online organization supports student learning. Students claim to use online learning materials outside of class to support their learning. It is evident that students engage with the material because they are able to share the knowledge they learn from the course with others. Recall, one student indicates, "I was able to talk about the content outside [of the class]. For example, I could talk about the skin to my friends and they think it's gross, but there is [*sic*] a lot of things I learned." There is also other evidence about engagement with the course. In the learning reflection, one student claims, "My attitude has changed because I made time to self-study, which I rarely did. I used to cram the night before and the morning of. Taking a hybrid course was very good for me."

Additionally, results from this study indicate that the online organization supports student learning. Students convey that knowing course expectations including assignments, due dates, and procedures were key to successful completion of the course. Students report the organization of the course also influences student engagement. In an interview, one student asserts,

> I wouldn't change the class, I really like the way it was structured. You made it easy to learn and made things organized and handouts that would help us at home. We had all the notes to review and look at. I actually did more than I was supposed to.

Taken together, consistency in the online course design supports student learning and students use online course components to engage in the course.

The course in this study is set up to afford the flexibility needed by community college students. Previous research suggests that community college students experience additional stressors beyond those experienced by typical university students (Bambara, 2009; Johnson, 2009). Consistent with these claims, results from the present study indicate other life commitments tend to be barriers to their learning. These other life commitments leave students feeling pressed for time. Face-to-face course time was traded for flexibility in the hybrid course delivery format. This trade also shifts much of the responsibilities of learning on to the student. As a result, the employment of SRL behaviors is essential for success in the course (Schunk, 2005b). Time management is an important SRL behavior in navigating this class. Students demonstrate their recognition of the importance of making time to study by suggesting several strategies. These strategies include optimal scheduling, scaffolding the material, and adjusting study behaviors so they are more effective. Students mention taking class materials to work so they could study when the demands at work were low. Students also discuss the benefit of having online activities that are accessible anywhere at anytime. Work schedules were adjusted as well as study strategies. Results from also indicate the necessity of students to rely on self-regulated learning strategies in an hybrid course.

Lessons Learned from the Study

Self-reflection is a valuable part of the learning process. I found that students were somewhat uneasy when asked to reflect. Some students were not sure what it meant to reflect on their learning. Some students wanted to make sure they were correct in their

reflections. From this, I learned that although self-reflection is valuable and necessary to the learning process, many students are ill-equipped to or simply do not engage in these strategies that are effective in aiding learning. Reflecting on the learning process is essential for the development of self-regulated learners. Unfortunately, teachers typically do not include activities that support self-regulated learning development (Zimmerman, 2002). Adjusting curriculum to include self-regulated learning practice is one way to help students become more effective, life-long learners.

Moreover, motivation is shown to support student learning. Previous research indicates the importance of motivation to the learning process (Cho, 1999; Zimmerman & Schunk, 1989). Motivation is but one of the triad of SRLT along with behavioral actions and metacognition. Students are indeed motivated to learn. Nevertheless, the behavioral actions and metacognition typically need to be refined to increase self-regulated learning. Providing students with opportunities to develop metacognitive practices and assess their behaviors will foster the development of self-regulated learning.

I have become a better teacher and researcher as a result of this study. The dual role of participant-researcher in this action research project has helped me grow professionally and personally. I have become more deliberate and thoughtful in my professional duties. I have also become more sensitive to my students' needs and abilities.

I think that many instructors approach teaching from a standpoint of self-experience. This was true of me. This is not bad and is how we approach most situations in life. For example, we cook and clean the way we experienced how to cook and clean. We interact with others with the same interpersonal behaviors we experienced.

