ABSTRACT

THE IMPLEMENTATION OF A HYBRID LEARNING ENVIRONMENT AT A COMMUNITY COLLEGE IN THE MECHANICAL TRADES

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Northern Illinois University, 2014
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The study was a case-based exploratory study providing data for the implementation of hybrid learning in the trade classes at a community college. The research focused on understanding the ability of students to perform in a hybrid environment, specifically measuring the students’ abilities to monitor, predict and reflect on their own learning self-regulated learning behaviors. The study utilized a mixed methods approach to determine if the students in the newly implemented hybrid environment were academically capable of performing and if they would be receptive to the change which is required for success. The quantitative research provided results that indicated students who participated in classes concurrently demonstrated the ability to adapt to the hybrid platform more so than the students who took one class utilizing the hybrid platform. The qualitative research supported acceptance of the hybrid manner of instruction.
THE IMPLEMENTATION OF A HYBRID LEARNING ENVIRONMENT AT A COMMUNITY COLLEGE IN THE MECHANICAL TRADES

BY

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A DISSERTATION SUBMITTED TO THE GRADUATE SCHOOL IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE DEGREE DOCTOR OF EDUCATION

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Dr. Hayley Mayall, Co-director
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DEDICATION

This paper is dedicated to my parents who curiously sat back and watched me complete the process without asking too many questions. It was the values they instilled in me over the course of years that allowed me to complete this.
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Having been involved in the trades as laborer, skilled technician, and educator in both trade classes and community college environments, I feel learning is best achieved by a combination of different learning environments, peer collaboration, and a community of individuals that have common goals. Trade specific classes taught by organizations are apprenticeship oriented and provide hands-on learning but require a minimal amount of theory. Classes taught at the community college are more theoretical and less authentic. A mixture of these environments could provide a plethora of knowledge and the hybrid environment could be a viable solution. The use of online courses has provided community college students with new opportunities to actively participate in postsecondary education (Cox, 2005). My study implemented a hybrid environment in a community college’s trade classes with the intention to create a positive learning experience for the students.

Chapter 1 provides an overview of the study including the following: community college platform, trade environment, hybrid environment, statement of the problem, purpose of the study, research questions, theoretical constructs of the study, limitations and delimitations, definitions, and summary of the following chapters.

Community College

The community college provides a learning experience for individuals who would like to remain close to home or who do not have the financial or social skills for obtaining a bachelor’s
degree. The role of the community college is to train individuals who will most likely stay in the community. The community college provides the ability to train individuals to adapt into the local workforce and industry. According to Gleazer (1980), the viable community college has three valid elements: the capacity to be adaptable, a continuing relationship with the learners, and community orientation. An example of adaptability is when the renewable energy push started to take shape, community colleges created curriculum to train local individuals for possible jobs near home. Continuing relationship element examples are non-traditional students who may take a class at one time then take a class a couple of years later while they live in the community or dislocated workers being retrained twenty years after they participated in their first college class. Community orientation provides an element that is unique to the community college; the campuses are comprised of individuals who have a history together as family members, socially and/or professionally.

The community college environment allows individuals who have worked together in the community to actively participate in formal learning. Individuals who share common characteristics and abilities are able to create a positive learning environment, which allows individuals to co-exist in a learning environment within their community. The community college provides a means for individuals to reach the fullest potential of their talents regardless of who they are or why they did not attend a four-year institution. According to Cohen and Brawer (2003), “Talent is potentially to be found in every social stratum and at any age. People who fail in their youth should be given successive chances” (p. 10). The community college needs to be prepared to accept all individuals regardless of past educational experiences. This open-door policy can make curriculum design a challenge because it does not have the luxury of turning away individuals that a four-year institution can and therefore must be willing to accept
all individuals. The acceptance of all individuals creates a diverse student population interacting together in learning communities.

Trades

For my study I analyzed data looking at individuals in the manual/skilled trades and specifically hybrid classes in heating ventilation and air conditioning (HVAC) and renewable energy (ENE, i.e., solar technicians and geothermal technicians). The manual/skilled trades include individuals who carry out physical work with their hands, repairing, installing, and/or servicing equipment or individuals involved in any line of employment requiring physical work. The term technician or service technician applies to the individual performing the task and the skills required mandate high levels of problem solving. Skilled labor includes individuals who have the ability to problem solve. According to Newell and Simon (1972), a problem has three main components: a given state, a goal state, and a set of operators transforming the given state into the goal state. All technicians form a problem-solving sequence unique to their own abilities. Recognizing these components is necessary for a technician to be successful, and the technician must recognize how the components fit into his or her distinct cognitive and metacognitive processes.

The development of metacognitive skills can help individuals perform at higher levels. Learners need to be able to develop the skills necessary to be able to monitor their own thinking processes. Kluwe (1987) expanded on metacognition processes by acknowledging two characteristics: the thinker knows something about his or her own and others’ thought processes and the thinker can pay attention to his or her own thinking. Kluwe referred to this as the executive processes. The executive decision processes are a critical component in problem
solving. Technicians need to be able to process information and rely on their own thought processes to formulate a solution in an effective and efficient manner. After the solution is carried out, the individuals need to check their solution for accuracy, which is a metacognitive function.

The training of skilled technicians in the trades is critical for the success of the individual and the company or institution in which the individual is employed. A good technician needs to be able to solve a problem in a reasonable amount of time. A reasonable amount of time for troubleshooting a given problem is approximately twenty to thirty minutes; this is the process of figuring out what is defective, not the repair portion, which requires a different set of skills. This is not a substantial amount of time; therefore, the technician has to be able to develop troubleshooting techniques (i.e., problem solving) that are efficient and accurate. Problem-based learning (PBL), a methodology of collaborative learning, has the potential to provide the learning platform to help technicians achieve the levels of skill they require. A component of PBL is peer collaboration and group work, which were addressed in my study through interviews and participation in class assignments.

The development of troubleshooting skills allows for effective problem solving and the ability to think analytically, which are required for today’s technician. The teaching of these mechanical trades requires a balance of learning epistemologies that include hands-on authentic experiences integrated with computer-mediated environments. This skill set needs to be developed in formal and informal educational settings using the most efficient form of learning tools available including computers, Smart Boards, or specifically the most effective means of verbal or written communication. Formal learning is achieved in an educational setting or structured trade classes, while informal learning takes place among individuals who share
common interests and work as group. The trades are a highly social environment for formal and informal learning. Each of the individual trades becomes a community of learners and each community must interact with the other communities (i.e., trades). The successful interaction of the communities is critical for success of any given job.

One of the underling theoretical foundations of my study is social learning theory, which can be applied to deliberate education or accidental adaptation, and both apply to the community of practice (Hoadley & Kilner, 2005). Having been involved in the manual trades for many years, I can personally attest to the knowledge acquired through accidental adaptation that takes place among peers in casual conversation. As an educator and practitioner in the trades for thirty plus years, I can attest to the value of an authentic learning environment. I have been a part of environments that are non-authentic and non-structured in which learning did not occur. As stated by Crawford (2009, p. 11), in the book Shop Class as Soulcraft: An Inquiry into the Value of Work:

> In schools, we create artificial learning environments for our children that they know to be contrived and undeserving of their full attention and engagement. Without the opportunity to learn through the hands, the world remains abstract, and distant, and the passions for learning will not be engaged. (A certain shop teacher whose name I have lost)

 Students can sense when an environment is not authentic and will show a lack of interest resulting in a minimal amount of cognitive and metacognitive growth, if any. I believe that the hybrid platform can provide a positive, effective, and efficient learning environment in community colleges.
The term e-learning came into use in the mid-90s with the development of the World Wide Web. The original goal of e-learning was to allow educators to create a community of inquiry completely independent of the location with the help of information and communication technologies (Garrison & Anderson, 2003). E-learning is a specific field in education, with its foundation in computer conferencing and collaborative constructivist approaches to learning (Garrison, 2011). In contrast, blended (hybrid)\textsuperscript{1} learning is not rooted in traditional distant education as some individuals feel (Cleveland-Innes & Garrison, 2010).

Stated by Dale (1946), “Learning is likely to be ‘permanent’ if it is (1) well motivated, (2) if its purpose and value are clear, and (3) if there is practice, application, use” (p. 22). The idea of learning in 1946 was the same as it is in 2014, even though the methodologies and terminologies have changed over the course of time. Instructors today need to work with current tools and implement them in a positive manner to facilitate learning. Instructors need to recognize the audience they are addressing and provide a valuable tool to convey the instruction even if the means is a piece of chalk and a blackboard or if the means is e-learning.

The use of the computer has evolved over the course of time, and no one knows how far it will take instructors in education. E-learning has been researched in the past and is also currently being researched. Garrison (2011) formally defined the field of e-learning as “electronically mediated asynchronous and synchronous communication for the purpose of constructing and confirming knowledge” (p. 2). E-learning has two primary forms, fully on-line and blended (hybrid) learning (the form researched in my study was hybrid). In today’s society, computers have allowed for different amounts and types of information to be presented to the

\textsuperscript{1} blended and hybrid in this paper reference the same environment.
learners, and the increased amounts and instructional capabilities have attracted the attention of many educators (Reiser & Dempsey, 2002).

The trend of hybrid education in higher education has been developing exponentially. Hybrid education provides a means of delivering instruction, which combines on-line and face-to-face delivery methods; however, it does not replace face-to-face instruction (Garrison, 2011). On-line environments rich in content require interaction with individuals to enhance learning outcomes. When hybrid education is designed into a learning environment, it can provide a valuable learning experience that goes beyond the basic acquisition of knowledge (Reiser & Dempsey, 2002). E-learning is a positive learning tool, and hybrid education is able to combine the face-to-face component and the oral communication skills, along with the online written communication skills. The percentage of each is completely dependent on the designer’s decision of what is important enough to justify face-to-face content.

For instruction to be effective, it needs to be created in a logical manner and needs to be efficient. The learning environment needs to utilize the available resources and tools to be efficient. According to the Association for Educational Communications and Technology (2007), “learning events take place in face-to-face settings or in virtual environments, as in microworlds or distant learning” (p. 4). The hybrid environment is an effective means of instructional design to provide for efficient learning. The hybrid environment provides a platform to utilize classroom time for important concepts the instructor feels need to be elaborated on. The work students accomplish on their own provides the base the instructor needs to build on. The hybrid environment allows for students to manage their own learning time when completing the online portion and allows for a wide population to draw students from, nationally, if not globally.
According to Shea (2007), “to understand learning in a blended environment we need to have an understanding of several underlying and interrelated questions. These include: how learning occurs generally, how it occurs in adult learners, and how it occurs in technology mediated-environments” (p. 20). Regarding knowledge, Shea suggested learning is in many ways a social activity, and it must be viewed as a cognitive activity. I feel that effective instruction in the trades needs to be community centered with all individuals contributing at their level of skill. The interaction allows for individuals to participate and/or learn vicariously. The value of the community is a critical component of the hybrid learning pedagogy. As stated by Garrison and Kanuka (2004):

Community provides the stabilizing, cohesive influence that balances the open communication and limitless access to information on the internet. Communities also provide the condition for free and open dialogue, critical debate, negotiation and agreement—the hallmark of higher education. Blended learning has the capabilities to facilitate these conditions and adds an important reflective element with multiple forms of communication to meet specific learning requirements. (p. 97)

Statement of Problem

Students are maintaining schedules that require some flexibility in learning; this flexibility will allow the student to maintain a professional status, and maintain their personal and family matters. The community college Technology Area caters to students who work and maintain active roles in the community. The instructor needs to provide an intuitive environment that captures the student’s attention while allowing the student to attend to daily life routines. The hybrid environment can provide the means for students to control a portion of the way they learn. To date, I have yet to identify any empirical research on the implementation of the hybrid environment at the community college level in the trades. The questions that surface with the
implementation of the hybrid platform include: Are the students self-regulated learners, which is required for hybrid learning? Will the student be receptive to the hybrid platform? Is the student in this specific geographic region of study able to overcome any specific computer or educational deficiencies? The questions are of great importance in my study to the determination of the hybrid course design and if it is adaptable to the Technology Area at my institution. Learning, as stated by Driscoll (2005), is “a persisting change in performance or performance potential that results from experience and interaction with the world” (p. 1). The answers to the preceding questions will help to determine the effectiveness of hybrid learning at my institution. If the students are not able to perform, then the instruction will not be effective and learning will not occur.

Purpose of Study

My study examined the use of a hybrid environment in the community college environment, specifically the skilled trade classes. Educational institutions are incorporating online course delivery into their course offerings at increasing rates (Allen & Seaman, 2011; Chau, 2010; Perry, 2009). The results of my study could be used to help educators in the trade classes and brick-and-mortar environments incorporate the proper amounts of computer mediated and face-to-face epistemologies to promote learning in the environment. The hybrid environment utilizes a combination of online and face-to-face learning and provides a positive experience, with each platform complementing the other (Garrison & Anderson, 2003).

Therefore, the intent of my case-based exploratory concurrent, transformative, mixed-methods study was to explore the possible implementation of the hybrid environment in the mechanical trades. In the study, the Online Self-Regulated Learning Questionnaire (OSLQ;
Barnard, Lan, To, Paton, & Lai, 2008) was utilized to measure if the students were capable of self-regulated learning skills, which are necessary for the hybrid environment. Concurrently, with the quantitative data collection, qualitative data were collected, which provided insight into the students’ ability to monitor, predict, and reflect upon their own learning, all necessary components of being successful in the hybrid environment. The qualitative method of research selected was phenomenology, which allowed for an in-depth inquiry of students sharing a mutual experience (Moustakas, 1994). The combination of the quantitative and qualitative data was to help provide information about the effectiveness of the hybrid platform.

**Research Questions**

Working as a skilled technician in the trades requires individuals to use all tools available, which include computers. The use of computer technology and programming is a critical component of today’s technician for proper troubleshooting. Any skills the technician can develop prior to entering the field will be beneficial. The use of computers to develop soft skills and the implementation of hybrid learning in training may help individuals perform at high levels at the community college level in the mechanical trades. According to Jonassen, Peck, and Wilson (1999), good technology integration utilizes authentic tasks that are designed to actively help learners construct their own meanings from thinking about experiences. My study was a case-based exploratory study for the use of hybrid learning at the community college where I am currently a tenured faculty member. The intent of the research questions was to construct a profile of the trades’ student at my institution, which allowed me to determine the benefit of the hybrid environment for my institution. The questions for the study were
1. How, and to what extent, do community college students enrolled in hybrid trade classes exhibit self-regulated learning behaviors?

2. To what extent are self-regulated learning behaviors associated with student performance in hybrid trade classes?

Theoretical Constructs of Study

The theoretical constructs of the study include the following: social learning theory and situated cognition, with each focusing on the construct of hybrid learning and self-regulation. As stated by McKeachie (2000), “Self-regulation constructs nicely integrate the cognitive, motivational, social, and behavioral strands of theory and research” (p. xxii). Bandura’s (1977) social learning theory emphasizes the reciprocal influences of behavior, environment, and person. The construct of situated cognition allows the learners to participate in a community and to be given more responsibility as they learn (Brown, Collins, & Duguid 1989; Lave & Wenger, 1991). For individuals to succeed in the skilled trades, they need to understand how they learn and they need to rely on others for information when they are presented with a dilemma of some magnitude. The constructs chosen for the study provided an environment conducive for the successful technician. According to Kim and Baylor (2006), “Teaching and learning are highly social activities. Seminal psychologists such as Vygotsky, Piaget, and Bandura have theorized that social interaction is a key mechanism in the process of learning and development” (p. 569).

Limitations of the Study

The limitations of the study include the following. First, due to time constraints, the study was case-based, although it would have been more beneficial to conduct a longitudinal
study. Second, the participants were limited due to low enrollment numbers at the community college; a factor that is a reflection of the current economic conditions of the area in which the college was geographically located. Third, since it was a case-based study and enrollment numbers were low, I was not able to utilize a control group for comparison. I had the students’ grades from the previous semester and current semester in traditional settings for comparison. Fourth, the students had minimal, if any, prior experience in the hybrid environment and may have rejected the concept or been biased toward the course design. Lastly, some students had limited computer skills, which was an obstacle the students had to overcome.

**Delimitations of the Study**

The study was conducted in a small community college in rural northwestern Illinois. The participants in the study were in the Technology Area of Education at the school. The study included some preliminary data collected in Fall 2013. The data in the fall semester included grades obtained in a face-to-face environment. The data collection for the current study took place in Spring 2014, which started in January 2014 and ended in May 2014. The classes included in the study were: HRS 120, 130, 160, and 170 and ENE classes 140 and 145.

**Definitions**

The terms defined below relate to the trades or are specific to my study.

**Blended/Hybrid**: Incorporating face-to-face and online teaching strategies.

**ENE**: Acronym used for renewable energy classes at college.

**HVAC**: Acronym used for, Heating ventilation and air conditioning.

**HRS**: Acronym used for HVAC classes at college.
Manual Labor: Individuals physically working to accomplish a goal.

PBL: Problem-based learning; utilizes a rich problem that allows for free exploration by students and is student centered (Barrows, 1988).

Renewable Energy: Solar, geothermal or any other field that utilizes a renewable source of energy.

Service technician: An individual servicing a piece of equipment to repair and put in operation.

Skilled Laborer: Individuals required to troubleshoot, install, or repair equipment.

Technology Area: The area in which classes are being taught at the school. It is known as the trades’ area, not the computer technology area.

Trades: Workers involved in working in HVAC or renewable energy fields or as electricians, plumbers, pipe fitters, millwrights, steel workers, etc.

Summary

Understanding cognitive and metacognitive functions can help learners recognize their strengths and weaknesses in formal and informal environments to promote critical thinking and problem solving. The goal I have established for myself as an educator and teacher in formal and informal settings is to create a learning environment that is interactive and learner centered. The hybrid platform can help create a learning community that is beneficial to the learner in regard to money saved on commuting, day care and numerous other variables, and the hybrid platform is a viable means for the institution to save time and expenditures in their strategic planning. Distance education has adapted to today’s instruction, and online education has become a standard means of instructional delivery for college courses (Allen & Seaman, 2011).
Chapter 2 will provide a review of the literature, including social learning theory, situated cognition, and hybrid learning. Chapter 3 describes the research methodology. Chapter 4 details the quantitative research findings, and Chapter 5 will consist of the integration of quantitative and qualitative data, discussion and reflection.
CHAPTER 2
LITERATURE REVIEW

The underlying theories that shape hybrid learning are situated cognition and sociocultural theory (Hoadley & Kilner, 2005). Sociocultural theory is “based on a particular kind of community, the community of practice” (p. 32). Sociocultural theory and communities of practice both evolved from constructivism (Oliver & Herrington, 2000). An intention of my study was to develop a community of learners in the Technology Area at the college to help facilitate learning. A learning community allows individuals to learn behaviors, either through formal instruction or informally, that can be used in real-life situations (Hill, 2012). The social component helps to promote learning, as noted by Vygotsky, Cole, John-Steiner, Scribner, and Souberman (1978), “the mechanism of individual developmental change is rooted in society and culture” (p. 7).

The first section of this chapter reviews literature related to the overarching theory of constructivist concepts including the social constructivist theory and learning communities. The next section defines situated cognition and its subcomponents of communities of practice as well as online communities. Section three contains an in-depth discussion of social cognitive theory, including observational learning, agency, and self-efficacy. Metacognition and social cognition will then be discussed as they relate to self-regulated learning in section four. Hybrid learning viewed through the lens of the How People Learn Framework (Bransford, Brown, & Cocking, 2000) and the Community of Inquiry Framework (Garrison, 2003) will be discussed in the fifth
Constructivist Concepts

Constructivist theory suggests that knowledge is constructed by learners as they process and analyze their experiences. The constructivist epistemology is to allow learners to develop their own learning goals and allow them to pursue those goals (Driscoll, 2005). According to Santrock (2011), the constructivist approach is learner-centered allowing learners to actively construct their knowledge with the help of the teacher. Students should be encouraged to construct their own meaning with the use of reflecting and critically thinking; students need to gain meaning and should no longer be passive participants in the learning process. Additional goals of the constructivist pedagogy are the abilities to solve ill-structured problems (Jonassen et al., 1999) and develop personal inquiry skills (Hannafin, Land, & Oliver, 1999). Two prominent constructivist theorists include Piaget and Vygotsky. My study focused on the social constructivist approach of Vygotsky and social influences.

The pedagogy in a constructivist classroom shifts control from the instructors to the learners (Johnson, 2001). The following concepts apply to the constructivist classroom: open-ended questions authentic in nature to help learners navigate complex problem solving; learning in social context utilizing collaborative work; constructivist environments utilizing social interdependence; negotiated goals shared by learners and instructors allowing for co-ownership of the learning process; and cognitive tools that help learners systematically organize their knowledge. The role of the instructor becomes that of a facilitator and guides the learners to help them develop their cognitive and metacognitive functions (Johnson). As stated by Driscoll
“self-regulation is desirable to constructivist educators” (p. 391). Constructivist environments require self-regulation and participants need to take ownership of their learning. This belief allows for methods of instruction in open-ended learning environments, collaborative learning environments, and problem-based learning environments.