Frequently, this is also true for teaching. We tend to teach the way we were taught. We are also puzzled when students do not learn as we did. I was exactly this way. I taught concepts the way I learned and was perplexed to find that my students were not learning the concepts. From this study I have learned that students use a variety of strategies. I also found that my students have diverse backgrounds and abilities that may require additional support from me. Additionally, I learned that my students have additional roles. Because of these new insights, I have grown to understand the importance of acknowledging differences in my experience as compared to the experiences of my students. Further, I acknowledge the similarities as well. Differences tend to be generational however similarities tend to be more personal. I find that many of the experiential differences are related to changing of times for example reliance on the Internet or texting. The similarities are fundamental. I recall experiences of learning how to learn and my students are doing the same. I am able to validate student experiences as well as suggest alternative strategies thus creating symbiosis.

Limitations

This study was performed during one semester. To learn more about self-regulated learning behaviors of community college students, future cycles of action research could be completed. This study was also limited in the number of participants. Two sections of the course were studied; however, due to non-consent and a somewhat high withdrawal rate, the sample size was relatively small, especially when separated into groups based on the grades students received. Another limitation is the survey instrument. Based on the results of this project, the OSLQ is reliable on only three of the six subscales. Finally, another limitation of the study is the dual role played by the

researcher. Perhaps, the most important limitation is the potency of the intervention. These limitations are elaborated in the following sections.

This study is an action research endeavor. The nature and purpose of action research is to solve problems in a workplace setting through systematic investigation. As a result, the research is highly contextual and variable. Stringer (2007, p. 1) states, "… unlike traditional experimental/scientific research that looks for generalizable explanations that might be applied to all contexts, action research focuses on specific situations and localized solutions." Action research is an approach used to better understand the workplace or to create a more fulfilling and meaningful workplace. Naturally, the focus on local context limits the extent to which results may be generalizable to other settings, despite their outward similarity.

A total of 29 students participated in this study. When grouping the class as one, the number of participants was substantial. However, one intent of the study was to group the students by the grade they received to explore more fully the SRL behaviors students exhibited. When this grouping was done, two groups had three students, a very small number of participants from which to draw conclusions. The study took place in two sections of the class; however, not all students gave consent to be a part of the study and several students withdrew from the class early in the semester. Thus, conclusions that can be drawn with respect to differential use of SRL behaviors by students showing different levels of performance are quite limited.

Results from prior research studies that used the OSLQ survey instrument show good reliability. The OSLQ was developed specifically for online university students, a

different context than the community college setting for this study. Perhaps the language used on the instrument caused confusion among the students leading to unreliable results.

An additional limitation of the study was the dual role of the researcher. The researcher and instructor of this study were the same. Students may have been less or more inclined to participate and share their thoughts due to this dual role. This dual role may have inhibited some students to give consent for participation. On the other hand, students may have provided socially desirable responses because they wanted their responses to please the instructor who was conducting the interviews and reading other materials submitted by students. Although the dual role complicates the study, it also enhances the study. As a participant, the researcher knows the context of the study.

Implications for Practice

Online course delivery of science courses is not fully embraced by science professionals (Perry, 2009a). Concerns about the quality of online courses are still evident but changing (Allen & Seaman, 2011). This study has implications for future online course development. Students found the BIO 160 hybrid course to be difficult and challenging in both content and time required outside of the classroom. Community college students can benefit from the flexibility of a hybrid science course. However, community college students must also navigate that course with respect to the extra effort and time required outside of class. Much of this effort must come on an individual basis. Thus, fostering the use of self-regulated learning among such students may be quite beneficial.

Teaching and learning capitalizes on the delicate balance between instruction and learning. The two major influences on this phenomenon is the teacher and the student,

both of whom fit into a highly contextualized situation. As a teacher, one of the most important ways to enhance instruction is to learn more about the students and particularly about what influences their learning. This study provides some insights into community college students and their self-regulated learning behaviors. It is clear from this study that community college students are, in fact, simultaneously committed to many roles—student in various courses, member of a family, and employee in a work setting. Along with the many roles they have, they are also navigating their learning in the hybrid biology course.

Generally, results from the study show that students are quite motivated. Notably, specific goals tend to be the most important source of motivation. When specific goals are lacking, students may not be as motivated. Differences exist between those students who have a clear reason for enrolling in the course compared to others merely taking it to fulfill a college requirement. This assists me because helping students understand their motivations will ultimately help them succeed. In my role, this translates to answering the ultimate question, "Why do I need to know this?" Motivators often include extrinsic factors such as going to medical school, or getting an A grade. Intrinsic motivators can be used in a more productive way. When the knowledge is the reward, intrinsic motivation is achieved. In practice, including material that authenticates the content is a step toward establishing intrinsic motivation.

Zimmerman (2002) writes that we can teach students to become self-regulated learners. The same behaviors that establish a self-regulated learner are also those behaviors that establish lifelong learners. Its important as instructors to allow students to make choices in their learning as well as to assess self-efficacy and attributions they

make with respect to learning (Zimmerman, 2002). Integrating reflective activities like those enacted in this study such as learning reflections, responses to a vignette, photo ethnography of SLR strategies, and personal study plans, are important in aiding students to develop self-regulated learning behaviors. These types of activities are typically not included in regular instruction. The rationale for their exclusion is subjective because many college instructors are driven by the need to cover important course content material rather than taking some time to teach strategies that assist students in learning the content. As a college faculty member, it is clear that learning how to learn is an important set of activities that should be taught to students. It is clear that many students are entering our classrooms without such knowledge. Integrating learning reflections into the curriculum is a way help our students learn. For example, as a next step, SRL behaviors such as goal setting, task strategies, and self-evaluation might be taught to students early in the course. Subsequently, a measure of performance as well as qualitative data might be used to determine how teaching these SRL techniques influences student performance in the hybrid course.

Implications for Future Research

The results of this study indicate that self-regulated learning behaviors influence student performance. The extent to which specific behaviors are effective vary by student. For future research, data could be sorted according to performance level. Complementarity of the qualitative and quantitative data can give the researcher more information as to the specific SRL behaviors used by high performing students compared to low performing students. These data also suggest that behaviors between these student groups are somewhat similar, but may vary in degree. Specifically, it might be the extent

or sophistication of the behaviors that makes the difference. In previous research, Zimmerman (2002) notes a difference in the level of self-regulation among students. A case study approach may be warranted to document a few high performing students' SRL behaviors. Further, based on the examination predictions, the ANOVA results are suggestive that the A/B end-of-course grade group should be explored. The A/B group moves from over predicting to under predicting, whereas the D/F group continues to over predict. This finding suggests that working with A/B students in case studies to gain insights about specific strategies employed by successful learners is warranted. From this information a prototype might be created, which subsequently could be used to teach students SRL behaviors.

Moreover, an examination of the effectiveness of specific SRL behaviors is warranted. For example, how do goal setting, environmental structuring, task strategies, time management, help seeking, and self-evaluation influence performance in the hybrid biology course? As a next step, the focus could be on explicit instruction in three SLR behaviors such as goal setting, task strategies, and self-evaluation. Subsequently, performance in the course and qualitative data might be used to determine how teaching these SRL techniques influences student performance.

Conclusion

The development of self-regulated learning behaviors exhibited by community college students during a hybrid biology class was examined. The following two research questions guided conceptualization and implementation of the project:

1. How and to what extent do community college students enrolled in a hybrid laboratory science course exhibit SRL behaviors?

2. How and to what extent does the use of SRL behaviors influence student performance in a hybrid course?

To answer these questions, qualitative and quantitative data were collected in the form of survey responses, grade predictions, learning reflections, personal study plans, and interviews. These data helped to answer the research questions.

Community college students exhibit some SRL behaviors that support their learning in the hybrid course environment. The three fundamental components of SRLT, motivation, metacognition, and specific learning behaviors were evident in the demonstration of SRL behaviors by community college students. SRL behaviors were diverse. Student performance was influenced by the SRL behaviors. Evidence shows students use SRL behaviors to support their learning in the hybrid course.