Social Constructivist Theory

According to Hill (2012), social constructivist theory expanded upon constructivism and how the interaction with others will influence the learning process. The work of Vygotsky is some of the most influential in the social constructivist theory, specifically, the work done on the zone of proximal development (ZPD) and scaffolding (Hill).

As stated by Vygotsky et al. (1978), the zone of proximal development is “the distance between the actual developmental level as determined by independent problem solving and the level of potential development as determined through problem solving under adult guidance or in collaboration with more capable peers” (p. 86). Novices will begin their learning at one end of the ZPD continuum and slowly move across as they develop (Hill, 2012). This notion was also supported by Zimmerman and Campillo (2003) and their work in the area of problem solving. The ZPD is extremely important in the hierarchy of the teaching of the trades. Individuals develop at different rates when it comes to troubleshooting, problem solving and the development of a complete analysis and repair. The process of troubleshooting changes for individuals over the course of work experience. The novice will jump right into a repair without giving the problem a thorough analysis. The end result is usually failure to repair completely. With the help of seasoned professionals, young, inexperienced technicians or students will gradually develop over the course of an apprenticeship or with instructor guidance. Lave and
Wenger (1991) supported this notion and the value of apprenticeships with their analysis of the Vai and Gola tailors in Liberia and the butchers in U.S. supermarkets.

Scaffolding is associated with ZPD since it relates to the help given to learners, and as the learner progresses, the scaffolding is removed to allow the learner to work independently (Hill, 2012). Scaffolding describes an instructional support provided for learners by external agents such as teachers, students, or additional supplementary materials (Oliver, Omari, & Herrington, 1998). This concept of masters (journeyman) removing themselves has become known as fading (Pea, 2004). The notion of fading is common to the word apprenticeship as indicated by Collins, Brown, and Newman (1989), “Once the learner has a grasp of his target skill, the master reduces (or fades) his participation, providing only limited hints, refinements, and feedback to the learner” (p. 456). Scaffolding is implemented frequently in the field of HVAC and ENE with success. An example of this is when a journeymen installer will show a novice one particular job in an installation. The next job where this task is required, the journeymen will have the novice carry out the work and check on the quality and accuracy. Over the course of time the novice will take on the specific task and the journeymen will no longer follow-up with checking the completed task.

Learning Communities

According to Komito (1998), a community does not take on a specific form or have a specific function. Instead a community “is a mixed bag of possible options whose meanings and concreteness are always being negotiated by individuals, in the context of changing external constraints. This is true whether the group members interact electronically, via face-to-face communication, or both” (p. 105). Komito discussed three possible communities that can exist
when discussing the concept of the community and an individual needs to determine what kind of community is being discussed or emphasized. Moral communities are individuals who care about each other, help each other, and have a sense of responsibility toward each other as well as trust for each other. Trust in the trades is critical for safety and proper troubleshooting.

Normative communities are based on a cognitive viewpoint; this community has a set of rules and appropriate behavior agreed upon, a common value or meaning is shared. A community of practice would fall in this community. For proximate communities, a shared norm is an attribute of this community. This community includes individuals that are in a particular location and interact with each other as individuals; this becomes the starting point for discussions in the virtual community.

According to Hill (2012), the concept of communities to assist in learning has been an interest of educators for a substantial period of time. A learning community is a group of individuals “working together to facilitate the learning process” (p. 269). The idea of building a learning community takes time. A learning community, or community of practice, does not just form; it can develop from a group of individuals with a common purpose. Hill suggested three areas of challenge when building a learning community: learning community environment, time, and technology. The learning community environment needs to provide the leaners with a failsafe feeling allowing the learners to feel they can act as themselves. This sense of feeling safe supports self-directed or self-regulated learning beliefs. The environment needs to be grounded, which will allow for the learners to gain an understanding of their role in the community; the environment also needs to be real-world or authentic in nature. For the time component, this addresses the fact that time is precious to all of us and is a scarce commodity. The facilitator of the learning community needs to reassure the learner that someone is out there
to help them when they need the help; along with this a means to help individuals regulate their time is also necessary. The concept of social interdependence is a key component in a learning community. The learners need to recognize that along with managing their time they need to set priorities on how they participate in the community, which is a benchmark for the self-directed learner. For the technology component, the evolving technology continues to enable a stronger social presence in the community; an example of this is a blog or a wiki that can enable a collaborative knowledge building community in a matter of seconds. For the technology to be successful the instructor must minimize the problems with technology to avoid user frustration (Hill).

According to Bielaczyc and Collins (1999), the defining quality of a learning community “is that there is a culture of learning in which everyone is involved in a collective effort of understanding” (p. 271). Therefore, this culture must have the following characteristics: 1) a diverse field of experts who are valued for their contributions and encouraged to develop more, 2) a shared belief and understanding to always be advancing the skills and knowledge of the community, 3) an emphasis on how to properly learn the information, and 4) a means to distribute the information to individuals. The premise for the learning community is that when presented with problem as a group they can collectively solve the problem. Not every member has to be an expert on the subject nor participate in the specific solving of the given problem. The objective is students in the group will acquire the same knowledge as experts over time.

Bielaczyc and Collins (1999) stated the classroom environment has changed over the years to involve more social interaction. They provide a framework for the learning community classroom that includes eight distinct dimensions making the classroom-based learning communities specific in nature: 1) goals of the community, both individuals and the community
commit to learning and how to learn together. The intent is for the members to learn to respect other individual’s opinions; 2) Learning activities, the activities of a learning community must foster growth for the individual as well as the community, knowledge needs to be shared among members, and the processes must be completely visible to all members; 3) teacher roles and power relationships, the teacher takes on the role of organizing and facilitating student-directed activities. Power shifts to the student and they take on the responsibility of learning and checking progress; 4) centrality/peripherally and identity, the central roles go to the individuals with the most direct experience. Less experienced individuals in the group can participate in the discussion and their roles change as they developed. Students are supported for this effort to join the discussion; 5) resources, outside resources are used in all paradigms. The learning community takes learning to the point where both the content learned and the processes of learning are shared among the learners and are adopted by the group; 6) discourse is a means the learning community embraces for formulating and exchanging ideas. It helps to motivate research, and reflection, to generate new ideas; 7) knowledge is the development of diverse individual’s expertise and collective knowledge is emphasized where individual and collective knowledge support each other. Topics are chosen to help understand broad ideas that can be applied to other areas; and 8) products are what the members work together to produce these items include artifacts or performances that can be used by the community to help promote learning this can take months to develop.

Situated Cognition

Many studies regarding situated learning have been carried out in mathematics education. Situated cognition emphasizes the idea that much of what is learned is specific to the situation in
which it was learned (Lave & Wenger, 1991). According to Barb and Duffy (2012), situative theories “emphasize the reciprocal character of interaction in which individuals, as well as cognition and meaning, are considered socially and culturally constructed” (p. 30). Through this shared exchange, situated learning can create a positive learning situation for individuals in either formal or informal settings. The following section provides for past and current work in situated learning going back to 1987 and the work of Resnick. Barb and Duffy considered it to be seminal work in situated cognition.

Education and learning is around us at all times, and individuals have the potential to learn at any point in time if they are willing. Resnick (1987) stated, “Popular wisdom holds that common sense outweighs school learning for getting along in the world—that there exists a practical intelligence, different from school intelligence, that matters more in real life” (p. 13). Resnick examined four areas of research looking at the broad characteristics of mental activity outside of school contrasted with in-school work and the implications of the different learning styles. The four areas included individual cognition in school versus shared cognition outside, pure mentation in school versus tool manipulation outside, symbol manipulation in school versus contextualized reasoning outside, and generalized learning in school versus situation-specific competencies outside.

In area number one, Resnik (1987) addressed individual versus shared cognition and suggested how schools focus mainly on individual efforts and how an individual will succeed independently of other individuals. However, outside of school, the individual’s activities are socially shared. The individual’s work life and overall personal life function depending on how others may act and influence them. Resnick cited an example of shared cognition provided by Edwin Hutchinson. The example discussed the navigation of naval ships from a shipyard in San
Diego, which requires six individuals working together relying on each other and how each individual is required to accomplish the task. This example shows that no individual can work alone to successfully pilot the ship.

According to Resnick (1987), pure mentation in school versus tool manipulation outside of school indicates another contrast in and out of school. Schools may utilize books or any other instrument to enhance learning, yet when it comes to testing, the tools are not present for an individual. The contrast to this outside of school can be explained like this—the tools available help to shape the way in which they are used and will be utilized as needed in the authentic environment where they are located. The tools in real world activities develop as needed by the way the original tools are utilized. The example used by Resnick discussed the evolution of the compass and how over the course of time, it has become more sophisticated and, in turn, has made navigation easier.

Symbol manipulation in school versus contextualized reasoning out of school is another indication of a contrast. Resnick (1987) suggested that what children learn through real-life application could be useful as a framework for deriving the correct answers in school. However, in the school environment, the focus is on “learning symbol manipulation rule and saying or writing things according to the rules” (p. 15). What Resnick was talking about in this area was the ways individuals use objects and events to help reason. In contrast, the school environment was symbol based, so the meaning of something was lost because there was not a direct correlation to the content. The suggestion was that how we learn and apply outside school experiences is isolated from students’ in school experience—a distinct disconnect.

Generalized learning in school versus situation-specific competencies outside of school addresses again the difference or disparity between what happens in school environments and the
expectations of competence in a work environment. The work environment requires specific forms of reasoning depending on the task at hand; whereas Resnick (1987) stated that the educational system at the time taught general skills and theoretical principles. Resnick suggested that this difference may be more pronounced than previously thought. She cautioned that using situation-specific learning alone “is very limited” (p. 15). The work generated by Resnick provided a solid foundation for situated cognition and for the value of group work or a community of individuals striving to accomplish a desired goal.

Communities of Practice and Legitimate Peripheral Participation (LPP)

The concept of situated cognition evolved into legitimate peripheral participation (LPP) for Lave and Wenger (1991). They stated, “learning is not merely a condition for membership, but is itself an evolving form of membership” (p. 53). LPP allows individuals to become involved in the process or culture from the beginning. They stated that learning is a process that takes place in a participation framework and is distributed among co-participants in the community. Legitimate peripheral participation provides a means for old timers and newcomers in the group to interact to promote learning. The individuals involved need to be fully committed to the group and to the culture for learning to take place, even if they only participate vicariously.

LPP provides a reason for communities of practice to exist. The community or group needs to be consistent in the manner in which they think and communicate. Defined boundaries are also important in communities and their existence. The structural components of the community require boundary objects to help define the community. The objects can include
artifacts, terms, concepts, monuments, points of focus, or anything else a community can organize around (Lave & Wenger, 1991).

**Communities of Practice Currently**

The following section will focus on the evolution of communities of practice suggested by Hoadley (2012). According to Hoadley, “one of the most important concepts in social or situated learning\(^2\) theory is the notion of community of practice” (p. 286). The development of a community of individuals sharing the same beliefs and goals will enhance learning as it has done for generations in apprenticeship programs. Hoadley suggested that two definitions of community of practice arose from Lave and Wenger’s work in the early 1990s. Hoadley termed the definitions featured-based and process-based.

Hoadley (2012) suggested the featured-based definition is based on the words themselves: a community that shares practices. This component of the definition suggests an anthropological approach to communities of practice. Knowledge is situative; it is not based on what is in the head or behaviors suggested by the environment. Knowledge is a property that is “lying somewhere between individuals and cultures, involving practice in context” (p. 288). Learning is accomplished through putting individuals in an authentic environment and not the mere rote memorization of information.

The process-based definition suggests that communities of practice are groups where legitimate peripheral participation takes place. In this scenario, individuals enter into a group and slowly take on more responsibility, becoming active members in the group over time. The process-based definition has significant implications in education, including the following

\(^2\) Situated learning is the same as situated cognition referenced in this paper
considerations: learners are required to have access to experts, the community of practice must already exist for participants to participate at their fullest extent, and lastly, the educational system must provide a space for legitimate peripheral participation to exist.

Social Cognitive Theory

Social cognitive theory states “social and cognitive factors, as well as behavior, play important roles in learning” (Santrock, 2011, p. 235). Bandura’s (1977) social cognitive theory focused on the defining roles of the following psychological processes: vicarious, symbolic, and self-regulatory. Regarding vicarious, social cognitive theory acknowledges that thought and behavior can be influenced by observation as well as direct experience. For symbolic, social cognitive theory suggests that individuals have the ability to use symbolic representations to plan, create and engage in foresightful action, which helps to regulate action. With self-regulatory, individuals do not just react to external events; they have the ability to select, analyze and transform meaning of external factors they are exposed to.

The reciprocal determinism model consists of three main variables interacting. As stated by Bandura (1977), “From the social learning perspective, psychological functioning is a continuous interaction between personal, behavioral, and environmental determinants” (p. 194). The choice of the word reciprocal is a key component of the model and is an indication of the mutual/equal variables in the model. In the process the environmental factors influence the behavior, behavior influences the person, the person influences the environment, or any possible combination of variables interacting and influencing the other. As stated by Bandura:

Behavior can create environmental conditions, as well as regulate their impact. Social environments provide an especially wide latitude for creating contingencies that reciprocally affect one’s own behavior. People can converse on many topics, they can engage in a variety of activities, and their potential
responsiveness is exceedingly diverse in other ways. In social interactions the behavior of each participant governs which aspects of their potential repertoires are actualized and which remain unexpressed. (p. 197)

The preceding statement can be applied to my study in the following manner. If the behavior of administration allows for the creation of the environmental conditions (i.e., hybrid), the instructor can provide for the social environment and the students can converse and use the acquired knowledge as they determine to be advantageous for their individual learning paradigm (See Figure 1).

![Figure 1. Bandura’s social cognitive theory. (Reproduced from Santrock, 2011, p. 235)](image)

**Observational Learning**

Observational learning, vicarious learning, or modeling incorporates the beliefs that by observing others, individuals can acquire the skills and strategies required to perform in their job, which is the underlying motive of any apprenticeship program and can also be applied to the community college trade class environment. According to Bandura (1977, 1986), the four key processes involved in observational learning included attentional, retentational, production, and motivation. With attentional, individuals need to want to learn if observational learning is going to be effective. Regarding retentional, for
modeled behavior to be effective, individuals need to be able to recall it either by verbal or imagined cognitions. Production is the process of using symbolic representations to perform an action. With motivation, learners will tend to act on behaviors that provide a reward as opposed to acting on behaviors that do not provide a reward. As stated by Bandura (1977), “In the social learning [cognitive] view, results of one’s own actions are not the sole source of knowledge ... information about the nature of things is frequently extracted from vicarious experience” (p. 181). However, the confirmation of the learning experiences ordinarily requires conformation through direct experience.

**Agency**

Bandura (2001) stated, “To be an agent is to intentionally make things happen by one’s actions” (p. 2). Individuals have the ability to take charge of how they learn and the particular processes they employ for success. Agency allows an individual to act upon the environment they are in and is also a requirement for the individual to achieve academically (Barnard-Brak, Lan, & Paton, 2010). The core features for agency include intentionality, forethought, self-reactiveness, and self-reflectiveness (Bandura). Intentionality refers to actions performed with intent and a proactive commitment to an action. For forethought, individuals will set goals for themselves, anticipate consequences, and carry out actions that will provide a positive result. Regarding self-reactiveness, along with forethought an agent has to be a motivator and self-regulator. After a plan is decided upon, agency will allow an individual to shape a plan of action, execute and apply corrective self-reactions if necessary. With self-reflectiveness, individuals are agents of their own actions along with self-examiners of their actions.
This is a metacognitive function where individuals reflect on the choices they made and determine correctness of what they predicted versus the actual outcomes (Bandura, 2001).

**Self-Efficacy and its Importance Online**

Bandura (1986) suggested that self-efficacy referred to individuals’ own perceptions about their capabilities to organize and take necessary actions to achieve a designated performance for a specific task or skill; along with this he felt individuals with a high sense of self-efficacy would set more challenging goals than those individuals with low self-efficacy. Self-efficacy beliefs are an important concept of the online environment and help to mediate behavior, “in essence, perceived self-efficacy has a mediating influence on behavior, specifically whether a behavioral task is attempted at all, and the effort to persist in that task” (Puzziferro, 2008, p. 73). Puzziferro asserted that learners who have a high confidence in their ability to perform academic tasks use more cognitive and metacognitive strategies.

A study conducted by Shea and Bidjerano (2010) addressed self-efficacy, self-regulation and the development of communities of inquiry in online and blended learning environments. They hypothesized that the both the teaching presence and social presence would affect the student ratings of cognitive presence. It was anticipated that student self-efficacy would predict effort regulation, which would produce favorable perceptions of cognitive presence. Shea and Bidjerano suggested that teaching and social presence can have an effect on self-efficacy; they believed that self-efficacy acts as a mediator among teaching, social and cognitive presence. According to the Shea and Bidjerano, the
results indicated a strong correlation exists between self-efficacy and the community of inquiry constructs, especially the constructs of teaching presence and social presence. The results suggested that the students felt they could achieve significant learning and that the effort they put forth was partly due to their self-efficacy.

Metacognition and Self-Regulated Learning

As stated by Zimmerman and Schunk (2011), self-regulated learning and performance referred to “processes whereby learners personally activate and sustain cognitions, affects, and behaviors that are systematically oriented toward the attainment of personal goals” (p. 1). Self-regulated learners set goals for themselves and create feedback loops that provide for monitoring of learning, making necessary adjustments, to facilitate learning. Self-regulated learners will know how to seek out help of peers or teachers making the process social and not individualized. Evidence indicated that students who had trouble self-regulating their studying performed poorly in school (Zimmerman, 2000).

According to Azevedo, Behnagh, Duffy, Harley, and Trevors (2012), the hybrid environment constitutes a student-centered learning environment and these environments pose challenges for students of all learning backgrounds. The non-traditional style of learning in this open-ended structure involves the implementation of different self-regulatory processes such as planning, reflection, metacognitive monitoring and regulation. These processes are not familiar to all learners and can create a holistic environment, also limiting the effectiveness of the environment. According to Azevedo et al., while engaged in self-regulated learning the learners need to
Deploy several metacognitive processes to determine whether they understand what they are learning, and perhaps modify their plans, goals, strategies, and efforts in relation to dynamically changing contextual conditions. In addition students must also monitor, modify, and adapt to fluctuations in their motivational and effective states, and determine how much social support (if any) may be needed to perform the task. (pp. 171-172)

The construct of metacognition gained momentum in the early 1970s with the help of individuals such as Flavell providing seminal research. Flavell constructed the framework for metacognition and researchers such as Brown supported the field (Weinert, 1987). “Metacognitions are second order cognitions: thoughts about thoughts, knowledge about knowledge, or reflections about actions” (Weinert, 1987, p. 9). Kluwe (1987) expanded on metacognition processes by acknowledging two characteristics: the thinker knows something about his or her own and others’ thought processes and the thinker can pay attention to his or her own thinking. Kluwe referred to this as the executive processes. Executive decisions used to control or monitor cognitive activity will provide information about the present cognitive state. According to Flavell (1987), these executive decisions initiate metacognitive strategies to monitor the cognitive process. Flavell identified four executive activities for monitoring purposes: classification; checking, evaluation, and anticipation. Classification of an individual’s cognitive activity provides information about status, type or mode of the current cognitive activity. Checking provides information about what is done, so an individual can find a solution to the problem. Evaluation of an individual’s cognitive state provides information about the quality of the activity; this process goes beyond checking. Prediction provides information about the possible alternative options for problem solving, the different possible sequences of steps for problem solving, and the possible outcomes. The internal processing of information enhances metacognition that creates the ability to problem solve (Brown, 1987). According to Brown,
individuals have control over their executive decisions with the use of a central processor or monitoring system.

According to Kuhn (1999), metacognition is constructed of three separate foundations: metastrategical, metacognitive, and epistemological knowing. Metastrategical knowing refers to how a person utilizes his or her procedural knowledge, meaning that they know how to accomplish something. This type of knowledge allows a person to develop and implement a strategy for accomplishing a specific task. Metacognitive knowing refers to how an individual uses and demonstrates personal knowledge. Individuals will use their own metacognitive skills to express their own beliefs. Metacognitive skills allow individuals to determine the following questions about themselves: What do I know? and How do I know that? Epistemological knowing refers to both how individuals know and what their knowing is about.