Giving students opportunities to reflect upon their learning can enhance SRL behaviors. The inclusion of these opportunities may have helped students develop their SRL behaviors. This is especially important for hybrid course delivery. Data show that students became better predictors of their grades on exams. Including opportunities for students to hone their SRL skills is not typical of most hybrid courses. Development of SRL behaviors is normally left to the students themselves. As instructors we are preoccupied with delivering course content. Frequently, little attention is devoted to elements that might assist students by engaging them in learning-to-learn processes such as SRL behaviors including prediction of performance, reflection of performance and course effort, and self-evaluation that may assist their overall learning in the course. Creating activities for students to assess their behaviors and determine how these

behaviors affect academic success is a powerful way to create self-regulated learners, which is critical for students who are taking a hybrid course.

REFERENCES

Allen, I. E. & Seaman, J. *Going the distance: Online Education in the United States, 2011*, Sloan Consortium.

Anderson, T. (2004). Chapter 2: Toward a theory of online learning. In T. Anderson (Ed.), *Theory and practice of online learning.* Athabasca University: Creative Commons. Retrieved from http://cde.athabascau.ca/online_book/ch2.html

Bambara, C. S. (2009). Delicate engagement: The lived experience of community college students enrolled in high-risk online courses. *Community College Review*, *36*, 219-238.

Bandura, A. (1977). *Social learning theory.* New Jersey: Prentice-Hall.

Barnard-Brak, L., Lan, W. Y., & Paton, V. O. (2010). Profiles in self-regulated learning in the online learning environment. *International Review of Research in Open and Distance Learning, 11*(1), 61-80.

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

Chau, P. (2010). Online higher education commodity. *Journal of Computing in Higher Education, 22*(3), 177-191. doi: 10.1007/s12528-010-9039-y

Cho, M. (1999). The effects of design strategies for promoting students self-regulated learning skills on students' self-regulation and achievements in online learning environments. *Association for Educational Communications and Technology, 27*, 174-179.

Corbin, J. M., & Strauss, A. C. (2008). *Basics of qualitative research: Techniques and procedures for developing grounded theory* (3rd ed.). Thousand Oaks, CA: Sage.

Gobert, J. (2000). Introduction to model-based teaching and learning in science education. *International Journal of Science Education*, *22*, 891-894.

Greene, J. (2007). *Mixed methods in social inquiry.* San Francisco, CA: John Wiley & Sons.

Hofstein, A., & Lunetta, V. N. (1982). The role of the laboratory in science teaching: Neglected aspects of research. *Review of Educational Research*, 52(2), 201-217.

Hofstein, A., & Lunetta, V. N. (2004). The laboratory in science education: Foundations for the twenty-first century. *Science Education, 88*(1), 28-54. doi: 10.1002/sce.10106

Hsu, Y., Ching, Y., Mathews, J. P., & Carr-Chellman, A. (2009). Undergraduate students' self-regulated learning experience in web-based learning environments. *Quarterly Review of Distance Education, 10*(2), 109-121.

Huang, H. (2002). Student perceptions in an online mediated environment. *International Journal of Instructional Media, 29*, 405-422.

Hybrid classes could be the wave of the future. (2009, October 27). *Community College Times*. Retrieved from http://www.communitycollegetimes.com/Pages/Academic-Programs/Hybrid-classes-could-be-wave-of-the-future.aspx

Jensen, P.A. & Moore, R. (2008). Students' behaviors, grades and perceptions in an introductory biology course. *The American Biology Teacher*, *70*, 483-487.

Johnson, M. (2009). Community college students' perceptions of stress. *Biology of Exercise*, *5*(1), 15-27. doi: http:doi.org/10.4127/jbe.2009.0022

Kolb, A. (2005). Learning styles and learning spaces: Enhancing experiential learning in higher education. *Academy of Management Learning & Education, 4*(2), 193.

Kolb, D. (1984). *Experiential learning: Experience as a source of learning and development.* Upper Saddle River, NJ: Prentice Hall.

Kossan, P. (2009, August 29). ACTs suggest many Arizona students not college-ready. *Arizona Republic*. Retrieved from http://www.azcentral.com/arizonarepublic/news/articles/2009/08/29/20090829acttests0829.html

Kumrow, D. E. (2007). Evidence-based strategies of graduate students to achieve success in a hybrid web-based course. *Journal Of Nursing Education*, *46*(3), 140-145.

Martin, J. (2004). Self-Regulated Learning, Social Cognitive Theory, and Agency. *Educational Psychologist*, *39*(2), 135-145.

Mills, G. E. (2011). *Action research: A guide for the teacher researcher*. Boston: Pearson.

Narciss, S., Proske, A., & Koerndle, H. (2007). Promoting self-regulated learning in web-based learning environments. *Computers in Human Behavior, 23*, 1126-1144. doi:10.1016/j.chb.2006.10.006

Nicol, D. J., Minty, I., & Sinclair, C. (2003) The social dimensions of online learning. *Innovations in Education and Teaching International*, *40*, 270-280. doi: 10.1080/1470329032000103807

Nunnally, J. C. (1978). *Psychometric theory*, (2nd ed.). New York: McGraw-Hill.

Office of Planning and Institutional Effectiveness. (2010). *Estrella Mountain Community College Environmental Scan.* Retrieved from http://www.emc.maricopa.edu/ie/ie_reports.asp

Onwuegbuzie, A. J., & Johnson, R. B. (2009). The validity issue in mixed research. *Research in the Schools*, *13*(1), 48-63.

Orey, M., Koenecke, L., & Crozier, J. (2003) Learning communities via the Internet a la epic learning: You can lead the horses to water, but you cannot get them to drink. *Innovations in Education and Teaching International*, *40*, 260-269. doi: 10.1080/1470329032000103799

Perry, M. (2009a, August 31). Professors embrace online courses despite qualms about quality. *The Chronicle of Higher Education*. Retrieved from http://chronicle.com/article/Professors-Embrace-Online/48235

Perry, M. (2009b, October 22). Online college access comes at a high price for students, survey says. *The Chronicle of Higher Education*. Retrieved from http://chronicle.com/article/Online-College-Access-Comes-at/48895/

Pintrich, P. R. (2000). The role of goal orientation in self-regulated learning. In M. Boekaerts, P. R. Pintrich, & M. Zeidener (Eds.), *Handbook of self-regulation* (pp. 451-502). San Diego, CA: Academic.

Puzziferro, M. (2008). Online technologies self-efficacy and self-regulated learning as predictors of final grade and satisfaction in college-level online courses. *The American Journal of Distance Education, 22*, 72-89. doi: 10.1080/08923640802039024

Rio Salado Community College. (n.d.) Retrieved from http://www.riosalado.edu/about/Pages/default.aspx

Rovai, A. P. (2004). A constructivist approach to online college learning. *Internet and Higher Education*, *7*, 79-93.

Schunk, D. H. (2005a). Commentary on self-regulation in school contexts. *Learning and Instruction, 15*(2), 173-177. doi:10.1016/j.learninstruc.2005.04.013

Schunk, D. H. (2005b). Self-regulated learning: The educational legacy of Paul R. Pintrich. *Educational Psychologist*, *40*(2), 85-94. doi:10.1207/s15326985ep4002_3

Seng, L., & Mohamad, F. S. (2002). Online learning. Is it meant for science courses? *The Internet and Higher Education, 5*, 109-118.

Sharp, J. H., & Huett, J. B. (2006). Importance of learner-learner interaction in distance education. *Information Systems Education Journal*, *4*(46), 3-10.

Smith, M. (1997). Mixing and matching: Methods and models. *New Directions for Program Evaluation, 74*, 73-85.