Metacognition may be considered the foundation of critical thinking (Kuhn, 1999). The importance of metacognition is that students need to understand how their mind functions in order to be able to solve open ended questions or scenarios in the mechanical trades. According to Downing, Kwong, Chan, Lam, and Downing, (2009), metacognition does involve how to reflect, analyze thought, draw a conclusion from the thought, and implement it into problem solving. Students need to understand the importance of how they perform important cognitive tasks such as remembering, learning, and problem solving. As stated by Hanley (1995),

Metacognitive skills give people the opportunity to gain some awareness of what they are thinking about and how their thinking progresses. If students are to exhibit critical-thinking skills, they must learn when specific cognitive skills are relevant (a metacognitive skill) and then successfully apply the cognitive skills to solve problems. (p. 68)

Azevedo et al. (2012) identified eight metacognitive monitoring processes important for the promotion of self-regulated learning. The processes include feeling of knowing, judgment of
learning, monitoring use of strategies, self-test, monitoring progress towards goals, time monitoring, content evaluation, and evaluation of adequacy of content. They suggested that these separate processes would help students self-regulate learning skills in student centered learning environments. Feeling of knowing is when the learner is analyzing information based upon pre-existing knowledge and the current content, if the learner recognizes a mismatch in understanding more emphasis will then be placed. Judgment of learning is the monitoring by a learner on the understanding of a concept and the resources they have supplying the information. Monitoring use of strategies is the learner monitoring the efficacy of recently learned information. In self-test, while acquiring information learners will test themselves as they feel is necessary. For monitoring progress toward goals, the learner is monitoring the merging of the learned results and goals set for the learning session. Time monitoring involves the learner paying attention to the time they put forth compared to each individual goal in a project and establishing set time frames for the task to keep on track. Content evaluation is the monitoring of information to its appropriateness’s for the situation in the content they are currently reading, hearing or observing with regard to the current learning goals. Adequacy of content is the learners’ assessment of how appropriate the content of the learning materials is (Azevedo et al.). For the student in the trade classes or an apprenticeship, these processes are critical for success. An apprentice or student will have to put forth an effort to learn these skills so they can develop into a seasoned professional.

Seasoned professionals can efficiently monitor themselves while troubleshooting, this will save money from the standpoint of time spent on a job and reduced callbacks (callback-going back to repair something that you already have attempted to repair at the cost of your company). These skills help to define a technician and have the potential to separate the
accomplished technician from the average technician; the seasoned professional has refined problem solving skills. Excessive callbacks can cost a company a tremendous amount of time and money (Moriarity, 2010). Zimmerman and Campillo (2003) supported the preceding notion. They differentiated between novice and expert problem solvers. The differences included: 1) experts have greater domain specific knowledge about a task, 2) experts are able to identify meaningful patterns in problem solving that novices cannot, 3) experts complete the task quickly and novices do not, 4) experts spend more time analyzing problems and do not immerse themselves without thought, novices do, 5) experts define a task novices respond, 6) experts monitor their processes and will break into parts. The ability to monitor makes the expert perform at high levels and in time the experts will become their own teachers to refine their skills.

Social Cognition and Self-Regulated Learning

From the social cognitive viewpoint, Zimmerman (1989) suggested a triadic definition of self-regulation similar to that of Bandura’s (1986) view of self-regulation. The definition includes behavioral self-regulation, environmental self-regulation, and covert self-regulation. Behavioral involves self-observing and adjusting learning processes to enhance performance. Environmental involves observing and adjusting the environment to produce desired outcomes. Covert self-regulation is directed at the individual’s ability to adjust cognitive states, such as imagery (Zimmerman). (See Figure 2)
According to Zimmerman (1989), students are self-regulated when they become active participants in their own learning process. These individuals seek out and control their own efforts to gain knowledge and do not rely on teachers or parents. Zimmerman suggested for students to be self-regulated, they must use specific strategies in order to obtain academic goals; the strategies are based upon self-efficacy perceptions. For this to occur, Zimmerman suggested three elements including self-regulated learning strategies, self-efficacy perceptions of performance and skill, and a commitment to academic goals.

Self-regulated strategies involve processes and actions that are intended to gain knowledge specifically directed at agency and purpose. These strategies include actions such as organizing, memory aids, transforming and seeking information. Self-efficacy relates to the perceptions about one’s own ability to organize and implement an action to successfully perform a task. Academic goals such as grades provide motivational factors to learners.
Development of Self-Regulatory Skills

Zimmerman (2000) discussed, from the social cognitive perspective the development of self-regulatory skills and beliefs is a cyclical process that can fall into three phases including forethought, performance or volitional control, and self-reflection. The forethought process references the important processes and actions that create the platform for the action. Performance or volitional control refers to the processes that occur during the motoric actions and affect individual’s specific actions. The self-reflection phase occurs after the performance and influences the person’s experiences. The reflection process will influence the forethought and motoric operations of future learning (Zimmerman). (See Figure 3)

![Figure 3. Cyclical phases of self-regulation. (Zimmerman, 2000, p. 16)](image)

 Students need to be proactive in their learning for success in academics in formal education or informal settings. The individuals who tend to be reactive to their environment fail to be effective in self-regulated skills. As stated by Zimmerman (2000), “reactive methods of self-regulation are generally ineffective because they fail to provide the necessary goal structure, strategic planning, and sense of personal agency for students to progress consistently” (p. 27).
Profile of Self-Regulated Learner

The concept of self-regulation is important from the standpoint that a substantial component of education is the development of life-long learning skills (Zimmerman, 2002). This holds true for individuals in the trades as well as individuals in business settings, and they must be able to refine their skills to achieve success. Individuals with the ability to self-regulate have success in work; however, students today do struggle with self-reliance and their study methods the same as they have struggled in the past. Zimmerman suggested three qualities that contemporary research tells us about the self-regulated learner that will be discussed in the following paragraph.

According to Zimmerman (2002), contemporary research on self-regulated learning suggests the following. First, self-regulated learning involves more than a detailed knowledge of a skill; it involves self-awareness and motivation to implement the skill. Secondly, self-regulation is not a single process that an individual must possess, but it involves specific processes that must be adapted for each individual learning task. The skills include: 1) the setting of specific proximal goals, 2) the adoption of strong strategies to obtain the desired goals, 3) monitoring one’s performance selectively to see where you are at in the processes, 4) the ability to restructure one’s social and physical context to obtain goals, 5) efficient use of time, 6) self-evaluation of the process, 7) establishing causation with success or failure, and 8) making the necessary adaptations to future methods (Zimmerman). Lastly, contemporary research suggests that the self-motivated qualities of a self-regulated learner depend on beliefs such as perceived efficacy and intrinsic interest. Today’s student needs to have the self-regulated skills required to succeed in the academic and work settings, and with proper learning environments,
these skills will transfer to authentic life experiences (Zimmerman). The use of blended learning supports instructors and their abilities to create learning strategies based on authentic tasks, (Oliver, Herrington, & Reeves, 2006).

According to Zimmerman and Martinez-Pons (1988), the persona of the common student is an individual who has “emerged as metacognitively motivationally, and behaviorally active participants in their own learning process” (p. 284). Zimmerman and Martinez-Pons suggested the following, in regards to metacognitive processes, self-regulated learners have the ability to plan, organize, self-instruct and self-evaluate during the processes of acquiring knowledge. From the motivational vantage point self-regulated learners, view themselves as self-efficacious, autonomous and motivated from within. In regard to behavior, the self-regulated learner creates an environment that will optimize his/her chances of successes. Metacognition is significant in the process of self-regulated learning strategies.

According to Barnard-Brak et al. (2010), “self-regulated learning refers to those active and volitional behaviors on the part of individuals to achieve in their learning” (p. 62). The skills can include goal setting, time management, task strategies, environmental structuring, and help seeking. In turn, this infers the students are capable of being their own agents in their own lives and learning paradigms.

Barnard et al. (2008) identified the importance of self-regulatory skills and its importance in the face-to-face environment and suggest that if the skills are important in traditional settings, then they are more important in the online environment. They discussed that students need to be prepared for the online environment and it is a requirement for the online students. As stated by Barnard et al., “Students lacking self-regulatory learning skills may misconstrue the autonomy of the online learning environment, and as a result may not accomplish the learning tasks they are
expected in online courses” (p. 1). The notion of students not being prepared is the basis for my research; if the students are not capable of the environment, then learning will not occur.

In the study conducted by Barnard et al. (2008), they set out to examine the properties of an instrument created to measure a student’s ability to self-regulate their learning. The instrument they developed was called the Online Self-regulated Learning Questionnaire (OSLQ). In the research they wanted to check the reliability and validity of the instrument in the online and hybrid environments. The study consisted of two groups: group one was comprised of 434 students enrolled in a hybrid course and the second group consisted of 628 individuals in an online course. The results from both studies indicate evidence toward the reliability and validity of the instrument implemented (see Methodology section for Cronbach’s Alpha reliability). The instrument developed includes six individual constructs: time management, environmental structuring, task strategies, goal setting, self-evaluation and help seeking (Barnard et al.). Within each individual construct are questions based upon a Likert-type scale rating. Examples of statements include the following: Goal Setting, I set standards for my assignments in online courses; Environmental Structuring, I find a comfortable place to study; Task Strategies, I read aloud instructional materials posted online to fight against distractions; Time Management, I allocate extra studying time for my online courses because I know they are time demanding; Help Seeking, if needed, I try to meet my classmates face-to-face; Self-Evaluation, I communicate with my classmates to find out what I am learning that is different from what they are learning.

Recall from previous discussion that Zimmerman (2000) suggested a three phase self-regulated learning model including forethought, performance or volitional phase, and the third and final phase self-reflection. Barnard et al. (2010) implemented these phases into their OSLQ
instrument in the following manner. Self-regulated learning skills and strategies such as environmental structuring and goal setting may be associated with the forethought phase. Time management, task strategies, and help seeking are associated with performance, and self-reflection is associated with self-evaluation. These evaluations are based on social comparisons and will lead to adjustments made in forethought and performance during the next learning task.

Hybrid Learning

The hybrid platform has the potential to create a social environment where learners can interact with each other and with the instructor. These interactions can take place face-to-face or via a discussion board (Garrison & Vaughn, 2008). The balance of the hybrid environment, online and face-to-face, can be adjusted for content and class demographics.

Learners, like observers more generally, are engaged both in the contexts of their learning and in the broader social world within which these contexts are produced. Without this engagement, there is no learning, and where the proper engagement is sustained, learning will occur. (Hanks as cited in Lave & Wenger, 1991, p. 24)

Hybrid learning according to some researchers is becoming the dominant method of delivery for instruction. Bonk, Kim, and Zeng (2006) stated, “blended learning is more than fashionable; it is the training and educational delivery method of choice” (p. 550). Hybrid learning is a means of instructional delivery that works well in both corporate America and in educational settings. The hybrid learning platform allows for the extension of the traditional face-to-face environment and allows individuals to help create their own learning environment. Garrison and Vaughn (2008) stated, “Blended learning—a design approach whereby both face-to-face and on-line learning are made better by the presence of the other—offers the possibility of recapturing the traditional values of higher education while meeting the demands and needs of
the twenty-first century” (p. 5). This blending of environments promotes a positive learning atmosphere when and if individuals adapt to the epistemology.

The hybrid learning environment is the merging of the traditional face-to-face that has been in existence for centuries and distributed learning environments that are growing exponentially (Graham, 2006). Masie (2006) suggested that all learning is blended and learners have always had the ability to add or subtract information of value or non-value; they socialize and find context transforming it into learning. Masie proceeded to argue in regards to blended learning, we can stop using the word blended or stop using the e in e-learning; all learning is blended and all learning in the 2000s will have an element of e.

The use of the word blended means different things to different individuals; however, the word blended definitely suggests the mixing of different paradigms. A very good simple analogy of the hybrid environment suggested by Picciano (2009) is the mixing of two different paints. The suggestion is that when you take two cans of paint and mix them together, they will take on a unique color and the original colors will no longer exist. In the broadest sense, blended learning “can be defined or conceptualized as a wide variety of technology/media integrated with conventional face-to-face classroom activities” (Picciano & Dziuban, 2007, p. 8). (See Figure 4)
Shea (2007) recognized three possible lenses to view the framework of blended learning including the How People Learn framework (HPL) put forth by Bransford et al., (2000); the Principles of Good Practice in Undergraduate Education put forth by Chickering and Gamson (1987); and the Community of Inquiry Model put forth by Garrison, Anderson, and Archer (2000). For the purposes of my research I am going to look at the HPL framework and community of inquiry framework.

**HPL Framework**

Bransford et al. (2000) discussed that successful learning environments have the following elements: knowledge centered, learner centered, assessment centered and community centered. For learner-centeredness, the environment needs to focus on the goals, objectives, and
interests of the learners. For quality instruction to occur the learners and their characteristics need to be identified by the instructor for the purpose of instructional design. For knowledge-centeredness, the learner is encouraged to enhance understanding rather than rote memorization of materials. The online and face-to-face environments need to be developed to support understanding of the different materials to help promote thinking. For this to occur, the instructor will need to understand what the learners already know and build off of this foundation. This would require the instructor to learn the goals and passions of the learners. For assessment-centeredness, the appropriate assessment tools need to be utilized, and the instructor needs to make the learners thinking visible. The individuals need to be able to self-assess their skills and apply the necessary cognitive and metacognitive procedures to change or adapt their approach. The fourth and final criterion to meet is community centered. The environment needs to be conducive to a feeling of connectedness and collaboration. The integration of online and face-to-face needs to support these conditions to construct knowledge, the creation of a community of practice. (See Figure 5)

Figure 5. HPL framework. (Bransford et al., 2000, p. 134)
Community of Inquiry

Garrison (2003) approached the blended learning environments through the community of inquiry framework model he and his colleagues developed. This model is rooted in collaborative learning and is consistent with the beliefs of higher education. The community component acknowledges the social aspect of education and how collaboration is helpful in constructing knowledge. The community of inquiry model contains three elements that are continuously interacting including a social presence, teaching presence, and a cognitive presence. For the social presence, students must feel they can express themselves openly in a free manner and collaboration needs to be encouraged. The categories in the social presence include open communication, group cohesion and affective/personal connections; these components help form the community and sustain it. For the cognitive presence, ideas are connected and information is exchanged to create new ideas. The categories in the cognitive presence include exploration, a triggering event, integration, and resolution. For the teaching presence, curriculum methods are determined, and the design and facilitation of content must be presented in a manner that is conducive to learning. The community interacts, analyzes, constructs and validates important knowledge that can be applied (Garrison). The participants in the community are “expected to be self-directed and focus on the task at hand” (Garrison & Vaughn, 2008, p. 15). The participants in the community collaborate through discussion, sharing experiences and beliefs. This model “articulates the behaviors and processes required to nurture knowledge construction (Shea & Bidjerano, 2010, p. 1722). (See Figure 6)
Online Communities

Instructional design needs to evolve with technology in order to be beneficial to today’s learner. Hoadley and Kilner (2005) suggested the development of the online community is beneficial to the learner. From their theoretical standpoint, they stated, “communities can support learning according to the major learning theories, and indeed the very existence of enduring communities relies on learning” (p. 31). The goal of education then becomes the development of instructional material to merge communities and learning. Hoadley and Kilner suggested the merging of two theoretical frameworks, the C4P model of learning in communities and the Design for Distributed Cognition framework. The merging of these two frameworks provides a means for learning with technology.

Communities of practice are groups of people who are stable and share the same values in their cultural practices. The community provides the platform for learning, with all individuals having a definite place depending on when they enter the community. According to Lave and Wenger (1991) individuals learn through involvement in the community. Hoadley and
Kilner (2005) suggested the traditional view of the community of practice aligns well with knowledge-building communities in education. The goal of the knowledge-building community, according to Hoadley and Kilner is that, “knowledge-building communities take as an explicit goal the development of individual and collective understanding. Such communities are not limited to scholars or researchers” (p. 32). This viewpoint aligns well with the concept of the community of practice and the involvement in a group. The knowledge-building community is directed at the learning of knowledge.

The C4P model developed by Hoadley and Kilner (2005) suggested that knowledge is developed through conversation, connections, context, content, and that these four components create a purpose. It is a non-linear cyclical process where the four C’s interact with each other all providing a purpose for the community or group to exist. The content can refer to documents or media of some value. The conversation can take place either face-to-face or online. The difference between the two is that content is a delivery of materials in one direction only; whereas, conversation is back and forth among participants. Connections are the personal contacts made among participants. The context allows for the information to be valuable and authentic in context. This combination creates a purpose in which the community can exist (See Figure 7).
The second framework addressed by Hoadley and Kilner (2005) was the Design for Distributed Cognition framework. The utilization of technology can provide the scaffolding needed to enable a community of learners to succeed. The framework identifies three separate areas that technology can provide to learning environments including a representational advantage, a process advantage, and a social context advantage. The representational advantage allows computer technology to provide access and flexibility in acquiring information. The process advantage allows the computer to provide the necessary scaffolding from one learned concept to another. And lastly, the social context advantage allows for interaction among individuals, thereby enhancing learning.

The basis for the merging of the two frameworks is combining them in a way that the technology design for distributed cognition can support each of the elements involved in the C4P model. By supporting the elements properly, a designer can create a community of learners with a purpose. Even with great distances among learners in a given group, the technology available presents the means for many individuals to exist as a community, providing more input than a small group of individuals geographically located close to each other (Hoadley & Kilner, 2005).
Issues Pertaining to Designing Hybrid Environments

One negative aspect of hybrid education involves the redesign of curriculum and adapting existing course work to a hybrid environment. Educators most likely think they have to change their existing structures in order to meet the demands of the learner, and this is the case (Garrison, 2011; Graham, 2006). According to Garrison, “blended learning is not benign it will inherently precipitate a fundamental rethinking and questioning of current approaches to teaching and learning” (p. 3). Educators are realizing that blended learning takes more time and effort to be successful. Educators in formal education need to become proactive if they decide to become involved with blended education. A stated by Graham, from the standpoint of pedagogy “designers of blended learning systems should be seeking best practices for how to combine instructional strategies in face-to-face and CM [computer mediated] environments that take advantages of each environment and avoid their weakness” (p. 17). Adding an online element to a traditional face-to-face environment does not meet the requirements of a blended design (Garrison).

According to Graham (2006), there are six major issues that are relevant to designing blended environments. They include: 1) the role of live interaction and learning communities, 2) the role of the learner and self-regulation and how the environments can be designed to help the learner, 3) models of support and training because there is an increase demand on instructors to provide the learners with the technical skills to actively participate in both environments, 4) the digital divide and socioeconomic divide, 5) cultural adaptation and making the instruction available to the local audiences, and 6) the balance between innovation and production and creating a cost effective environment with emerging technologies. The preceding points were
applicable to the intent of my study. The focal point of this study was to see if individuals in my specific environment were capable of the blended environment. This study looked at learning communities and self-regulation items one and two. As the instructor, I took into account items three and four by making myself available and maintaining the open computer lab. Item five was not applicable to my study, and item six, the cost savings, should have been noticed by the students in commuting costs.

Support of Hybrid Environment

In a study conducted by Napier, Dekhane, and Smith (2011) the following results were obtained. The study looked at the conversion of an introductory computer course to a hybrid environment for instructional delivery and the researchers made comparisons to traditional settings. The research utilized qualitative methods to make a case for the value of blended learning. To assess the students’ views, data were collected at the midpoint and end of the semester. Comparisons were also made between blended and traditional courses on the students’ final exams. To obtain a sense of how teachers felt about the blended course, written reflections and discussion forums were analyzed. The participants in the study were students enrolling in the introductory computer courses at Georgia Gwinnet College. The research was guided by the following research questions: 1) What do students perceive as the benefits and challenges of taking blended learning courses? 2) What does faculty perceive as the benefits and challenges of teaching blended learning courses? (p. 21).

The Napier et al. (2011) study provided qualitative data on both the students’ and faculty’s perceptions of the blended learning environment. The study provided positive aspects of blended learning from both the students’ views and the faculty’s view. An important theme
that evolved in my study indicated that the students’ perceptions of blended learning increased as the semester progressed and that they felt they had acceptable amounts of interactions with the professor. Another important point of the Napier et al. study was the finding that the hybrid environment provided a positive learning experience for educators and students.

Another study conducted by Berger, Eylon, and Bagno (2008) looked at the continuity of learning utilizing face-to-face and online collaborations. The main goal was to determine if learning was continuous for the participating teachers. The study used comparative methodologies to investigate the relationship between face-to-face and online environments. The study utilized qualitative data with interviews and reflections to provide evidence of the benefits gained in a blended environment. The participants included sixteen experienced physics teachers. The following research questions were addressed in the study: 1) To what extent were the same ideas discussed in the face-to-face meetings and the online exchanges? Did teachers engage in extending these ideas throughout the program? 2) To what extent did the teachers employ the same reasoning patterns in the face-to-face meetings and the online exchanges? (p. 402).

The research provided by Berger et al. (2008) supported the fact that an online component mixed with a face-to-face component created a positive learning experience. One fact that came out of the study was that, even after the course concluded, online collaboration continued. This is important in that it gives credit to the concept of the online community of learners. Once the community is formed and the connections are in place, members will collaborate.