Strait, J., & Sauer, T. (2004, November). Constructing experiential learning for online courses: The birth of E-service. *Educase Quarterly Magazine, 27*(1), 62-65. Retrieved from http://www.educause.edu/pub/eq/eqm04/eqm04110.asp

Strauss A. & Corbin J. *(*1998). *Basics of qualitative research: Techniques and procedures for developing grounded theory*, (2nd ed.). Thousand Oaks, CA: Sage Publications.

Stringer, E. T. (2007). *Action research,* (3rd ed.). Thousand Oaks, CA: Sage Publications.

Tomlinson, C. A. (1999). *The differentiated classroom.* Alexandria, VA: Association for Supervision and Curriculum Development.

Toth, M., Foulger, T, & Amrein-Beardsley, A. (2008). Post-implementation insights about a hybrid degree program. *TechTrends*, *52*(3), 76-80.

Tuckman, B. W. (2003). The effect of learning and motivation strategies training on college students' achievement. *Journal of College Student Development, 44*(3), 430.

Valaitis, R. K., Sword, W. A., Jones, B., & Hodges, A. (2005). Problem-based learning online: Perceptions of health science students. *Advances in Health Sciences Education*, *10*, 231-252. doi: 10.1007/s10459-005-6705-3

Vaughn, N. (2007). Perspectives on blended learning in higher education. *International Journal on Elearning, 6*(1), 81-94.

Wenger, E. (1998). *Communities of practice: Learning, meaning, and identity.* New York, NY: Cambridge University Press

Wiggins, G. & McTighe, J. (2005). *Understanding by design.* Alexandria, VA: Association for Supervision and Curriculum Development.

Zimmerman, B. J. (1989). A social cognitive view of self-regulated academic learning. *Journal of Educational Psychology, 81*(3), 329-339.

Zimmerman, B. J. (2002). Becoming a self-regulated learner: An overview. *Theory into Practice, 41*(2), 64-70.

Zimmerman, B. J., & Martinez-Pons, M. (1988). Construct validation of a strategy model of self-Regulated learning. *Journal of Educational Psychology, 80*(3), 284-290.

Zimmerman, B. J., & Martinez-Pons, M. (1990). Student differences in self-regulated learning: Relating grade, sex, and giftedness to self-efficacy and strategy use. *Journal of Educational Psychology, 82*(1), 51-59.

Zimmerman, B. J., & Schunk, D. H. (1989). *Self-regulated learning and academic achievement: Theory, research, and practice*. New York, NY: Springer.

Zimmerman, B. J., & Schunk, D. H. (2001). *Self-regulated learning and academic achievement: Theoretical perspectives* (2nd ed.). Mahwah, NJ: Lawrence Erlbaum Associates.

APPENDIX A

STUDENT INTERVIEW PROTOCOL

Self-Regulated Learning in Hybrid Learning Environments
Interview Method and Outcomes
Researcher - Shannon Manuelito, PI – Ray R. Buss

Student Interview

Introduction

Hello, thank you for your participation. My name is Shannon Manuelito. I am doing a study on learning in hybrid learning environments. The results of this study will be used in my dissertation for the Doctoral Program in Education at Arizona State University. Results will be published in my dissertation and I assure you that this interview will be anonymous. Your name will not be associated with the study.

Permission

Do I have your permission to tape record this interview?

Questions

1. What is a student's role in the learning process?
    a. Can you elaborate, tell me more?

2. In what ways do you contribute to your learning?
    a. Can you describe an example?
    b. Consider your overall performance in the course. Is your performance consistent with the effort you put into the course?
    c. In what ways did you contribute to your performance? What factors aided your performance? What barriers impeded your performance?

3. In your view of the instructor's role, how should he/she contribute to the face-to-face portion of the class?
    a. In your experience in the hybrid class, what instructor activities or actions helped you the most?

4. In your view of the instructor's role, how should he/she contribute to the online portion of the class?
    a. In your experience in the hybrid class, what instructor activities or actions were most helpful?