The findings across the different research studies are fairly consistent with each other whether it was a qualitative study providing an overall acceptance or quantitative study
providing solid empirical data. As summarized by Collopy and Arnold (2009) after conducting a quantitative study on blended learning,

The face-to-face environment supported team development, commitment and accountability to team members, and the processing of content with the instructor and class members. The online space supported the face-to-face environment by giving teacher candidates time to think, process, and have online conversations outside of scheduled class time. (pp. 98-99)

Application to Current Study

The trades are a social community and individuals need to rely on others to be successful; learning is a social process obtained when learners interact with each other (Vygotsky et al., 1978). The collaborative work among individuals allows for individuals to draw upon knowledge of others. The amount of knowledge required to be a successful technician is beyond the capabilities of a single individual. The community component allows for networking to reach levels beyond a single individual’s skill level (Brown, 2000). Brown, spoke of experiences at Xerox Company in the 1980s. Xerox was having problems with technicians and problem solving. What Xerox discovered was that when technicians got stuck on a problem they would not look in the manual but would try to contact a fellow technician to discuss the problem among each other and develop a solution. The solution Xerox chose included providing the technicians with 2-way radios, and in turn they developed a community of practice among the technicians (Brown). The technicians interacting together would develop a solution and determine a proper procedure to follow implementing the use of the correct tools and procedures to perform the task. As stated by Brown et al. (1989), “People who use tools actively rather than just acquire them, by contrast, build an increasingly rich implicit understanding of the world in which they use the tools and of the tools themselves” (p. 33).
By understanding the sequences of operation of a mechanical system, the skilled technician can rely on explicit knowledge to perform cognitive functions and also recognize when to slow down the process of troubleshooting when certain processes are not taking place correctly, a metacognitive function. The current study looked at self-regulated learning skills in a hybrid environment and whether the students involved were capable of using the skills. Open-ended questions during the semester provided learners with enough information that they were able to contextualize their own problem-solving strategies to provide a viable solution. All individuals in the trades need to be able to solve ill-defined problems and no two people will get to the conclusion in the same manner. However, the direction individuals navigate through troubleshooting is irrelevant. What is relevant is a correct and concise conclusion. Cognitive and metacognitive functions for the skilled technician are components of troubleshooting that the technician needs to comprehend. The technicians need to recognize their skills so they can rely on metacognitive functions to reach higher skill sets.

All individuals who instruct in the trades, whether it is in a classroom setting or in the field as a journeyman mechanic teaching an apprentice, negotiate learning with the learner. The negotiation process is accomplished when learners know a specific amount about a given subject matter or tool. The teacher provides information at the level the individual is currently functioning, so the learner is able to contextualize the information for cognitive processing and generating an implicit understanding.

The construct of the learning community was focused on in the study and it was an intent of the study to form a learning community. One learning community that formed in my research was the community of learners taking multiple classes in trade specific curriculum. As stated by Frazier (2006), “learning communities in higher education may combine intellectual, social,
and/or physical components in a variety of ways depending on the need of the institution and its
students” (p. 23). The development of the community can help individuals develop the
necessary skills to be successful. As summarized by Frazier, “intellectual components reinforce
the development of critical thinking skills through small group... social components emphasize
easing the transition to college through shared experiences with peers” (p. 23). The role of
observational experiences, modeling or vicarious observation is critical in the development of a
well-rounded/polished technician. This provides a means to advance an individual’s skills.

The intent of the current mixed methods study is to develop a persona of the community
college student in the trades and make a determination on the feasibility for the implementation
of future hybrid classes. The self-regulated attributes including time management, study,
environment, and effort regulation can be correlated with performance in class (Puzzifero, 2008).
Some additional components of self-regulated learning include self-efficacy, motivation,
resource management, metacognition and learning assessments. As previously discussed,
students capable of regulating their own learning are more successful (Cho, 1999; Zimmerman &
Schunk, 2011). The specific areas integrated into the research include monitoring, predicting,
and reflecting. Specifically in my study the students kept a log, predicted their performance on
tests based on their preparation, and self-reflected on outcomes (See Figure 8).
Chapter 2 provided a review of the literature including constructivist concepts, social constructivist theory, and learning communities; situated cognition and its subcomponents of communities of practice as well as online communities; social cognitive theory, including observational learning, agency, and self-efficacy; metacognition and social cognition and how they related to self-regulated learning; hybrid learning viewed through the lens of the How People Learn Framework and the Community of Inquiry Framework; and applications to the current study. Chapter 3 describes the research methodology. Chapter 4 details the quantitative research findings, and Chapter 5 consists of the integration of quantitative and qualitative data, discussion and reflection.
CHAPTER 3

METHODOLOGY

The following chapter is an in-depth description of the methods and procedures utilized to collect data. The content of this chapter includes descriptions of the following: data collection time line, justification of mixed methods, participants and setting, role of researcher, data collection procedures, instrumentation and validity, and analytical data analysis. My study was a case-based exploratory study providing data for the implementation of hybrid learning in the trade classes at a community college in rural Northwest Illinois. My research was focused on understanding the ability of students to perform in a hybrid environment, specifically measuring the students’ abilities to monitor, predict and reflect on their own learning. The research questions in my study were:

1. How, and to what extent, do community college students enrolled in hybrid trade classes exhibit self-regulated learning behaviors?
2. To what extent are self-regulated learning behaviors associated with student performance in hybrid trade classes?

Data Collection Time Line

Data collection began in January 2014 (at the beginning of the Spring 2014 semester) and continued to the end of the semester in May 2014. In the Spring 2014 semester, the following classes were offered in heating ventilation and air conditioning (HVAC): HRS 120, Basic Refrigeration; HRS 130, Introduction to Heating; HRS 160, Heat Pumps; HRS 170, Hydronics;
and HRS 222, Commercial Refrigeration. In Renewable Energy (ENE) the following courses were offered: ENE 130, Photovoltaics; ENE 140, Solar Thermal; and ENE 145, Geothermal. The classes taught using a hybrid delivery method included HRS 120, 130, 160 and 170 and ENE 140 and 145 (see Appendix A for course outlines). None of the classes had been taught in a hybrid format previously. The Academic Vice President of the community college gave me permission to implement the hybrid platform (see Appendix B). This was an exploratory study to see if students would accept the method of delivery. I was the instructor for each of the courses in the hybrid environment and also the researcher (see Role of the Researcher later in the chapter).

The general overview of the hybrid courses consists of the following sequence of activities and events:

• The students were provided with a course syllabus (see Appendix C) the first day of class. The courses were broken down into four specific modules; the exact content was determined as students’ skills developed. The instructor discussed the syllabus in class. The researcher/instructor informed the students that they were involved in research and gave them the opportunity to not participate in the study; however, whether they participated in the study or not, they were required to participate in all the class activities as instructed. The IRB approval letter and consent form were provided for students to view/sign (see Appendix D) and accept or reject participation in the study. It was explained that students could withdraw from the study at any time, and neither participation nor non-participation would affect their grades in the course. The consent form was read aloud by the researcher and any confusion clarified.
• The hybrid environment was discussed along with the use of computers in the classroom. The open computer lab hours were discussed to help alleviate any student anxiety. Student peer groups were discussed in the beginning session; the option was also given to students to form groups if they desired. Students were also informed they could work alone.

• The first week of class, students completed a demographic survey and a computer aptitude test. The computer aptitude test was an open access document that could be accessed at http://www.digitalliteracyassessment.org/index.php. The results for the test were printed, saved to a file and locked in a cabinet for future data analysis.

• The course content began in week 2 of an 18-week semester. The hybrid platform proceeded until the end of April (Week of April 28). The hybrid platform consisted of a 50/50 mix of face-to-face and online. The course outlines and syllabi explain the specific content and lab components covered and provide semester calendars (see Appendices, A & C).

• Students were selected to participate in individual interviews if they agreed. The agreement was part of the consent letter previously signed (see Appendix D). These interviews took place after the course content was covered. The interviews concluded the week of May 5, 2014.

• An open computer lab was maintained Monday thru Friday during school hours, 7:00 am to 9:00 pm. Students were allowed in the computer room every week of the semester, including online weeks.
Mixed-Method Approach

My research utilized a concurrent, transformative, mixed-methods approach to data collection to capture the strengths of both qualitative and quantitative research (Creswell, 2009). The data collection was concluded by the end of the semester and participants were able to provide input about the hybrid platform and their acceptance or non-acceptance. The mixed-methods approach was utilized in the study partially due to low enrollment numbers and to help add validity to the data collected during the study. The combination of quantitative and qualitative methods complemented one another, drawing upon the advantages of both methods and allowing for robust analysis (Green & Caracelli, 1997). To aid in validation of the study, the survey questions utilized were validated and piloted by Barnard et al. (2008).

Participants and Setting

The participants in the study were students enrolled in the Technology Area of a small community college in Northwest Illinois. The student population included home-schooled individuals, high school graduates, dislocated workers, individuals currently involved in the trades, and individuals seeking knowledge in a specific field for their own use with no intention of going to work in the field. The study included students enrolled in Technology, in particular those enrolled in HRS 120, HRS 130, HRS 160, HRS 170, ENE 140, and ENE 145. The actual enrollment, at the beginning of the semester into the specific classes is shown in Table 3.0.
Table 3.0
Course Enrollment – Spring 2014 HRS and ENE

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<thead>
<tr>
<th>Semester</th>
<th>HRS 120</th>
<th>HRS 130</th>
<th>HRS 160</th>
<th>HRS 170</th>
<th>ENE 140</th>
<th>ENE 145</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Spring 2014</td>
<td>14</td>
<td>9</td>
<td>7</td>
<td>6</td>
<td>5</td>
<td>5</td>
<td>46</td>
</tr>
</tbody>
</table>

Because students had the ability to enroll in fields concurrently or take the individual classes as an elective, the possibility existed that they would be able to enroll in both an HVAC class and an ENE class or any other possible combination. This in fact did occur, and some students were enrolled concurrently in classes that were part of the study and being taught using a hybrid format. The amount of individuals in the research was fifteen (demographics presented table 4.0). For my study, each class was treated as separate for data collection.

Students participating in the study filled out demographic information prior to starting the course work. The student demographic information questions specific to the research include general questions of ethnicity, courses currently enrolled in, and work status (see Appendix E). The actual enrollment at the beginning of the semester regarding gender and ethnicity for the individual classes is as follows (with n= to the total number of students enrolled that agreed to participate in data collection procedures). The discrepancy in the number of individuals enrolled versus demographic is the fact that two students from HRS 120 chose not to participate. Additionally, one student registered two weeks into the semester and enrolled in HRS 160 and ENE 140 concurrently. These three students were not included in the data collection. The demographic information for the participants that were enrolled at the beginning semester for the data collection is presented in Table 3.1.
Table 3.1

Actual Class Participants Who Began Semester – Gender, and Ethnicity Spring 2014

<table>
<thead>
<tr>
<th>Semester</th>
<th>Male</th>
<th>Female</th>
<th>Caucasian</th>
<th>African American</th>
<th>Hispanic</th>
<th>Other</th>
</tr>
</thead>
<tbody>
<tr>
<td>HRS 120</td>
<td>12</td>
<td>0</td>
<td>10</td>
<td>2</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>HRS 130</td>
<td>9</td>
<td>0</td>
<td>7</td>
<td>2</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>HRS 160</td>
<td>6</td>
<td>0</td>
<td>4</td>
<td>2</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>HRS 170</td>
<td>6</td>
<td>0</td>
<td>4</td>
<td>2</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>ENE 140</td>
<td>4</td>
<td>0</td>
<td>3</td>
<td>0</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>ENE 145</td>
<td>5</td>
<td>0</td>
<td>4</td>
<td>0</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Total</td>
<td>42</td>
<td>0</td>
<td>32</td>
<td>8</td>
<td>1</td>
<td>1</td>
</tr>
</tbody>
</table>

Role of the Researcher

My role in the study was to collect data and research the findings, and act as the instructor in the classroom. As the instructor my duties included creating lesson plans for face-to-face and hybrid platforms, providing necessary scaffolding in lesson plans, functioning as small group tutor, creating authentic labs, and maintaining an open computer lab for students to utilize during off weeks. My role as researcher included monitoring, collecting and maintaining the research data for analysis.

Data Collection Procedure

The quantitative data instruments included a measure of self-regulated learning incorporating a pre/post format utilizing a Likert-type scale, grade predictions made by students, examination statistics, and final grade statistics of all student participants. The prediction portion
was a survey in the LMS the students submitted prior to taking the test. They could choose a grade from A to F. The wording on the survey was: “Based upon your study habits and preparation what grade do you think you will achieve on the test?” The qualitative data included online individual reflections, student interviews, and online student monitoring which was provided by the course preparation daily/weekly logs. The data were synthesized at the end of the semester after all quantitative and qualitative data were collected, and all data were transformed for analysis purposes (Creswell, 2009).

Quantitative Instruments

The quantitative data collected based on student performance included the following: predicted examination scores, actual examination scores, course classroom grades, and scores from the Online Self-Regulated Learning Questionnaire (OSLQ), which was used to measure self-regulated learning. The questionnaire utilized a Likert-type scale consisting of 24 items, where each item had five response categories. The responses ranged from 1-5, with 1 being strongly disagree and 5 being strongly agree. The items comprised six subscales: environmental structuring, goal setting, time management, help seeking, task strategies, and self-evaluation (see Appendix F). The OSLQ (see Appendix G) was administered as a pre-test/post-test. Barnard et al. (2008) validated scores obtained from the questionnaire and established internal consistency of scores with $\alpha = .90$ for scores obtained from a blended course. I made contact with Barnard-Brak and was given permission to use the instrument (see Appendix H). In the same study, they examined the internal consistency of subscale scores that ranged from .67 to .90; this information is presented in Table 3.2.
Table 3.2

Reliability Coefficients (Cronbach’s Alpha) for Subscales of the Online Self-Regulated Learning Questionnaire (OSLQ) (Barnard et al., 2008)

<table>
<thead>
<tr>
<th>Subscale</th>
<th>α</th>
</tr>
</thead>
<tbody>
<tr>
<td>Environmental structuring</td>
<td>0.90</td>
</tr>
<tr>
<td>Goal setting</td>
<td>0.86</td>
</tr>
<tr>
<td>Time management</td>
<td>0.78</td>
</tr>
<tr>
<td>Help seeking</td>
<td>0.69</td>
</tr>
<tr>
<td>Task strategies</td>
<td>0.67</td>
</tr>
<tr>
<td>Self-evaluation</td>
<td>0.78</td>
</tr>
</tbody>
</table>

Qualitative Instruments

The students in the classes were required to post assignments to Moodle, the learning management system the school was currently using. Each of the hybrid courses consisted of four modules culminating in a face-to-face examination of the materials. The exams were given in the face-to-face environment to help alleviate any anxieties the students had with computers and remove the fear of not being able to complete the test due to technological problems.

As part of the monitoring process, the students were required to keep a daily/weekly log of their class preparation for the semester via electronic format (see Appendix I for daily log, and typical week, actual week of April 21-27 provided) as displayed in Moodle. Monitoring was done online as a discussion forum between the instructor and each individual participant. The process was explained with the consent form (See Appendix D) and these data provided information on self-regulated learning behaviors.
At the end of the module, after the test, the students posted their reflections via electronic format. Reflections and daily/log information were kept confidential and the students were asked to answer honestly. The reflections were based on open-ended questions to help provide input toward the acceptance or non-acceptance of the hybrid platform, and the reflections were part of the testing procedures for the modules. The questions for discussions on the reflections included the following: How well do you feel you learned the information in the module, and why? Do you feel the group work was beneficial to your learning style, and why? Do you feel the information would have been more easily understood in a traditional setting, and why?

At the conclusion of the semester, five separate interviews were conducted based upon comments the students made about the hybrid and an age range of participants. Four of the interviews conducted included individual participants and one interview included two participants who acted as a group in one of the classes. A total of six different individuals were interviewed. The interviews were semi-structured, allowing for the researcher to explore a different avenue if an unforeseen theme emerged in the interview (see Appendix J).

Data Analysis

Quantitative Data Analysis

The quantitative data, including exam predictions, actual exam scores, and the OSLQ scores were analyzed using descriptive procedures, which allowed the data to be summarized and organized. SPSS was utilized to calculate means, standard deviations, and conduct tests of inference. The OSLQ scores, pre/post, were analyzed using a paired samples t-test design to address Research Question 1.
For Research Question 2, I examined how the OSLQ scores are related to exam scores, predicted exam scores, and grades using linear regression. King, Harner, and Brown (2000) conducted an experiment where they hypothesized that self-regulation of learning was more important in distance education than in traditional platforms. They concluded that self-regulation factors, goals and study skills were statistically significant predictors of student academic performance.

**Qualitative Data Analysis**

The qualitative analysis for the study utilized electronically submitted reflections after testing based on results, daily/weekly logs submitted by the students (monitoring), and interviews. The research utilized a constant comparative method for analysis. This method allowed for data collection to begin at the start of the course, working with the emerging themes, to look for patterns and relationships of social processes (Bogdan & Biklen, 2007). Open coding was utilized to identify key concepts. Member cross-checking procedures of qualitative data were carried out during the study to verify what participants stated. This was done by reading reflections and field notes throughout the semester and discussing with individual students. An example of cross-checking would be student (N) referring to poor computer skills and then verifying the same sentiment in a field discussion I had with him the week of 3/4. The qualitative data lent support to Research Question 1 to create a profile of the self-regulated learner in the study for the given geographic region.
Conclusion

In conclusion, Chapter 3 provided an in-depth description of the research methodology and the actual procedures utilized. Chapter 4 presents the quantitative research findings, and Chapter 5 consists of the integration of the quantitative and qualitative research discussion and reflection. Chapter 5 concludes with conclusions, implications, and future research.
CHAPTER 4

QUANTITATIVE RESULTS

The following chapter provides the results yielded from the study. The content of this chapter includes descriptions of the following: a research overview, a presentation of the demographic information of the students completing the research, a presentation of the paired samples $t$-test addressing research question 1 and a presentation of the standard linear regression addressing research question 2. Recall from Chapter 3 that the research was focused on understanding the ability of students to perform in a hybrid environment, specifically measuring the students’ abilities to monitor, predict and reflect on their own learning. The research questions in my study were:

1. How, and to what extent, do community college students enrolled in hybrid trade classes exhibit self-regulated learning behaviors?

2. To what extent are self-regulated learning behaviors associated with student performance in hybrid trade classes?

Research Overview

The quantitative data collected for the research included the following: predicted examination scores, actual examination scores, overall classroom grades, and scores from the OSLQ pre/post (see Appendix F). The OSLQ questions included 24 different questions broken down into six different sub-scales. Questions 1-5 were goal setting questions, questions 6-9
were environmental structuring questions, questions 10-13 were task strategy questions, questions 14-16 were time management questions, questions 17-20 were help seeking questions and questions 21-24 were self-evaluation questions. A Likert-type scale was used to quantify answers ranging from 1-strongly disagree to 5-strongly agree. SPSS software was used to analyze the data.

**Classes/Participants and Demographic Information**

The total number of classes in the research study was six. The total number of students that started in the six different classes was 42 (see Table 3.1). As typical in any semester students’ drop out for various reasons during the semester; this semester was no different in this regard. The total number of students in each of the classes for the study after students withdrew is presented in Table 4.0.

**Table 4.0**

<table>
<thead>
<tr>
<th></th>
<th>HRS 120</th>
<th>HRS 130</th>
<th>HRS 160</th>
<th>HRS 170</th>
<th>ENE 140</th>
<th>ENE 145</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>9</td>
<td>6</td>
<td>4</td>
<td>4</td>
<td>3</td>
<td>3</td>
<td>29</td>
</tr>
</tbody>
</table>

Table 4.0 specifically provides the numbers of students in each of the classes involved. Students did enroll in classes concurrently, which is indicated in the total (n=29). The demographic information of the individual participants (n=15) that made up the classes in the research is presented in Table 4.1 and 4.2. Therefore the data sets presented identified as n=15 is data for the different unique individuals enrolled in six different classes and the data sets of n=29 is data sets for the all the classes and includes the unique individuals that were enrolled concurrently in different classes.
The gender of the participants was 100% male. This is a normal population for the trade classes at the community college the research is being carried out in. The ethnicity consisted of 12 Caucasians, 80%; 1 Hispanic, 6.7%; 1 African American, 6.7%; and 1 other, 6.7%. All participants reported and completely filled out the demographic questionnaire.
Results for Quantitative Data

The quantitative data will be presented in two separate data sets for research question 1 (participants, n=15 and all classes, n=29). For research question 2, only one data set was used (all classes, n=29). For research question 1, OSLQ scores pre/post were analyzed using a paired samples t-test. For research question 2, OSLQ scores were related to: predicted exam scores, actual exam scores and classroom grades using linear regression. Prior to the research question data being presented the descriptive statistics for the predicted and actual test scored will be presented.

Survey Reliability

Prior to analyzing the results of the OSLQ scores the reliability was assessed using Cronbach’s alpha reliability coefficient. Generally, Chronbach’s alpha coefficients exceeding .70 indicate levels of acceptable reliability (Nunnally, 1978). The reliability results for participants (n=15, internal consistency $\alpha = .94$) and all classes (n=29, internal consistency $\alpha = .93$) are presented in Tables 4.3 and 4.4, respectively.

Table 4.3
Reliability Coefficients (Chronbach’s Alpha) for Subscales of the OSLQ – Participants (n=15) internal consistency $\alpha = .94$

<table>
<thead>
<tr>
<th>Subscale</th>
<th>$\alpha$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Environmental structuring</td>
<td>0.82</td>
</tr>
<tr>
<td>Goal setting</td>
<td>0.68</td>
</tr>
<tr>
<td>Time management</td>
<td>0.77</td>
</tr>
<tr>
<td>Help seeking</td>
<td>0.84</td>
</tr>
<tr>
<td>Task strategies</td>
<td>0.62</td>
</tr>
<tr>
<td>Self-evaluation</td>
<td>0.60</td>
</tr>
</tbody>
</table>
Table 4.4

Reliability Coefficients (Chronbach’s Alpha) for Subscales of the OSLQ – Participants (n=29)
internal consistency $\alpha = .93$

<table>
<thead>
<tr>
<th>Subscale</th>
<th>$\alpha$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Environmental structuring</td>
<td>0.77</td>
</tr>
<tr>
<td>Goal setting</td>
<td>0.61</td>
</tr>
<tr>
<td>Time management</td>
<td>0.67</td>
</tr>
<tr>
<td>Help seeking</td>
<td>0.85</td>
</tr>
<tr>
<td>Task strategies</td>
<td>0.72</td>
</tr>
<tr>
<td>Self-evaluation</td>
<td>0.60</td>
</tr>
</tbody>
</table>

The reliability coefficients do have some subscale numbers below .70, which can give an indication of less reliable data, and those categories may be suspect. These data are similar to the data presented in Table 3.5, the Barnard et al. (2008) study. They also included coefficients with an alpha value less than .70.

Descriptive Statistics Predictions and Actuals

Table 4.5 presents the descriptive statistics for the predicted grades and the actual grades. The scale coding in SPSS was 1.00 correlated with a grade of an F, 2.00 correlated with a grade of a D, 3.00 correlated with a grade of a C, 4.00 correlated with a grade of a B, and 5.00 correlated with a grade of an A.
Table 4.5

Predicted vs. Actual Scores for All Tests (n=29 for each test)

<table>
<thead>
<tr>
<th></th>
<th>Test 1 Predicted</th>
<th>Test 1 Actual</th>
<th>Test 2 Predicted</th>
<th>Test 2 Actual</th>
<th>Test 3 Predicted</th>
<th>Test 3 Actual</th>
<th>Test 4 Predicted</th>
<th>Test 4 Actual</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean</td>
<td>3.75</td>
<td>2.82</td>
<td>3.41</td>
<td>2.34</td>
<td>3.48</td>
<td>2.55</td>
<td>3.41</td>
<td>3.27</td>
</tr>
<tr>
<td>Median</td>
<td>4.00</td>
<td>3.00</td>
<td>3.00</td>
<td>2.00</td>
<td>3.00</td>
<td>2.00</td>
<td>3.00</td>
<td>3.00</td>
</tr>
<tr>
<td>Standard Deviation</td>
<td>.63</td>
<td>1.10</td>
<td>.62</td>
<td>1.23</td>
<td>.63</td>
<td>1.27</td>
<td>.50</td>
<td>1.46</td>
</tr>
<tr>
<td>Minimum</td>
<td>3.00</td>
<td>1.00</td>
<td>3.00</td>
<td>1.00</td>
<td>3.00</td>
<td>1.00</td>
<td>3.00</td>
<td>1.00</td>
</tr>
<tr>
<td>Maximum</td>
<td>5.00</td>
<td>5.00</td>
<td>5.00</td>
<td>5.00</td>
<td>5.00</td>
<td>5.00</td>
<td>4.00</td>
<td>5.00</td>
</tr>
</tbody>
</table>

Research Question 1

How, and to what extent, do community college students enrolled in hybrid trade classes exhibit self-regulated learning behaviors? Question 1 was analyzed using a paired samples t-test. Analysis of the data was carried out in the following manner: 1) each individual class was analyzed including (HRS 120,130,160, and 170 and ENE 140 and 145). This provided minimal significance per class, so the data will not be presented. By minimal significance only one question if any of the 24 had a p < .05. 2) The individuals participating in the study were grouped together (n=15) and analysis was carried out comparing means pre/post of the OSLQ scores of all 24 questions; these data will be presented. 3) The analysis was also carried out for all classes (n=29) comparing means pre/post of the OSLQ scores of all 24 questions; these data will be presented. Table 4.6 presents the data for the results of the paired t-test for individuals in the study.
Table 4.6
Paired \( t \)-test Individuals, \( p < .05 \) – Results (\( n=15 \))

<table>
<thead>
<tr>
<th>Pair</th>
<th>Description</th>
<th>( t )</th>
<th>dF</th>
<th>Sig (2-tailed)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Goal setting – Goal setting</td>
<td>-2.358</td>
<td>14</td>
<td>.033</td>
</tr>
<tr>
<td>2</td>
<td>Goal setting – Goal setting</td>
<td>-1.948</td>
<td>14</td>
<td>.072</td>
</tr>
<tr>
<td>3</td>
<td>Goal setting – Goal setting</td>
<td>-2.703</td>
<td>14</td>
<td>.017</td>
</tr>
<tr>
<td>4</td>
<td>Goal setting – Goal setting</td>
<td>-1.309</td>
<td>14</td>
<td>.212</td>
</tr>
<tr>
<td>5</td>
<td>Goal setting – Goal setting</td>
<td>-3.371</td>
<td>14</td>
<td>.005</td>
</tr>
<tr>
<td>6</td>
<td>Environmental structuring – Environmental structuring</td>
<td>-.745</td>
<td>14</td>
<td>.469</td>
</tr>
<tr>
<td>7</td>
<td>Environmental structuring – Environmental structuring</td>
<td>-.564</td>
<td>14</td>
<td>.582</td>
</tr>
<tr>
<td>8</td>
<td>Environmental structuring – Environmental structuring</td>
<td>-2.582</td>
<td>14</td>
<td>.022</td>
</tr>
<tr>
<td>9</td>
<td>Environmental structuring – Environmental structuring</td>
<td>-2.582</td>
<td>14</td>
<td>.022</td>
</tr>
<tr>
<td>10</td>
<td>Task strategies – Task strategies</td>
<td>-1.919</td>
<td>14</td>
<td>.076</td>
</tr>
<tr>
<td>11</td>
<td>Task strategies – Task strategies</td>
<td>-2.646</td>
<td>14</td>
<td>.019</td>
</tr>
<tr>
<td>12</td>
<td>Task strategies – Task strategies</td>
<td>-1.388</td>
<td>14</td>
<td>.187</td>
</tr>
<tr>
<td>13</td>
<td>Task strategies – Task strategies</td>
<td>-3.166</td>
<td>14</td>
<td>.007</td>
</tr>
<tr>
<td>14</td>
<td>Time – Time</td>
<td>-1.309</td>
<td>14</td>
<td>.212</td>
</tr>
<tr>
<td>15</td>
<td>Time – Time</td>
<td>-.960</td>
<td>14</td>
<td>.353</td>
</tr>
<tr>
<td>16</td>
<td>Time – Time</td>
<td>-1.435</td>
<td>14</td>
<td>.173</td>
</tr>
<tr>
<td>17</td>
<td>Help seeking – Help seeking</td>
<td>-5.123</td>
<td>14</td>
<td>.000</td>
</tr>
<tr>
<td>18</td>
<td>Help seeking – Help seeking</td>
<td>-2.086</td>
<td>14</td>
<td>.056</td>
</tr>
<tr>
<td>19</td>
<td>Help seeking – Help seeking</td>
<td>-1.948</td>
<td>14</td>
<td>.072</td>
</tr>
<tr>
<td>20</td>
<td>Help seeking – Help seeking</td>
<td>-.924</td>
<td>14</td>
<td>.371</td>
</tr>
<tr>
<td>21</td>
<td>Self-evaluation – Self-Evaluation</td>
<td>-1.948</td>
<td>14</td>
<td>.072</td>
</tr>
<tr>
<td>22</td>
<td>Self-evaluation – Self-Evaluation</td>
<td>-3.552</td>
<td>14</td>
<td>.003</td>
</tr>
<tr>
<td>24</td>
<td>Self-evaluation – Self-Evaluation</td>
<td>-1.451</td>
<td>14</td>
<td>.169</td>
</tr>
</tbody>
</table>

Table 4.7 presents the means and standard deviations for the statistically significant questions from the results of the paired sample \( t \)-test for individuals where \( p < .05 \). Also
included in Table 4.7 is the actual question from the OSLQ that correlates with the means and standard deviations pre/post.

Table 4.7

Paired t-test Individuals Significance p < .05; Means and Standard Deviations Pre/Post OSLQ (n=15)

<table>
<thead>
<tr>
<th>Question</th>
<th>Pre Test</th>
<th></th>
<th>Post Test</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean</td>
<td>SD</td>
<td>Mean</td>
<td>SD</td>
</tr>
<tr>
<td>1. I set standards for my assignments in online courses.</td>
<td>3.46</td>
<td>0.84</td>
<td>4.06</td>
<td>0.59</td>
</tr>
<tr>
<td>3. I keep a high standard for my learning in my online courses.</td>
<td>3.40</td>
<td>0.98</td>
<td>4.20</td>
<td>0.56</td>
</tr>
<tr>
<td>5. I don't compromise the quality of my work because it is online.</td>
<td>3.00</td>
<td>0.84</td>
<td>4.13</td>
<td>0.99</td>
</tr>
<tr>
<td>8. I know where I can study most efficiently for online courses.</td>
<td>3.26</td>
<td>0.96</td>
<td>4.00</td>
<td>0.65</td>
</tr>
<tr>
<td>9. I choose a time with few distractions for studying for my online courses.</td>
<td>3.26</td>
<td>0.79</td>
<td>4.00</td>
<td>0.65</td>
</tr>
<tr>
<td>11. I read aloud instructional materials posted online to fight against distractions.</td>
<td>2.86</td>
<td>0.83</td>
<td>3.53</td>
<td>0.83</td>
</tr>
<tr>
<td>13. I work extra problems in my online courses in addition to the assigned ones to master the course content.</td>
<td>3.13</td>
<td>0.74</td>
<td>4.00</td>
<td>0.65</td>
</tr>
<tr>
<td>17. I find someone who is knowledgeable in course content so that I can consult with him or her when I need help.</td>
<td>2.80</td>
<td>0.56</td>
<td>3.80</td>
<td>0.77</td>
</tr>
<tr>
<td>22. I ask myself a lot of questions about the course material when studying for an online course.</td>
<td>2.86</td>
<td>0.63</td>
<td>3.93</td>
<td>0.79</td>
</tr>
<tr>
<td>23. I communicate with my classmates to find out how I am doing in my online classes.</td>
<td>2.86</td>
<td>0.63</td>
<td>3.66</td>
<td>0.72</td>
</tr>
</tbody>
</table>

Table 4.8 provides the significance and calculated effect size for each of the individual questions. Also included in Table 4.8 is the question the subscale is paired with. The calculated effect provides an objective measure of the importance. An r value equal to .10 provides a small
effect, an r value equal to .30 provides a medium effect and an r value above .50 is a large effect (Field, 2009).

Table 4.8
Paired t-test Individuals’ Questions, Subscale, Significance, and Effect Size (n=15)

<table>
<thead>
<tr>
<th>Question</th>
<th>Subscale</th>
<th>Significance</th>
<th>Effect Size</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. I set standards for my assignments in online courses.</td>
<td>Goal Setting</td>
<td>t(14) = -2.35, p &lt; .05</td>
<td>r = .53</td>
</tr>
<tr>
<td>3. I keep a high standard for my learning in my online courses.</td>
<td>Goal Setting</td>
<td>t(14) = -2.70, p &lt; .05</td>
<td>r = .58</td>
</tr>
<tr>
<td>5. I don't compromise the quality of my work because it is online.</td>
<td>Goal Setting</td>
<td>t(14) = -3.37, p &lt; .05</td>
<td>r = .66</td>
</tr>
<tr>
<td>8. I know where I can study most efficiently for online courses.</td>
<td>Environmental Structuring</td>
<td>t(14) = -2.58, p &lt; .05</td>
<td>r = -.56</td>
</tr>
<tr>
<td>9. I choose a time with few distractions for studying for my online courses.</td>
<td>Environmental Structuring</td>
<td>t(14) = -2.58, p &lt; .05</td>
<td>r = .56</td>
</tr>
<tr>
<td>11. I read aloud instructional materials posted online to fight against distractions.</td>
<td>Task Strategies</td>
<td>t(14) = -2.64, p &lt; .05</td>
<td>r = .57</td>
</tr>
<tr>
<td>13. I work extra problems in my online courses in addition to the assigned ones to master the course content.</td>
<td>Task Strategies</td>
<td>t(14) = -3.16, p &lt; .05</td>
<td>r = .64</td>
</tr>
<tr>
<td>17. I find someone who is knowledgeable in course content so that I can consult with him or her when I need help.</td>
<td>Help Seeking</td>
<td>t(14) = -5.12, p &lt; .05</td>
<td>r = .80</td>
</tr>
<tr>
<td>22. I ask myself a lot of questions about the course material when studying for an online course.</td>
<td>Self-Evaluation</td>
<td>t(14) = -3.55, p &lt; .05</td>
<td>r = .68</td>
</tr>
<tr>
<td>23. I communicate with my classmates to find out how I am doing in my online classes.</td>
<td>Self-Evaluation</td>
<td>t(14) = -2.86, p &lt; .05</td>
<td>r = .60</td>
</tr>
</tbody>
</table>

The following tables (4.9-4.11) present the data for all classes. These data are composed of the individuals registered for all classes (n=29). These data tables include the individuals that
were concurrently enrolled in more than one class; ranging from 2 classes concurrently to four classes concurrently. Table 4.9 presents the data for the results of the paired \( t \)-test for all classes.

### Table 4.9

**Paired \( t \)-test Individuals, \( p < .05 \) – Results (n=29)**

<table>
<thead>
<tr>
<th>Pair</th>
<th>Description</th>
<th>( t )</th>
<th>( dF )</th>
<th>Sig(2-tailed)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Goal setting – Goal setting</td>
<td>-1.907</td>
<td>28</td>
<td>.067</td>
</tr>
<tr>
<td>2</td>
<td>Goal setting – Goal setting</td>
<td>-3.016</td>
<td>28</td>
<td>.005</td>
</tr>
<tr>
<td>3</td>
<td>Goal setting – Goal setting</td>
<td>-3.378</td>
<td>28</td>
<td>.002</td>
</tr>
<tr>
<td>4</td>
<td>Goal setting – Goal setting</td>
<td>-1.512</td>
<td>28</td>
<td>.142</td>
</tr>
<tr>
<td>5</td>
<td>Goal setting – Goal setting</td>
<td>-3.566</td>
<td>28</td>
<td>.001</td>
</tr>
<tr>
<td>6</td>
<td>Environmental structuring – Environmental structuring</td>
<td>-0.941</td>
<td>28</td>
<td>.355</td>
</tr>
<tr>
<td>7</td>
<td>Environmental structuring – Environmental structuring</td>
<td>-0.909</td>
<td>28</td>
<td>.371</td>
</tr>
<tr>
<td>8</td>
<td>Environmental structuring – Environmental structuring</td>
<td>-3.839</td>
<td>28</td>
<td>.001</td>
</tr>
<tr>
<td>9</td>
<td>Environmental structuring – Environmental structuring</td>
<td>-2.730</td>
<td>28</td>
<td>.011</td>
</tr>
<tr>
<td>10</td>
<td>Task strategies – Task strategies</td>
<td>-1.944</td>
<td>28</td>
<td>.062</td>
</tr>
<tr>
<td>11</td>
<td>Task strategies – Task strategies</td>
<td>-5.073</td>
<td>28</td>
<td>.000</td>
</tr>
<tr>
<td>12</td>
<td>Task strategies – Task strategies</td>
<td>-3.007</td>
<td>28</td>
<td>.006</td>
</tr>
<tr>
<td>14</td>
<td>Time – Time</td>
<td>-1.886</td>
<td>28</td>
<td>.070</td>
</tr>
<tr>
<td>15</td>
<td>Time – Time</td>
<td>-.431</td>
<td>28</td>
<td>.669</td>
</tr>
<tr>
<td>16</td>
<td>Time – Time</td>
<td>-.550</td>
<td>28</td>
<td>.586</td>
</tr>
<tr>
<td>17</td>
<td>Help seeking – Help seeking</td>
<td>-5.953</td>
<td>28</td>
<td>.000</td>
</tr>
<tr>
<td>18</td>
<td>Help seeking – Help seeking</td>
<td>-3.016</td>
<td>28</td>
<td>.005</td>
</tr>
<tr>
<td>20</td>
<td>Help seeking – Help seeking</td>
<td>-1.907</td>
<td>28</td>
<td>.282</td>
</tr>
<tr>
<td>21</td>
<td>Self-evaluation – Self-Evaluation</td>
<td>-2.268</td>
<td>28</td>
<td>.031</td>
</tr>
<tr>
<td>22</td>
<td>Self-evaluation – Self-Evaluation</td>
<td>-4.036</td>
<td>28</td>
<td>.000</td>
</tr>
<tr>
<td>23</td>
<td>Self-evaluation – Self-Evaluation</td>
<td>-4.247</td>
<td>28</td>
<td>.000</td>
</tr>
<tr>
<td>24</td>
<td>Self-evaluation – Self-Evaluation</td>
<td>-2.512</td>
<td>28</td>
<td>.018</td>
</tr>
</tbody>
</table>

Table 4.10 presents the means and standard deviations for the statistically significant questions from the results of the paired sample \( t \)-test for individuals enrolled in classes.
concurrently where \( p < .05 \). Also included in Table 4.9 is the actual question that correlates with the means and standard deviations pre/post.

Table 4.10

**Paired \( t \)-test Individuals’ Significance \( p < .05 \) – Means and Standard Deviations Pre/Post OSLQ (n=29)**

<table>
<thead>
<tr>
<th>Question</th>
<th>Pre test</th>
<th>Post Test</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean</td>
<td>SD</td>
</tr>
<tr>
<td>2. I set short-term (daily or weekly) goals as well as long-term goals (monthly or for the semester).</td>
<td>3.27</td>
<td>0.79</td>
</tr>
<tr>
<td>3. I keep a high standard for my learning in my online courses.</td>
<td>3.51</td>
<td>0.94</td>
</tr>
<tr>
<td>5. I don't compromise the quality of my work because it is online.</td>
<td>3.00</td>
<td>0.92</td>
</tr>
<tr>
<td>8. I know where I can study most efficiently for online courses.</td>
<td>3.27</td>
<td>0.99</td>
</tr>
<tr>
<td>9. I choose a time with few distractions for studying for my online courses.</td>
<td>3.37</td>
<td>0.82</td>
</tr>
<tr>
<td>11. I read aloud instructional materials posted online to fight against distractions.</td>
<td>2.82</td>
<td>0.84</td>
</tr>
<tr>
<td>12. I prepare my questions before joining in the chat room and discussion.</td>
<td>3.0</td>
<td>0.75</td>
</tr>
<tr>
<td>13. I work extra problems in my online courses in addition to the assigned ones to master the course content.</td>
<td>3.20</td>
<td>0.72</td>
</tr>
<tr>
<td>17. I find someone who is knowledgeable in course content so that I can consult with him or her when I need help.</td>
<td>2.89</td>
<td>0.61</td>
</tr>
<tr>
<td>18. I share my problems with my classmates online so we know what we are struggling with and how to solve our problems.</td>
<td>3.10</td>
<td>0.77</td>
</tr>
<tr>
<td>19. If needed, I try to meet my classmates face-to-face.</td>
<td>3.13</td>
<td>0.78</td>
</tr>
<tr>
<td>21. I summarize my learning in online courses to examine my understanding of what I have learned.</td>
<td>3.06</td>
<td>0.70</td>
</tr>
<tr>
<td>22. I ask myself a lot of questions about the course material when studying for an online course.</td>
<td>3.00</td>
<td>0.65</td>
</tr>
<tr>
<td>23. I communicate with my classmates to find out how I am doing in my online classes.</td>
<td>2.89</td>
<td>0.61</td>
</tr>
</tbody>
</table>

Table continued on next page
Table 4.10 cont. from previous page

<table>
<thead>
<tr>
<th>Question</th>
<th>Pre test</th>
<th>Post Test</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean</td>
<td>SD</td>
<td>Mean</td>
<td>SD</td>
</tr>
<tr>
<td>24. I communicate with my classmates to find out what I am learning that is different from what they are learning.</td>
<td>3.24</td>
<td>0.87</td>
<td>3.79</td>
<td>0.81</td>
</tr>
</tbody>
</table>

Table 4.11 provides the significance and calculated effect size for each of the individual questions for students participating in classes concurrently. Also included in Table 4.11 is the question the subscale is paired with.