5. What does it mean to be a self-regulated learner?
    a. Can you give me an example?
    b. What activities or strategies help you to be self-regulated in your learning?

6. What does it mean to be reflective about your learning?
    a. Can you give me an example?
    b. Would you say that you are reflective when you are learning? If yes, how so? If not, why not?

7. Do you consider yourself to be an A, B, or C student? Why?

8. Is there anything else you would like to add?

End Interview

Thank you for your time. If you have any questions or additional comments, please send me an email. (Hand out card with contact information.)

APPENDIX B

SURVEY: ONLINE SELF-REGULATED LEARNING QUESTIONNAIRE (OSLQ)

Item*	Strongly Agree	Agree	Disagree	Strongly Disagree
1. I set standards for my assignments in online courses.	4	3	2	1
2. I set short-term (daily or weekly) goals as well as long-term goals (monthly or for the semester).	4	3	2	1
3. I keep a high standard for my learning in my online courses.	4	3	2	1
4. I set goals to help me manage studying time for my online courses.	4	3	2	1
5. I don't compromise the quality of my work because it is online.	4	3	2	1
6. I choose the location where I study to avoid too much distraction.	4	3	2	1
7. I find a comfortable place to study.	4	3	2	1
8. I know where I can study most efficiently for online courses.	4	3	2	1
9. I choose a time with few distractions for studying for my online courses.	4	3	2	1
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.	4	3	2	1
11. I read aloud instructional materials posted online to fight against distractions.	4	3	2	1
12. I prepare my questions before joining in the chat room and discussion.	4	3	2	1
13. I work extra problems in my online courses in addition to the assigned ones to master the course content.	4	3	2	1
14. I allocate extra studying time for my online courses because I know it is time-demanding	4	3	2	1
15. I try to schedule the same time everyday or every week to study for my online courses, and I observe the schedule.	4	3	2	1
16. Although we don't have to attend daily classes, I still try to distribute my studying time evenly across days.	4	3	2	1

17. I find someone who is knowledgeable in course content so that I can consult with him or her when I need help.	4	3	2	1
18. I share my problems with my classmates online so we know what we are struggling with and how to solve our problems.	4	3	2	1
19. If needed, I try to meet my classmates face-to-face.	4	3	2	1
20. I am persistent in getting help from the instructor through e-mail.	4	3	2	1
21. I summarize my learning in online courses to examine my understanding of what I have learned.	4	3	2	1
22. I ask myself a lot of questions about the course material when studying for an online course.	4	3	2	1
23. I communicate with my classmates to find out how I am doing in my online classes.	4	3	2	1
24. I communicate with my classmates to find out what I am learning that is different from what they are learning.	4	3	2	1

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

25. Describe at least one class activity you find most enjoyable. Why is it enjoyable?

26. Describe at least one class activity you find least enjoyable. Why is it least enjoyable?

Demographic Information: This information will not be used to identify participants. Fill in the blank or circle the best answer.

27. Gender: Male Female

28. Age: _____

29. Ethnicity (Please choose the one you most identify with):

White/Caucasian Black/African American Hispanic/Latino

Asian/Pacific Islander Native American Other: _____

30. How many semesters (including this one) have you been in college? _____
31. How many online courses (including this one) have you taken? _____
32. How many hybrid courses (including this one) have you taken? _____
33. How many credits are you currently taking? _____
34. How many hours per week are you working? _____

APPENDIX C

COURSE PREPARATION LOG

BIO 160 Course Preparation Log (CPL) NAME: _____

Date	Time	Activity Be specific. You must write the type of activity (*reading, studying, taking notes, reviewing notecards, working through online activities, etc*.) and the content (*muscle contraction, homeostasis, anatomical terms, etc)*.
Ex. 8/2 *Ex. 8/3*	*9:00-10:00 pm* *5:00-5:45 pm*	*Read pages 3-18 of chapter 1 about anatomical terms and body regions.* *Gathering information from the Internet about cellular components in muscle cells.*

APPENDIX D

COMPOSITE VIGNETTE

The following vignette is a contrived scenario. The basis of this vignette originates from various student observations and documented self regulated behaviors.