**Table 4.11**

Paired t-test Individuals’ Questions, Subscale, Significance, and Effect Size (n=29)

<table>
<thead>
<tr>
<th>Question</th>
<th>Subscale</th>
<th>significance</th>
<th>effect size</th>
</tr>
</thead>
<tbody>
<tr>
<td>2. I set short-term (daily or weekly) goals as well as long-term goals (monthly or for the semester).</td>
<td>Goal Setting</td>
<td>t(28) = -3.01, p &lt; .05</td>
<td>r=.50</td>
</tr>
<tr>
<td>3. I keep a high standard for my learning in my online courses.</td>
<td>Goal Setting</td>
<td>t(28) = -3.37, p &lt; .05</td>
<td>r=.53</td>
</tr>
<tr>
<td>5. I don't compromise the quality of my work because it is online.</td>
<td>Goal Setting</td>
<td>t(28) = -3.56, p &lt; .05</td>
<td>r=.56</td>
</tr>
<tr>
<td>8. I know where I can study most efficiently for online courses.</td>
<td>Environmental Structuring</td>
<td>t(28) = -3.83, p &lt; .05</td>
<td>r=.59</td>
</tr>
<tr>
<td>9. I choose a time with few distractions for studying for my online courses.</td>
<td>Environmental Structuring</td>
<td>t(28) = -2.73, p &lt; .05</td>
<td>r=.46</td>
</tr>
<tr>
<td>11. I read aloud instructional materials posted online to fight against distractions.</td>
<td>Task Strategies</td>
<td>t(28) = -5.07, p &lt; .05</td>
<td>r=.69</td>
</tr>
<tr>
<td>12. I prepare my questions before joining in the chat room and discussion.</td>
<td>Task Strategies</td>
<td>t(28) = -3.00, p &lt; .05</td>
<td>r=.49</td>
</tr>
<tr>
<td>13. I work extra problems in my online courses in addition to the assigned ones to master the course content.</td>
<td>Task Strategies</td>
<td>t(28) = -3.49, p &lt; .05</td>
<td>r=.55</td>
</tr>
</tbody>
</table>

Table continued on next page
Table 4.11 cont. from previous page

<table>
<thead>
<tr>
<th></th>
<th>Help Seeking</th>
<th>t(28)</th>
<th>p</th>
<th>r</th>
</tr>
</thead>
<tbody>
<tr>
<td>17.</td>
<td>I find someone who is knowledgeable in course content so that I can consult with him or her when I need help.</td>
<td>t(28) = -5.95, p &lt; .05</td>
<td></td>
<td>.56</td>
</tr>
<tr>
<td>18.</td>
<td>I share my problems with my classmates online so we know what we are struggling with and how to solve our problems.</td>
<td>t(28) = -3.01, p &lt; .05</td>
<td></td>
<td>.50</td>
</tr>
<tr>
<td>19.</td>
<td>If needed, I try to meet my classmates face-to-face.</td>
<td>t(28) = -3.33, p &lt; .05</td>
<td></td>
<td>.53</td>
</tr>
<tr>
<td>21.</td>
<td>I summarize my learning in online courses to examine my understanding of what I have learned.</td>
<td>t(28) = -2.26, p &lt; .05</td>
<td></td>
<td>.39</td>
</tr>
<tr>
<td>22.</td>
<td>I ask myself a lot of questions about the course material when studying for an online course.</td>
<td>t(28) = -4.03, p &lt; .05</td>
<td></td>
<td>.60</td>
</tr>
<tr>
<td>23.</td>
<td>I communicate with my classmates to find out how I am doing in my online classes.</td>
<td>t(28) = -4.24, p &lt; .05</td>
<td></td>
<td>.62</td>
</tr>
<tr>
<td>24.</td>
<td>I communicate with my classmates to find out what I am learning that is different from what they are learning.</td>
<td>t(28) = -2.51, p &lt; .05</td>
<td></td>
<td>.42</td>
</tr>
</tbody>
</table>

Research Question 2

To what extent, are self-regulated learning behaviors associated with student performance in hybrid trade classes? For research question 2 standard linear regression was carried out relating the OSLQ scores to the predicted exam scores, actual exam scores and final classroom grades. All predictors were entered into a single model and compared to one dependent variable at a time; for this research question the data set for all classes was used (n=29). The dependent variables for the regression included the four predicted scores, the four actual scores and the one overall classroom grade: nine separate dependent variables. The independent variables included the 24 OSLQ scores (post test scores). Only cases for which the standardized residual was
greater than two standard deviations were included in the analysis. Due to the small sample size and violation of normality, the results of the regression are applicable to my study only and should not be generalized beyond this sample (Field, 2009). The entry of data and the analysis for each of the separate dependent variables was carried out identically. For the preceding table the category references either the predicted or actual grades. The reference of the number with the wording is an indication of the test it associated with (i.e. predicted 1 would correspond to predicted grade test 1). See Table 4.12 for the general overall results of the nine different regression tests and the correlating subscale and question. The statistical significance for the table is $p < .05$.

Table 4.12

Linear Regression All Classes General Results for the Nine Linear Regressions Carried Out – Category (Predicted or Actual, Overall Class grade) Subscale and Question;

$p < .05$ (n=29)

<table>
<thead>
<tr>
<th>Category</th>
<th>Subscale</th>
<th>Question</th>
</tr>
</thead>
<tbody>
<tr>
<td>Predicted 1</td>
<td>Time Management</td>
<td>Although we don't have to attend daily classes, I still try to distribute my studying time evenly across days.</td>
</tr>
<tr>
<td>Predicted 1</td>
<td>Self-evaluation</td>
<td>I communicate with my classmates to find out how I am doing in my online classes.</td>
</tr>
<tr>
<td>Actual 2</td>
<td>goal setting</td>
<td>I set short-term (daily or weekly) goals as well as long-term goals (monthly or for the semester).</td>
</tr>
<tr>
<td>Actual 4</td>
<td>goal setting</td>
<td>I set standards for my assignments in online courses.</td>
</tr>
<tr>
<td>Actual 4</td>
<td>goal setting</td>
<td>I keep a high standard for my learning in my online courses.</td>
</tr>
<tr>
<td>Actual 4</td>
<td>goal setting</td>
<td>I don't compromise the quality of my work because it is online.</td>
</tr>
</tbody>
</table>

Table continued on next page
Table 4.12 cont. from previous page

<table>
<thead>
<tr>
<th>Category</th>
<th>Subscale</th>
<th>Question</th>
</tr>
</thead>
<tbody>
<tr>
<td>Actual 4</td>
<td>environmental</td>
<td>I find a comfortable place to study.</td>
</tr>
<tr>
<td></td>
<td>structuring</td>
<td></td>
</tr>
<tr>
<td>Actual 4</td>
<td>help seeking</td>
<td>I find someone who is knowledgeable in course content so that I can consult with him or her when I need help.</td>
</tr>
<tr>
<td>Actual 4</td>
<td>self-evaluation</td>
<td>I communicate with my classmates to find out how I am doing in my online classes.</td>
</tr>
</tbody>
</table>

For the purpose of my research, I used the results of the regression analysis utilizing Actual 4 as the dependent variable. This was the last test of the semester given at the end of April and was related to the current mixed methods research carried out. The results for the linear regression model summary are presented in Table 4.13. Table 4.14 presents the results of the regression model used in the research. The results in table 4.14 indicate the question that was used in the analysis (e.g., goal setting question 1 would correlate to the first question in the OSLQ goal setting subscale).

Table 4.13

Model Summary – All Classes Actual 4 (n=29)

<table>
<thead>
<tr>
<th>Model</th>
<th>R</th>
<th>R Square</th>
<th>Adjusted R Square</th>
<th>Std. Error of the Estimate</th>
<th>Durbin-Watson</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>0.954</td>
<td>0.911</td>
<td>0.722</td>
<td>0.76980</td>
<td>1.391</td>
</tr>
<tr>
<td>Model</td>
<td>Unstandardized Coefficients</td>
<td>Standardized Coefficients</td>
<td>t</td>
<td>Sig.</td>
<td></td>
</tr>
<tr>
<td>---------------------------------</td>
<td>-----------------------------</td>
<td>---------------------------</td>
<td>-------</td>
<td>-------</td>
<td></td>
</tr>
<tr>
<td></td>
<td>B</td>
<td>Std. Error</td>
<td>Beta</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Goal setting question 1</td>
<td>2.076</td>
<td>.579</td>
<td>1.069</td>
<td>3.588</td>
<td>.006</td>
</tr>
<tr>
<td>Goal setting question 2</td>
<td>1.209</td>
<td>1.278</td>
<td>.588</td>
<td>.945</td>
<td>.369</td>
</tr>
<tr>
<td>Goal setting question 3</td>
<td>-5.420</td>
<td>1.269</td>
<td>-1.736</td>
<td>-4.272</td>
<td>.002</td>
</tr>
<tr>
<td>Goal setting question 4</td>
<td>-1.232</td>
<td>.926</td>
<td>-.648</td>
<td>-1.330</td>
<td>.216</td>
</tr>
<tr>
<td>Goal setting question 5</td>
<td>1.553</td>
<td>.512</td>
<td>1.090</td>
<td>3.032</td>
<td>.014</td>
</tr>
<tr>
<td>Environmental question 2</td>
<td>1.891</td>
<td>.459</td>
<td>1.120</td>
<td>4.115</td>
<td>.003</td>
</tr>
<tr>
<td>Task question 1</td>
<td>-.788</td>
<td>1.031</td>
<td>-.485</td>
<td>-.764</td>
<td>.464</td>
</tr>
<tr>
<td>Task question 3</td>
<td>-.268</td>
<td>.499</td>
<td>-.157</td>
<td>-.538</td>
<td>.604</td>
</tr>
<tr>
<td>Task question 4</td>
<td>-.708</td>
<td>.654</td>
<td>-.310</td>
<td>-1.082</td>
<td>.307</td>
</tr>
<tr>
<td>Time question 1</td>
<td>1.163</td>
<td>.694</td>
<td>.648</td>
<td>1.676</td>
<td>.128</td>
</tr>
<tr>
<td>Time question 2</td>
<td>1.079</td>
<td>.776</td>
<td>.687</td>
<td>1.391</td>
<td>.198</td>
</tr>
<tr>
<td>Time question 3</td>
<td>-.934</td>
<td>.645</td>
<td>-.468</td>
<td>-1.447</td>
<td>.182</td>
</tr>
<tr>
<td>Help question 1</td>
<td>1.970</td>
<td>.776</td>
<td>.958</td>
<td>2.538</td>
<td>.032</td>
</tr>
<tr>
<td>Help question 2</td>
<td>1.109</td>
<td>.914</td>
<td>.681</td>
<td>1.214</td>
<td>.256</td>
</tr>
<tr>
<td>Help question 3</td>
<td>.338</td>
<td>.936</td>
<td>.213</td>
<td>.361</td>
<td>.726</td>
</tr>
<tr>
<td>Help question 4</td>
<td>-1.138</td>
<td>.604</td>
<td>-.677</td>
<td>-1.882</td>
<td>.093</td>
</tr>
<tr>
<td>Self-evaluation question 1</td>
<td>-.214</td>
<td>.944</td>
<td>-.101</td>
<td>-.227</td>
<td>.826</td>
</tr>
<tr>
<td>Self-evaluation question 3</td>
<td>-2.577</td>
<td>.732</td>
<td>-1.216</td>
<td>-3.519</td>
<td>.007</td>
</tr>
<tr>
<td>Self-evaluation question 4</td>
<td>-.739</td>
<td>.777</td>
<td>-.414</td>
<td>-.952</td>
<td>.366</td>
</tr>
</tbody>
</table>
Chapter 4 provided the quantitative results of the research how it was carried out along with tables of significance. Chapter 5 consists of the integration of the quantitative and qualitative research discussion and reflection. Chapter 5 concludes with implications for future research and conclusions.
CHAPTER 5
INTEGRATION OF DATA

The following chapter provides the integration of the quantitative and qualitative data for analysis. The content of this chapter includes descriptions of the following: data collection overview; general discussion of qualitative components including monitoring and reflecting—emerging themes; significance/discussion of data presented for Research Questions 1 and 2; implications and future research; and, conclusion. Recall from previous chapters the research was focused on understanding the ability of students to perform in a hybrid environment, specifically measuring the students’ abilities to monitor, predict and reflect on their own learning. The research questions in my study were:

1. How, and to what extent, do community college students enrolled in hybrid trade classes exhibit self-regulated learning behaviors?

2. To what extent are self-regulated learning behaviors associated with student performance in hybrid trade classes?

Data Collection Overview

The research was focused on the future implementation of the hybrid platform in trade classes at a rural Northwest Illinois community college and the development of a learning community in the hybrid platform. One premise of a learning community is that it allows for individuals to learn formally or informally (Hill, 2012). Each of the courses had four different
modules; at the conclusion of the module and after the tests’ the students were asked to provide a reflection (i.e. four modules, four tests and four reflections per class). The semester and research had a confusing start due to weather related issues, and what was expected of the students. The semester began the week of January 13, 2014. The school was closed for weather January 27, January 28, on February 5 opened at noon, and February 17 closed again. Some of these days coincided with class time, and even if they did not coincide with a class, they set the course work back, as noted “The snow days made the scheduling a little difficult” (student C posting, reflection-1). A posting by another student confirmed this thought, “When on the off weeks I did not know what to do” (student H comment, field notes week of 2/16). The implementation of a blended environment takes time (Garrisons & Vaughn, 2008; Graham, 2006). With the days missed I had to adjust lab due dates and testing, which did not affect the way the students monitored or studied.

Spring break was the week of March 9-16. After this time we were able to meet with regular class time as scheduled, as most work was online prior to this date. After spring break we came back to school and completed the last 3 modules. Module 1 had concluded and tested the week prior to spring break. Even with the days off, a student provided the following in support of the online environment, “missing so many snow days made things a little confusing but having the ability to do course work online helped” (student A posting, reflection-1). Another student also indicated that the environment probably did not affect his grade, “I think the setting was irrelevant to my grade; I didn’t apply myself in my opinion” (student J posting, reflection-1). The research was designed to integrate online and face-to-face requirements so knowledge could be constructed, which is a construct within the HPL framework along with the creation of a community of practice (Bransford et al., 2000).
Computers skills for the group were not a factor in the use of the LMS for the course work. Recall from Chapter 3 when the course began the students were asked to complete digital literacy modules from website: http://www.digitalliteracyassessment.org/index.php. The overall results for basic computer skills, World Wide Web, Windows 7, and using e-mail indicated no significant deficiencies in participants’ general computer skills required for the classes. However, anxiety of computers was an issue indicated more than once by different students, one student stated, “Failed to keep pace due to poor computer skills” (student N posting, reflection-1). This statement was confirmed in field notes, with the same student making the statement, “I get in classes with a computer and my grades go straight down” (student N statement, field notes 3/4).

With the exception of dislocated workers, all of the other participants in the study worked on a daily basis; this did affect the study. When a student was asked why he did not do the monitoring component (student was an A student), the response given was “I would read in my truck between calls and not have a computer with me” (student B response, field notes week of 4/28). Another student working 40 plus hours a week and taking 21 credit hours stated, “I log in to see what I have to do” (student posting O, reflection-1).

Qualitative Components of Study: Monitoring and Reflecting

Monitoring, predicting, and reflecting were SRL behaviors associated with the study and how they were utilized in the trade classes in which the research was carried out. All qualitative data including reflections, daily logs and interviews were coded to determine themes. The following section provides an introductory discussion on behaviors used for qualitative analysis including monitoring and reflecting as they were used in the research by the participants. The
monitoring portion was not used extensively and in fact not used at all by some individuals. However, it was used by some individuals with success. For the individuals who used the monitoring portion, they indicated it kept them focused.

Researcher: Do you think the monitoring component worked?
Student E: I had not done it before, yes it helped me stay on focus what I needed to do this week and what I should be studying.
Researcher: Is this something you may adopt for other classes?
Student E: I liked being able to tell you this is what I am doing; I think monitoring does show you have been studying.

Another student supported these sentiments when asked the same questions:

Researcher: Do you think the monitoring component worked?
Student G: I did. It got me organized as to what I needed to do.
Researcher: Would you keep using monitoring skills in your studies?
Student G: I would.
Researcher: Do you think monitoring helped you learn the material?
Student G: Yes, if I had a problem I would write down what I needed to do. It did get me thinking, and I would do one class one day and another class another day.

The preceding is from student interviews (week of 5/5). The discussions suggest the importance of self-efficacy with SRL and the relationship it has to ones perceptions about one’s own ability to organize and implement an action to successfully perform a task (Zimmerman, 1989). Two examples of monitoring are provided that proved to be beneficial for A students in their learning and final grades (see Appendix K).

The monitoring portion was a problem for some as previously stated and they did not use it to their benefit, however, they said they did monitor on their own without using the daily/weekly log. One student indicated the following when asked why he did not use the monitoring, “for someone growing up with computers, it would probably be nothing for them. I did not do it” (student M interview, week of 5/5). This was spoken by an A student who also indicated he studied approximately two hours a night. The preceding participant is over fifty
years of age and has learned much through his work experiences and apprenticeships. He was taking courses for his own benefit, making him a motivated learner. Another younger student, indicated the following when asked about monitoring the following:

Most of the time, I actually forgot to input my studying times. I rarely study next to a computer, so it never crossed my mind when done studying. I would study at random times on random days, I never established set times. I personally didn't find input my studying times very valuable, but then again I didn't put all them in. (student F comment field notes, week of 4/28)

The previous statement was a common theme among individuals in the research. Some individuals said they did not write down the specifics about what they did. These individuals did keep up with what they needed. The computer created an obstruction for the preceding two individuals and others. As stated by Brown (1987), individuals have a form of a central processor and they have control over their executive decisions; some students made the decision to implement other more beneficial strategies for their own learning paradigm.

A theme that developed in the monitoring portion is that individuals who were in classes concurrently did spend more time monitoring, influencing the outcome of the paired samples t-test and linear regression. For example, one student (student, G) who was in four classes concurrently made entries on an average of 10 per class. All were different entries and he made entries, all the way through April 15, 2014. Another student (student, K) concurrently in four classes made approximately the same amount of entries through the same time frame of April 15, 2014.

Reflections

Students submitted the reflections after taking the exam. The suggested prompts for the reflections were displayed on a white board so the students could answer; they were asked to
answer honestly and the prompts were suggestions only. The underlying theme of the reflections did not provide any insight to the monitoring portion and changes in study habits. A substantial amount of the postings by students indicated not studying enough; however, recognizing they needed to change. As stated by a student: “Didn’t do badly and didn’t do good but I like the way he test… somewhat of a challenge, but need to regroup and pick up more studying habits” (student K posting, reflection-4). Another student posted something similar, “I was a little upset with the grade I got for the test. I was studying for test but not paying attention to detail” (student posting D, reflection-3). These students recognized a change was needed, which is an SRL behavior (Zimmerman, 2002). The changes included the manipulation of their environment that would help provide them with success. A good percentage of the students formed their own study groups and spent many extra hours in the lab area perfecting their skills. These skills developed would be transferable to the trade they would decide to participate in. They became active participants in their learning paradigm, which is a quality of the self-regulated learner (Zimmerman, 1989). The self-regulated learner knows how to seek out the help of peers or teachers for success (Zimmerman & Schunk, 2011).

A developing theme of the reflections became the enjoyment and benefit of group work, as stated by Vygotsky et al. (1978), social components help promote learning. A student stated, “Working in a group allows us to compare our answers to see if we are doing things right. It also allows one of us who understands it a little better to explain it to the other person” (student A posting, reflection-4). This reflection by the student parallels the work of Lave and Wenger (1991), their work with the apprentices and their analysis of Vai and Gola tailors in Liberia and butchers in U.S supermarkets. In the apprenticeship examples, younger individuals learned vicariously and are trained in a specific sequence. Another student who was in the Fall HVAC
classes with me and had always worked alone (field notes, week of 3/20) stated, “Doing the
group diagram in this class helped out in the lab. Having people to bounce ideas off helped”
(student B posting, reflection-2). This was a benefit gained for the student from the group work
in the hybrid environment. As stated by Bransford et al. (2000), one component of a successful
learning environment is the environment needs to be community centered and conducive to a
feeling of connectedness and collaboration.

Discussion of Research Questions

The following section provides a discussion and significance of the research findings.
The section will be discussed in two sections: Research Question 1 and Research Question 2.
Only the data presented in Chapter 4 will be included, which includes the paired samples \( t \)-test
for individuals \( n=15 \) and all classes \( n=29 \) and the standard linear regression for all classes
\( n=29 \).

Research Question 1

Research Question 1 compared means pre/post of the OSLQ scores for the individuals
\( n=15 \) in the study and all classes \( n=29 \) in the study. Research question 1 was: How, and to
what extent, do community college students enrolled in a hybrid trade classes exhibit self-
regulated learning behaviors? In the paired samples \( t \)-test for individuals ten of the individual
questions have significant change in means pre/post where \( p < .05 \). The significant changes
include three from the goal setting subscale, two from the environmental structuring subscale,
two from the task strategies subscale, one from the help seeking subscale and two from the self-
evaluation subscale. The statements of significance are presented in Table 5.0.
Table 5.0
Paired $t$-test Individuals (n=15) – Statements of Significance

<table>
<thead>
<tr>
<th>Question</th>
<th>Subscale</th>
<th>Statement of Significance</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. I set standards for my assignments in online courses.</td>
<td>Goal Setting</td>
<td>On the average students felt their standards for online course assignments increased from the time the semester started ($M = 3.46, SE = .21$) to the time the semester ended ($M = 4.06, SE = .15$). $t(14) = 2.35, p &lt; .05, r = .53$.</td>
</tr>
<tr>
<td>3. I keep a high standard for my learning in my online courses.</td>
<td>Goal Setting</td>
<td>On the average students felt their standards of learning increased from the time the semester started ($M = 3.40, SE = .25$) to the time the semester ended ($M = 4.20, SE = .14$). $t(14) = 2.70, p &lt; .05, r = .58$.</td>
</tr>
<tr>
<td>5. I don't compromise the quality of my work because it is online.</td>
<td>Goal Setting</td>
<td>On the average students felt their quality of online work was not compromised and increased from the start of the semester ($M = 3.00, SE = .21$) to the end of the semester ($M = 4.13, SE = .25$). $t(14) = 3.37, p &lt; .05, r = .66$.</td>
</tr>
<tr>
<td>8. I know where I can study most efficiently for online courses.</td>
<td>Environmental Structuring</td>
<td>On the average students felt they developed the skills to recognize where they most efficiently study for online from the beginning of the semester ($M = 3.26, SE = .24$) to the end of the semester ($M = 4.00, SE = .16$). $t(14) = 2.58, p &lt; .05, r = .56$.</td>
</tr>
<tr>
<td>9. I choose a time with few distractions for studying for my online courses.</td>
<td>Environmental Structuring</td>
<td>On the average students increased their understanding of allowing for fewer distractions for online courses from the time the semester began ($M = 3.26, SE = .20$) to the end of the semester ($M = 4.00, SE = .16$). $t(14) = 2.58, p &lt; .05, r = .56$.</td>
</tr>
<tr>
<td>11. I read aloud instructional materials posted online to fight against distractions.</td>
<td>Task Strategies</td>
<td>On the average students felt it helped them to read materials aloud for online classes and this feeling increased from the time the semester started ($M = 2.86, SE = .21$) to the time the semester ended ($M = 3.53, SE = .21$). $t(14) = 2.64, p &lt; .05, r = .57$.</td>
</tr>
<tr>
<td>13. I work extra problems in my online courses in addition to the assigned ones to master the course content.</td>
<td>Task Strategies</td>
<td>On the average students felt they needed to work extra problems online and this need increased from the time the semester began ($M = 3.13, SE = .19$) to the time the semester ended ($M = 4.00, SE = .16$). $t(14) = 3.16, p &lt; .05, r = .64$.</td>
</tr>
</tbody>
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<table>
<thead>
<tr>
<th>Question</th>
<th>Subscale</th>
<th>Statement of Significance</th>
</tr>
</thead>
<tbody>
<tr>
<td>17. I find someone who is knowledgeable in course content so that I can consult with him or her when I need help.</td>
<td>Help Seeking</td>
<td>On the average the students felt they needed to ask for help from piers when they needed help and this increased from the time the semester began (M = 2.80, SE = .14) to the end of the semester (M = 3.80, SE = .20). ( t(14) = -5.12, p &lt; .05, r=.80 )</td>
</tr>
<tr>
<td>22. I ask myself a lot of questions about the course material when studying for an online course.</td>
<td>Self-Evaluation</td>
<td>On the average students felt the need to question themselves when studying for online courses and this feeling increased from the time the semester began (M = 2.86, SE = .16) to the time the semester ended (M = 3.93, SE = .20). ( t(14) = -3.55, p &lt; .05, r=.68 )</td>
</tr>
<tr>
<td>23. I communicate with my classmates to find out how I am doing in my online classes.</td>
<td>Self-Evaluation</td>
<td>On the average students will check with classmates on how they are doing compared to how their pier is doing for online classes this desire to check increased from the time the semester began (M = 2.86, SE = .16) to the time the semester ended (M =3.66, SE = .18). ( t(14) = -2.86, p &lt; .05, r=.60 )</td>
</tr>
</tbody>
</table>

Table 5.1 provides the significant statement for all classes. The data for all classes (n=29) include more questions that were identified as being significant to the findings. The study had individuals who took classes concurrently. Table 5.1 reflects some of the same students participating in more than one class. These data represent the premise that the more exposure the students have to the hybrid platform, the more they become adapted. All OSLQ scores for individuals were matched so they did not change between classes.
<table>
<thead>
<tr>
<th>Question</th>
<th>Subscale</th>
<th>Statement of significance</th>
</tr>
</thead>
<tbody>
<tr>
<td>2. I set short-term (daily or weekly) goals as well as long-term goals (monthly or for the semester).</td>
<td>Goal Setting</td>
<td>On the average students felt that they needed to set short term goals in their classes and this need increased from the time the semester began ($M = 3.27, SE = .14$) to the time the semester ended ($M = 3.82, SE = .13$). $t(28) = -3.01, p &lt; .05, r=.50$</td>
</tr>
<tr>
<td>3. I keep a high standard for my learning in my online courses.</td>
<td>Goal Setting</td>
<td>On the average students felt their standards of learning increased from the time the semester started ($M =3.51, SE = .17$) to the time the semester ended ($M = 4.17, SE = .08$). $t(28) = -3.37, p &lt; .05, r=.53$</td>
</tr>
<tr>
<td>5. I don't compromise the quality of my work because it is online.</td>
<td>Goal Setting</td>
<td>On the average students felt their quality of online work was not compromised and increased from the start of the semester ($M = 3.00, SE = .17$) to the end of the semester ($M = 3.86, SE = .19$). $t(28) = -3.56, p &lt; .05, r=.56$</td>
</tr>
<tr>
<td>8. I know where I can study most efficiently for online courses.</td>
<td>Environmental Structuring</td>
<td>On the average students felt they developed the skills to recognize where they most efficiently study for online courses from the beginning of the semester ($M = 3.27, SE = .18$) to the end of the semester ($M = 3.96, SE = .13$). $t(28) = -3.83, p &lt; .05, r=.59$</td>
</tr>
<tr>
<td>9. I choose a time with few distractions for studying for my online courses.</td>
<td>Environmental Structuring</td>
<td>On the average students increased their understanding of allowing for fewer distractions for online courses from the time the semester began ($M = 3.37, SE = .15$) to the end of the semester ($M =3.93, SE = .11$). $t(28) = -2.73, p &lt; .05, r=.46$</td>
</tr>
<tr>
<td>11. I read aloud instructional materials posted online to fight against distractions.</td>
<td>Task Strategies</td>
<td>On the average students felt it helped them to read materials aloud for online classes and this feeling increased from the time the semester started ($M = 2.82, SE = .15$) to the time the semester ended ($M = 3.68, SE = .15$). $t(28) = -5.07, p &lt; .05, r=.69$</td>
</tr>
<tr>
<td>12. I prepare my questions before joining in the chat room and discussion.</td>
<td>Task Strategies</td>
<td>On the average the students felt the need to better prepare themselves for chat room discussions and this feeling increased from the time the semester began ($M = 3.0, SE = .14$) to the time the semester ended ($M = 3.65, SE = .15$). $t(28) = -3.00, p &lt; .05, r=.49$</td>
</tr>
<tr>
<td>Question</td>
<td>Subscale</td>
<td>Statement of significance</td>
</tr>
<tr>
<td>-------------------------------------------------------------------------</td>
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<td>---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>13. I work extra problems in my online courses in addition to the assigned ones to master the course content.</td>
<td>Task Strategies</td>
<td>On the average students felt they needed to work extra problems online and this need increased from the time the semester began (M = 3.20, SE = .13) to the time the semester ended (M = 3.86, SE = .11).</td>
</tr>
<tr>
<td></td>
<td></td>
<td>$t(28) = -3.49, p &lt; .05, r = .55$</td>
</tr>
<tr>
<td>17. I find someone who is knowledgeable in course content so that I can consult with him or her when I need help.</td>
<td>Help Seeking</td>
<td>On the average the students felt they needed to ask for help from piers when they needed help and this increased from the time the semester began (M = 2.89, SE = .11) to the end of the semester (M = 3.82, SE = .13).</td>
</tr>
<tr>
<td></td>
<td></td>
<td>$t(28) = -5.95, p &lt; .05, r = .56$</td>
</tr>
<tr>
<td>18. I share my problems with my classmates online so we know what we are struggling with and how to solve our problems.</td>
<td>Help Seeking</td>
<td>On the average students sought out piers to discuss problems in the online classes and this action to seek out struggling piers increased from the time the semester began (M = 3.10, SE = .14) to the time the semester ended (M = 3.65, SE = .16).</td>
</tr>
<tr>
<td></td>
<td></td>
<td>$t(28) = -3.01, p &lt; .05, r = .50$</td>
</tr>
<tr>
<td>19. If needed, I try to meet my classmates face-to-face.</td>
<td>Help Seeking</td>
<td>On the average students meet face-to-face with other students to discuss the class this need to seek out piers for conversation increased from the time the semester began (M = 3.13, SE = .14) to the time the semester ended (M = 3.72, SE = .17).</td>
</tr>
<tr>
<td></td>
<td></td>
<td>$t(28) = -3.33, p &lt; .05, r = .53$</td>
</tr>
<tr>
<td>21. I summarize my learning in online courses to examine my understanding of what I have learned.</td>
<td>Self-Evaluation</td>
<td>On the average students would summarize their online learning for course to make sure they understand the material and the need to review increased from the time the semester began (M = 3.06, SE = .13) to the time the semester ended (M = 3.48, SE = .12)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>$t(28) = -2.26, p &lt; .05, r = .39$</td>
</tr>
<tr>
<td>22. I ask myself a lot of questions about the course material when studying for an online course.</td>
<td>Self-Evaluation</td>
<td>On the average students felt the need to question themselves when studying for online courses and this feeling increased from the time the semester began (M = 3.06, SE = .13) to the time the semester ended (M = 3.48, SE = .12).</td>
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<tr>
<td></td>
<td></td>
<td>$t(28) = -4.03, p &lt; .05, r = .60$</td>
</tr>
<tr>
<td>23. I communicate with my classmates to find out how I am doing in my online classes.</td>
<td>Self-Evaluation</td>
<td>On the average students will check with classmates on how they are doing compared to how their pier is doing for online classes this desire to check increased from the time the semester began (M = 2.89, SE = .11) to the time the semester ended (M = 3.75, SE = .12).</td>
</tr>
<tr>
<td></td>
<td></td>
<td>$t(28) = -4.24, p &lt; .05, r = .62$</td>
</tr>
</tbody>
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Table 5.1 cont. from previous page

<table>
<thead>
<tr>
<th>Question</th>
<th>Subscale</th>
<th>Statement of significance</th>
</tr>
</thead>
<tbody>
<tr>
<td>24. I communicate with my classmates to find out what I am learning</td>
<td>Self-Evaluation</td>
<td>On the average students would communicate with classmates and compare notes as to what</td>
</tr>
<tr>
<td>that is different from what they are learning.</td>
<td></td>
<td>they are learning to see if the information was different this communication increases</td>
</tr>
<tr>
<td></td>
<td></td>
<td>from the time the semester began (M = 3.21, SE = .16) to the time the semester ended</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(M = 3.79, SE = .15) t(28) = -2.51, p &lt; .05, r=.42</td>
</tr>
</tbody>
</table>

These data represent the change in significance p < .05, as students participated in more than one class. Individuals could be in the data set two or three times depending on the classes they were enrolled in. The individuals who took more than one class influenced the data in the following manner. In the all classes data set, question 2 was identified as being significant to the findings; I set short-term (daily or weekly) goals as well as long-term goals (monthly or for the semester). The students in multiple classes became more focused on setting obtainable goals to manage all the classes they had in the hybrid format. Many of the students involved in more than one class used the monitoring portion of the study until the middle of April, and many of them hand numerous postings in the LMS (i.e. student G—38 postings, student E—37 postings, student K—21 postings). This is an indication over the course of the semester the students spent more time developing the skills necessary to maintain multiple online courses and monitoring what they needed to accomplish for success. The ability to monitor one’s performance is a trait of SRL (Zimmerman, 2002). Although the monitoring portion was not used extensively it did prove to be of value to some individuals. For students to be self-regulated learners they need to become active in their own learning (Zimmerman, 1989). The students became proactive in their learning and exhibited a sense of agency (Zimmerman, 2000). As suggested by Barnard-Brak (2010) for students to be successful they need to become their own agents. The students with a
high level of self-efficacy which is exhibited with the posting, demonstrate with the skills necessary to organize and take the appropriate actions to achieve a designated goal (Bandura, 1986).

Question 12 was identified as being significant to the findings: I prepare my questions before joining in the chat room and discussion. The students prior to the semester had very little if any exposure to chat rooms. I tried to get chat rooms and discussion forums to work for students with very little luck. Students recognized they should be using the forums; one stated (student E) about using forums “I am not using the forums like I should.” This is a demonstration of another SRL trait in which the student recognizes the need to change (Zimmerman, 2002).

The use of the forums did not go well, possibly in due to minimal past experience. I described forums on more than one occasion; however, when students realized they could use it to their advantage. One conversation that took place after I explained forums again went as follows (discussion in field notes, week of 3/24).

Student I: You mean I can ask other people questions.
Researcher: Yes did you see [student name] asked a question?
Student I: I could not figure out why I got his forum in my email.
Student K: They helped me clear up questions I had.

The individuals involved in the discussion above were in multiple classes (one had 2 classes concurrently, one 4 had classes concurrently). However, the individuals who participated in the forums were in classes concurrently. This was unfortunate as stated by one student (participating in one class only) in response to a question about the forums in an interview “I think if there was a room full of students like me, you would have had a lot of discussions. I think they would have been helpful to me and I could have helped others.” The preceding was
spoken by an older individual in the study that felt he has been in an apprenticeship his whole life and will always be learning (student M interview, week of 5/5). The student personifies a suggestion by Zimmerman (2002) that a component of education is life-long learning skills. After this discussion some students did use the discussion forum when they required the help of each other (see Appendix L for example).

Question 18 was also identified as being significant to the findings: I share my problems with my classmates online so we know what we are struggling with and how to solve our problems, and Question 19 was identified as being significant to the findings: if needed, I try to meet my classmates face-to-face. Both of these questions are helping seeking questions in which more social interaction was sought out by the students. With all the missed days early in the semester, I went to an open lab format so individuals would have reduced anxiety about getting lab assignments completed. This is one example of negotiating the learning with the learners, which is a component of the constructivist classroom (Driscoll, 2005; Johnson, 2001), which became a common theme in the study. This worked out well for everyone taking multiple classes because of the amount of lab assignments. They were able to come in and work on any labs they wanted, in groups or alone. One student indicated, “Groups worked for me; you could stand back and watch if you needed to or were unsure” (student A interview, week of 5/5). This is one of many examples in the study of learning vicariously (Bandura, 1977, 1986) and how novices begin at one end of spectrum and move across (Hill, 2012; Zimmerman & Campillo 2003). These questions becoming significant within the study showed that as individuals participated in more classes, they relied on each other and the social aspect or personal contact was not lost in the hybrid environment. A theme that emerged from the interviews includes the
social aspect and how it was not lost. The following question was asked of different individuals in interviews (student interviews, week of 5/5)

Researcher:  Do you think there is a social aspect or do you feel the social aspect is lost in the blended environment?

Student E:  I do not think so whether f2f or online still communicating.

Student H:  I do not think so you still had all the lab time to communicate and talk; the groups worked well for this.

As the semester progressed the feeling of security in the hybrid environment also increased; the learning community formed promoted the failsafe feeling (Hill, 2012). This was confirmed by students in interviews (student interviews, week of 5/5).

Researcher:  Did you feel you were alone in the hybrid environment?

Student A:  At first I did. I realized if I asked you a question you would respond and not push away. Even with emails it was quick responses.

Student G:  No, I felt support; you never closed the door you gave personal phone number also if needed.

Question 21 was identified as being significant: I summarize my learning in online courses to examine my understanding of what I have learned. This question was a self-evaluation question and became significant with more exposure to the environment. In essence the more they used the tools (i.e., hybrid and computers) in an authentic contextual manner, the more proficient they became with them (Brown et al., 1989; Lave & Wenger, 1991). Question 21 is an indication that the more classes they participated in, the more they became proficient in keeping track of their own learning. This enabled students to better predict how they would perform on the exams. Table 5.2 presents predictions and actual grades of students only taking one class in the hybrid.
Table 5.2

Predicted vs. Actual Grade – Students in One Class Only

<table>
<thead>
<tr>
<th>Class</th>
<th>Predicted 1</th>
<th>Actual 1</th>
<th>Predicted 2</th>
<th>Actual 2</th>
<th>Predicted 3</th>
<th>Actual 3</th>
<th>Predicted 4</th>
<th>Actual 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>student 1</td>
<td>80%</td>
<td>70%</td>
<td>70%</td>
<td>65%</td>
<td>70%</td>
<td>60%</td>
<td>70%</td>
<td>62%</td>
</tr>
<tr>
<td>student 2</td>
<td>80%</td>
<td>65%</td>
<td>70%</td>
<td>58%</td>
<td>70%</td>
<td>52%</td>
<td>80%</td>
<td>68%</td>
</tr>
</tbody>
</table>

Table 5.3 presents predictions and actual grades of students in the same classes as above also taking other classes concurrently.

Table 5.3

Predicted vs. Actual Grade – Students in Multiple Classes

<table>
<thead>
<tr>
<th>Class</th>
<th>Predicted 1</th>
<th>Actual 1</th>
<th>Predicted 2</th>
<th>Actual 2</th>
<th>Predicted 3</th>
<th>Actual 3</th>
<th>Predicted 4</th>
<th>Actual 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>student 1</td>
<td>80%</td>
<td>70%</td>
<td>70%</td>
<td>74%</td>
<td>70%</td>
<td>77%</td>
<td>70%</td>
<td>78%</td>
</tr>
<tr>
<td>student 2</td>
<td>80%</td>
<td>90%</td>
<td>70%</td>
<td>82%</td>
<td>80%</td>
<td>88%</td>
<td>80%</td>
<td>92%</td>
</tr>
</tbody>
</table>

A theme that emerged during the prediction portion of the research indicated that the students who performed at higher levels would predict a score that was lower than what they would achieve. The students who performed at lower levels on the grade curve always tended to predict a higher grade than they achieved.

Question 24 was identified as significant: I communicate with my classmates to find out what I am learning that is different from what they are learning. This question being significant is another example of the development of the learning community in the research. The learning community is a group of individuals working together to promote learning (Hill, 2012) and they can occur face-to-face or electronically (Komito, 1998). As the semester progressed more
individuals used the open lab component of the class. Individuals would set up times to meet at
school to go through labs and assignments (field notes, week of 4/7).

Research Question 2

For Research Question 2, the OSLQ scores were related to predicted test scores, actual
test scores and overall classroom grades. Research Question 2 was: To what extent are self-
regulated learning behaviors associated with student performance in hybrid trade classes? For
the purposes of my research I am going to provide analysis for the Actual 4 grade, as this is
where the most significance showed in the regression analysis provided in Chapter 4. Table 5.4
presents the questions, the subscale the question is matched with, and significance, where p <
.05. Recall, the all class data includes the individuals who are in the specific class and
individuals who took classes concurrently.

Table 5.4
Linear Regression All Classes (n=29) – Actual 4 Grade

<table>
<thead>
<tr>
<th>Category</th>
<th>Subscale</th>
<th>Question</th>
<th>Significance p &lt; .05.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Actual 4</td>
<td>goal setting</td>
<td>I set standards for my assignments in online courses</td>
<td>0.006</td>
</tr>
<tr>
<td>Actual 4</td>
<td>goal setting</td>
<td>I keep a high standard for my learning in my online courses</td>
<td>0.002</td>
</tr>
<tr>
<td>Actual 4</td>
<td>goal setting</td>
<td>I don't compromise the quality of my work because it is online.</td>
<td>0.014</td>
</tr>
<tr>
<td>Actual 4</td>
<td>environmental</td>
<td>I find a comfortable place to study</td>
<td>0.003</td>
</tr>
<tr>
<td>Actual 4</td>
<td>structuring</td>
<td>I find someone who is knowledgeable in course content so that I can consult with him or her when I need help.</td>
<td>0.032</td>
</tr>
<tr>
<td>Actual 4</td>
<td>help seeking</td>
<td>I communicate with my classmates to find out how I am doing in my online classes.</td>
<td>0.007</td>
</tr>
</tbody>
</table>
Even though only 6 of the 24 questions surfaced as significant for the Actual 4 grade, the significance supports the hybrid platform at the community college trade classes. Although this is only one of nine tests however, it was the last test of the semester and is significant to the study. The semester had started very chaotic as previously indicated and ended at a very fast pace completing the last three modules after Spring break.

The first three questions are in the goal setting category and reference the online environment and maintaining the same standards. In the beginning of the semester, as previously stated, there was some anxiety and fear of the hybrid environment and this was acknowledged in reflections and interview transcriptions. As stated by a student, “I like reading and doing the questions in the online form, but I like having reviews in class face to face. It is too early for me to tell if I like the hybrid style of learning” (student F comment, reflection-1). The same student made the following comment after the 4th module, “It went really well and I feel I know information. I actually do like the hybrid environment much better than traditional” (student F comment, reflection-4). The general opinion of the environment changed over the course of the semester; which removed the fear, as this occurred individuals felt more at ease with the online environment. These examples are a good demonstration of agency in which the individuals have the ability to change the way they learn with their actions (Bandura, 2001). Therefore, they believed they were able to approach the online environment with the same ease as the traditional face-to-face environment.