> It is the night before the examination. Heather is going to the campus library to meet a study group. Her classmates have been studying together for the entire semester. This was the first time she was going to participate in a study group. Normally she studies alone for examinations.
>
> They begin to talk about the class before they study. The group asks Heather how she thinks she will do on the examination. Heather replies that she has no idea. The group responds with quizzical looks. She goes on to say that she has not been given a grade report from the instructor.
>
> The group begins to study. They start by reviewing and comparing their chapter outlines and questions for the unit. Heather does not have any chapter outlines or questions. She asks when the instructor provided the outlines. The group responds that the instructor did not hand out any outlines. They outlined the chapter as a study tool.
>
> Next the group proceeded to review the quizzes and homework given for the unit. Heather does not have her homework and quizzes. She tells the group that the instructor didn't tell her to keep track of her work.
>
> At this point the group is frustrated with the lack of input from Heather. They ask her how she normally studies for an examination.

Discuss the following questions in your blog. Use paragraphs and proper sentence form. Take care to use proper spelling and grammar.

1. In what ways are Heather and the group different?
2. Would you say that Heather is taking responsibility for her learning? Why or Why not?
3. What kind of grade do you think Heather is getting in class? Why?
4. How do you think Heather studies for examinations?
5. How does this compare to your preparation for class?

APPENDIX E

ASU IRB APPROVAL LETTER

ASU Knowledge Enterprise Development

Office of Research Integrity and Assurance

To:	Ray Buss FAB
From:	Mark Roosa, Chair Soc Beh IRB
Date:	09/14/2012
Committee Action:	**Exemption Granted**
IRB Action Date:	09/14/2012
IRB Protocol #:	1209008212
Study Title:	Self Regulated Learning in a Hybrid Biology Course at a Community College

The above-referenced protocol is considered exempt after review by the Institutional Review Board pursuant to Federal regulations, 45 CFR Part 46.101(b)(1) (2) .

This part of the federal regulations requires that the information be recorded by investigators in such a manner that subjects cannot be identified, directly or through identifiers linked to the subjects. It is necessary that the information obtained not be such that if disclosed outside the research, it could reasonably place the subjects at risk of criminal or civil liability, or be damaging to the subjects' financial standing, employability, or reputation.

You should retain a copy of this letter for your records.

APPENDIX F

MCCD IRB APPROVAL LETTER

Maricopa County Community College District
2411 West 14th Street
Tempe AZ, 85281
TEL: (480) 731-8701
FAX: (480) 731 8282

DATE:	September 17, 2012
TO:	Manuelito, Shannon, Biology
	Buss, Ray, Education
FROM:	MCCCD Institutional Review Board
PROTOCOL TITLE:	Self Regulated Learning in a Hybrid Biology Course at a Community College
FUNDING SOURCE:	NONE
PROTOCOL NUMBER:	2012-06-204
FORM TYPE:	NEW
REVIEW TYPE:	EXEMPT

Dear Principal Investigator,

The MCCCD IRB reviewed your protocol and determined the activities outlined do constitute human subjects research according to the Code of Federal Regulations, Title 45, Part 46.

The determination given to your protocol is shown above under Review Type.

You may initiate your project.

If your protocol has been ruled as ***exempt***, it is not necessary to return for an annual review. If you decide to make any changes to your project design which might result in the loss of your exempt status, you must seek IRB approval prior to continuing by submitting a modification form.
If your protocol has been determined to be ***expedited or full board review***, you must submit a continuing review form prior to the expiration date shown above. If you make any changes to your project design, please submit a modification form prior to continuing.

We appreciate your cooperation in complying with the federal guidelines that protect human research subjects. We wish you success in your project.

Cordially,
MCCCD IRB