The fourth question of significance is in the environmental structuring subscale. All participants approached this comfort zone in a different way. In the beginning of the semester I posted a pdf file on self-regulated learning in the LMS for students to review; we also briefly discussed the article. The article suggested finding a suitable comfort zone to study in. A
student stated, I “Set up a study area, away from TV and other distractions...can still hear TV for noise....need ‘noise’ to study but now don’t find myself watching TV while studying” (student C C posting, daily log). Another student felt comfort in avoiding the LMS area of submitting assignments. In a discussion with the student, I asked why he did not use the LMS, his response was “I do not like it and will not be using it too many things on it” (student H comment, field notes week of 3/24). The student submitted everything via email to me. This was another example of negotiating the learning with students as is required in the constructivist approach (Johnson, 2001). This did not cause an issue with me; this student (student H) started the semester with a fear of the online environment and a fear of computers. As the semester progressed everyone found a comfort zone and operated in that zone, so once the chaos settled everyone was on track. One class met as a group on off weeks in the classroom to discuss class, this was their comfort zone (researcher observation, field notes week of 3/24).

The last two questions include one that belongs in the help seeking subscale and one that belongs in the self-evaluation subscale. These questions supplement and add value to the previously significant questions in the social component of the hybrid platform and the value of learning from others. The community component developed in the research allowed students to seek out the help of peers when they realized they were beyond their own skills. As stated by Brown (2000), the community component allows for networking beyond a single individual’s skill level. In my study the social component existed and developed over the course of the semester and individuals drew upon others’ skills. A learning community needs a diverse field of experts, which will allow the novice to become the expert (Bielaczyc & Collins, 1999). The learning community in the research had individuals with different levels of expertise, which promoted knowledge. The expertise became apparent as younger students aided the older
students with less computer skills. Members providing support at their level of expertise is a sign of a community where all members work together (Bielaczyc & Collins).

With the weather closings and limited class time up to spring break there was a sense of isolation and frustration: “Feeling overwhelmed, don’t know what to study and it all keeps falling out of my head” (student C comment, reflection-2). Once the lab component took hold in the class, the social groups started to form and help shaped learning for everyone who wanted to be involved especially the individuals with multiple classes and the heavy load to complete. These individuals accepted the social component to help in their learning, and it did depend upon who was in the group.

Researcher: How was it working with [student name] yesterday?
Student I: That was excellent he has done the work and is a thinker not some slug with no knowledge it makes me strive to do better.

For this individual he was recognizing how he best learned. The self-regulated learner will seek out the help of peers or teachers, which makes the process social and not individualized (Zimmerman & Schunk, 2011).

Certainly there was a negative comment (arose from a past experience), but also the student recognizes the reality of the educational system. When speaking about the traditional environment the following conversation took place (student interviews, week of 5/5).

Student M: I like the one on one interaction and it is more efficient communication than typing.
Researcher: If you take a class this summer you will be back in the blended environment. Do you think you will approach the class differently?
Student M: Yes, definitely, it may not be the way I want it to be, but it is up to me to adapt.
Implications and Future Studies

An informal class survey conducted the week of May 5, 2014 provided the following results. When the 15 individual participants were asked if they liked the hybrid environment, 13 said yes without a doubt; one indicated no but stated, “I did not probably give it a fair chance because of a previous experience” (student interview M, week of 5/5); and one was a flat out no, saying “I would prefer the teacher to teach me, not myself” (student L posting, reflection-4). This survey provided acceptance (87%) of the hybrid platform in these community college trade classes. The results are similar to previously discussed studies: one study conducted by Napier et al. (2011) in which the results provided positive aspects of blended learning from both the students’ views and the faculty’s view and research provided by Berger et al. (2008), which supported that an online component mixed with a face-to-face component created a positive learning experience.

The results for the study will be of value in future trade classes at the community college. The positive results have allowed me to continue teaching classes utilizing the hybrid format in the Fall 2014 semester. For the fall semester, we are offering two hybrid classes, one in HVAC and one in ENE. I have recommended to the administration that we offer at least one hybrid class in each of the different trades including electrical and welding. However, despite the positive results, the outcome of the research was not what I expected. I did not expect the older students would adapt to the classes as well as they did, and I did not anticipate the students would apply themselves more efficiently than they would in the face-to-face setting. Some valuable findings which were not a part of the research include the comprehension of materials the students gained as opposed to face-to-face. What I found is that in the face-to-face setting
students would spend less time reading the materials and relied strictly on lecture. This theme emerged in discussions, and interviews. The students realized they needed to be prepared for the lecture component and I was not going to spend time on the entire readings. One other important finding which I will use in the future is the use of the LMS in the testing procedure. After submitting the tests they would have immediate results. With the immediate results, they would check their answers in the book and if they felt they were correct, the students would provide an argument for their answer which would allow for good discussion and learning.

My study provided evidence that the implementation of the hybrid environment at the community college in which the research took place in, can be beneficial. Even the student with reservations knows he has to adapt, which is an SRL trait (Zimmerman 2002). As stated by a student, “At first I had problems with blended, because I learn more hands on than just reading a book, and some lecture. Once I got started and back in the lab, it came easier and easier.” Another student concurred, “It got easier for me. I would study on my own out of book and next week we would go over it. You would learn the same as if you were in class” (student’s G & E respectively interviews, week of 5/5). These students’ agency allowed them to act upon the environment and achieve academically, which is supported by Barnard-Brak et al. (2010).

Future research could include students entering into the program in the Fall semester where the Learning and Study Strategies Inventory LASSI test will be administered as a pretest. The students will then be tracked through their AAS or certificate and the LASSI posttest will be administered. This would be a longitudinal study involving students in the program from start to finish. Originally my research was going to utilize LASSI due to time constraints this test was not possible for my research. LASSI provides a measure of students’ perceptions of their thinking or metacognition and will provide standardize test scores for ten different scales. This
provides students with a diagnosis of their strengths and weaknesses. The instrument provides data on three components of strategic learning including skill, will, and self-regulation. The skill component of strategic learning examines the students’ perception of their learning strategies, skills and thought processes. The LASSI scales correlate these abilities with information processing, selecting main ideas, and test strategies. The will component of strategic learning measures students’ perceptions of their own receptivity of acquiring new information. The LASSI scale correlates these beliefs to attitude, motivation, and anxiety. The self-regulation component of strategic learning is a measure of how individuals manage or self-regulate their learning. The measures include, concentration, time management, self-testing, and study aids.

Conclusion

These community college students exhibited some SRL behaviors that supported their learning in the hybrid course environment. Zimmerman and Martinez-Pons (1988) suggested the following in regard to metacognitive processes, self-regulated learners have the ability to plan, organize, self-instruct and self-evaluate during the processes of acquiring knowledge. These students demonstrated motivation, metacognitive behaviors, and specific learning behaviors that are required for SRL and the hybrid environment. These behaviors were demonstrated, even if they were not entered in the monitoring portion. Asked of a student,

**Researcher:** Do you study, you do not enter anything in monitoring?
**Student M:** I studied 6 hours on Sunday. (Student comment, field notes week of 3/4, sentiments confirmed by another A student (B) who did not enter in the monitoring portion).

The understanding of content was apparent in the class and in the students. When students were asked if they got as much out of it as a face-to-face setting some of the responses
were (stated by student B), “Especially if you read and re-read, this is the first time I actually highlighted in the book.” This student is displaying a metacognitive process by recognizing he needed to adapt and highlight (Flavell, 1987). Another student (student, I) supported this by stating, “In a traditional sense we talk about what we are to focus on and learn. With online more of an entirety of understanding, I had to sweep more out of the grey corners and more areas to fully understand” (field notes, week of 4/28). Individuals in the research needed to succeed in self-assessing their skills so they could apply the necessary cognitive and metacognitive procedures to change or adapt their approach to learning (Bransford et al., 2000).

I made a general comparison of Fall 2013 grades, in which all classes were face-to-face; excluding withdrawals, the grade point average (GPA) was 3.92 (n=27) and for Spring 2014 the GPA was 4.28 (n=29). I certainly cannot say better with hybrid; however, I cannot say worse either, factoring the economic advantages the school can gain (i.e., use of the one classroom for multiple classes) or what the students can save. Stated by a student, “This style has also been a lot easier on the pocket book. Driving less and being able to work more” (student A posting, reflection-1). The blending of environments promotes a positive learning atmosphere (Garrison & Vaughn 2008). These findings illustrate a blended environment is worth pursing in the trade classes, where the research was conducted. The findings also indicate a mixing of more face-to-face (i.e., 60% face-to-face & 40% hybrid) will be beneficial and the open lab component will need to stay intact. The mixing required for success need to have a strong lab component where individuals have enough time to complete labs the open lab format and additional class time will enable the students to develop there troubleshooting skills allowing for better cognitive and metacognitive abilities.
REFERENCES


APPENDIX A

COURSE OUTLINES AS REGISTERED WITH ICCB
(ILLINOIS COMMUNITY COLLEGE BOARD)
SAUK VALLEY COMMUNITY COLLEGE
COURSE OUTLINE

Course Title
HRS 120 Basic Refrigeration

Prepared by: Christopher Carlson 3/15/2011

I. Complete Catalog Description of Course

A. Description: This course will allow the student to become proficient in the use of tools and proficient in the correct materials to use for a given task. The tools will be specific to air conditioning operations for proper operations of components and system performance.

B. Number of Hours Per Week: 2 lecture and 2 lab for 3 credit hours

C. Prerequisite: None

II. Topical Outline and Course Objectives (OBE Outcomes)

A. Unit

1. Title: General safety procedures
   Outcomes: The student will demonstrate knowledge of HVAC safety and how to use tools in a safe manner.
   Assessment: The student will explain on written tests how to properly use tools in a safe manner and display correct usage in the lab.

2. Title: Tools and equipment
   Outcomes: The student will identify current hand and power tools used in the field today.
   Assessment: The student will explain on written tests how to properly use power tools in a safe manner and display correct usage in the lab.

3. Title: Fasteners, tubing, piping
   Outcomes: The student will identify different materials used in the field today to complete a job effectively.
   Assessment: The student will classify different materials and be able to explain on written tests how they are different.
B. Unit

1. Title: Soft soldering  
   Outcomes: The student will identify how to properly soft solder fittings in piping systems.

   Assessment: The student apply the proper techniques for soft soldering in the lab along with being able to explain the different materials used on a written test.

2. Title: Hard soldering  
   Outcomes: The student will identify how to properly hard solder fittings for a piping system.

   Assessment: The student will apply the proper techniques for hard soldering in the lab along with being able to explain the different materials used on a written test.

3. Title: Pipe threading  
   Outcomes: The student will identify how to properly thread pipe for a piping system.

   Assessment: The student will apply the correct techniques for threading pipe in a safe efficient manner in the lab along with written tests to show comprehension.

C. Unit

1. Title: Refrigerant and oil management  
   Outcomes: The student will demonstrate knowledge of how to use machinery for proper recovery for new or existing systems.

   Assessment: The student will apply the proper steps needed to recover refrigerant from a system in the lab along with written tests.

2. Title: System charging and evacuation  
   Outcomes: The student will identify how to properly evacuate and charge an air conditioning system.

   Assessment: The student will demonstrate proper charging techniques in the lab along with written tests.

3. Title: Calibrating instruments and specialty tools  
   Outcomes: The student will identify specialty tools involved in HVAC needed for success.
Assessment: The student will demonstrate how to calibrate common tools in the HVAC field.

III. Textbook and Materials Required

List text book and materials: As selected by the instructor

IV. Suggested Bibliography: text, handouts, library, and internet

V. Methods of Presentation: lecture, lab, available technology

VI. Methods of Evaluation: quizzes, homework, midterm, final, lab

Grade Scale: 90% A, 80% B, 70% C, 60% D, below 60% F
SAUK VALLEY COMMUNITY COLLEGE
COURSE OUTLINE

Course Title
HRS 130 Basic Heating

Prepared by: Christopher Carlson 3/15/2011

I. Complete Catalog Description of Course

A. Description: This class covers the basic residential forced air heating system. The class will address basic concepts involved in the combustion process for safe operation of a home forced air heating system. Furnace components and parts will be studied and how to properly hook components together for safe and efficient operation. The class will explore different furnace efficiencies and how they differ.

B. Number of Hours Per Week: 2 lecture and 2 lab for 3 credit hours

C. Prerequisite: ELT 160 or consent of instructor

II. Topical Outline and Course Objectives (OBE Outcomes)

A. Unit

1. Title: Climate Control
Outcomes: The student will identify the concepts involved in maintaining comfort.

Assessment: The student will associate different components of comfort and explain them on a written test.

2. Title: Safety
Outcomes: The student will demonstrate the safety factors involved in forced air heat.

Assessment: The student will demonstrate understanding of safety factors involved with gas heating and explain on written tests.

3. Title: Combustion
Outcomes: The student will identify the combustion process required for safe operation.


Assessment: The student will discuss in the classroom and explain on written tests the concepts of combustion.

B. Unit

1. Title: Parts Common to all furnaces
   Outcomes: The student will identify furnace operations and components that are common to all furnaces.
   
   Assessment: The student will locate parts of furnaces in the lab and explain the parts and how they interact on written tests.

2. Title: Basic electricity and electrical symbols for furnaces
   Outcomes: The student will identify the electrical symbols used with furnaces.
   
   Assessment: The student will demonstrate understanding of concepts on written tests and identification in the lab.

3. Title: Schematic wiring diagrams
   Outcomes: The student will demonstrate knowledge of schematic and pictorial wiring diagrams for proper furnace operation.
   
   Assessment: The student will apply learned knowledge to reading diagrams on equipment in the lab.

C. Unit

1. Title: System evaluation
   Outcomes: The student will demonstrate how to properly evaluate a system for safe operation.
   
   Assessment: The student will determine the factors required and present them in written form on exams.

2. Title: System maintenance
   Outcomes: The student will identify how to properly maintain and check a system for safe operation.
   
   Assessment: The student will demonstrate understanding for proper maintenance techniques on the lab equipment.

3. Title: Indoor air quality
   Outcomes: The student will demonstrate knowledge of indoor air quality to maintain comfort in a home.
Assessment: The student will define IAQ the different components involved on a written exam.

III. Textbook and Materials Required

List text book and materials: As selected by the instructor

IV. Suggested Bibliography: text, handouts, and internet

V. Methods of Presentation: lecture, lab, available technology

VI. Methods of Evaluation: periodic quizzes, midterm, final, homework, labs

Grade Scale: 90% A, 80% B, 70% C, 60% D, Below 60% F
SAUK VALLEY COMMUNITY COLLEGE
COURSE OUTLINE

Course Title
HRS 160 Heat Pumps

Prepared by: Christopher Carlson 3/15/2011

I. Complete Catalog Description of Course

A. Description: This course will cover heat pumps and how they operate along with supplemental heat. The refrigeration cycle will be reviewed than the heat pump cycle will be presented. The heat pump cycle will be covered and how it benefits a mechanical system from an energy standpoint. Supplemental heat is a design aspect of this system and electric heat will be addressed in the class.

B. Number of Hours per Week: 2 lecture and 2 lab for 3 credit hours

C. Prerequisite: ELT 160, HRS 105, HRS 120, HRS 130 or consent of instructor

II. Topical Outline and Course Objectives (OBE Outcomes)

A. Unit

1. Title: Vapor compression review
   Outcomes: The student will demonstrate knowledge of the basic vapor compression cycle and identify all the mechanical components.
   Assessment: The student will demonstrate understanding by identification in the lab and on written tests.

2. Title: Vapor compression controls
   Outcomes: The student will identify the electrical control circuits of the vapor compression cycle and the sequence of operation.
   Assessment: The student will identify the controls in the lab in and their applications on written exams.

3. Title: Heat pump cycle
   Outcomes: The student will identify the basic vapor compression heat pump and the mechanical components.
   Assessment: The student will identify the heat pump components in the lab and identify their applications on written exams.
B. Unit

1. Title Refrigerant side troubleshooting
   Outcomes: The student will identify how to properly troubleshoot the refrigerant side of the vapor compression heat pump.

   Assessment: The student will apply learned knowledge to the equipment in the lab for proper troubleshooting.

2. Title: Load calculation
   Outcomes: The student will identify how to properly size equipment for the heating and cooling, using a heat pump for primary comfort along with possible cost savings compared to other systems.

   Assessment: The student will apply concepts and submit a written comparison of different systems including advantages and disadvantages.

3. Title: Supplemental heat
   Outcomes: The student will identify the need for supplemental heat and the role it plays in a heat pump system.

   Assessment: The student will demonstrate understanding through written tests and physical identification in the lab.

C. Unit

1. Title: Wiring diagrams
   Outcomes: The student will identify the electrical sequence and modes of operation involved in a vapor compression heat pump.

   Assessment: The student will assess the different sequences of operation on written tests.

2. Title: Servicing
   Outcomes: The student will break down the maintenance and service procedure needed to have proper operation of a vapor compression heat pump.

   Assessment: The student will demonstrate understanding through written tests and verbal communication in the lab.

3. Title: Troubleshooting
   Outcomes: The student will demonstrate troubleshooting the basic vapor compression heat pump control circuits and components.
Assessment: The student will demonstrate understanding through written tests and demonstration on the lab equipment.

III. Textbook and Materials Required

List text book and materials: As selected by the instructor

IV. Suggested Bibliography: text, handouts, and internet

V. Methods of Presentation: lecture, lab, available technology

VI. Methods of Evaluation: quizzes, homework, midterm, final, labs

Grade Scale: 90% A, 80% B, 70% C, below 60% F
SAUK VALLEY COMMUNITY COLLEGE  
COURSE OUTLINE  

HRS 170-Hydraulics  

Prepared by: Christopher Carlson 4/21/2011  

I. Complete Catalog Description of Course  

A. Description: This course will cover Hydronic heat and how it operates in residential, commercial and industrial settings. The necessary control for a safe and efficient system will be covered and how to properly hook up and troubleshoot. Piping design and installation will be covered along with the advantages and disadvantages of different systems.  

B. Number of Hours per Week: 2 lecture and 2 lab for 3 credit hours  

C. Prerequisite: ELT 160, HRS 105, HRS 130, (HRS 130 may be taken as a co-requisite), or consent of instructor  

II. Topical Outline and Course Objectives (OBE Outcomes)  

A. Unit  

1. Title: Fundamental Concepts  
   Outcomes: The student will identify the fundamental concepts and subsystems of Hydronic system.  
   Assessment: The student will demonstrate understanding of the basic Hydronic heat system on written tests and in the lab.  

2. Title: Heat load estimates  
   Outcomes: The student will demonstrate how to calculate a simple heat loss and apply the answers to sizing a Hydronic system.  
   Assessment: The student will perform heat loss calculations for a given structure and submit for grade.  

3. Title: Hydronic heat sources  
   Outcomes: The student will identify the various ways industry uses to heat water for heating of a space.  
   Assessment: The student will identify different modes of heating a medium and explain on written tests.
B. Unit

1. Title: Piping, fittings, valves  
   Outcomes: The student will identify the different fittings needed in a Hydronic system and the importance of being installed correctly.

   Assessment: The student will assemble a basic piping structure using materials in the lab.

2. Title: Fluid flow and circulating pumps.  
   Outcomes: The student will demonstrate knowledge of the importance of a linear fluid flow and how circulating pumps and pump curves factor into the system.

   Assessment: The student will demonstrate understanding through written tests and verbal communication.

3. Title: Heat emitters  
   Outcomes: The student will identify different heat emitters how they differ in efficiency and installation practices.

   Assessment: The student will identify in the lab different heat emitters and explain how they differ on written tests.

C. Unit

1. Title: Control strategies for heat emitters  
   Outcomes: The student will identify closed loop control strategies the hardware involved and design concepts.

   Assessment: The student will assess a closed loop arrangement in the lab and recommend how it should be changed if at all.

2. Title: Hydronic panel heating  
   Outcomes: The student will demonstrate knowledge of radiant heating and the advantages it provides. Design and control strategies will be covered.

   Assessment: The student will design a radiant heating system and submit a written report.

3. Title: Distribution piping systems  
   Outcomes: The student will learn about zoning and different piping designs and how they differ.
Assessment: The student will identify different piping arrangements on written tests.

III. Textbook and Materials Required

List text book and materials: As selected by instructor

IV. Suggested Bibliography: Text, handouts, internet

V. Methods of Presentation: lecture, lab, available technology

VI. Methods of Evaluation: quizzes, homework, midterm, final, labs

Grade Scale: 90% A, 80% B, 70% C, 60% D, below 60% F
I. Complete Catalog Description of Course

A. Description: The course will cover the basic theory of heat transfer and the principles of solar energy devices available and how they evolved. The course will touch upon residential, commercial and industrial applications.

B. Number of Hours per Week: Three lecture hours for three credits.

C. Prerequisite: ELT 160 or consent of instructor

II. Topical Outline and Course Objectives (OBE Outcomes)

A. Unit Thermodynamics

1. Title: Heat transfer  
   Outcomes: Student will identify thermodynamic laws and principles for heat transfer.
   
   Assessment: Student will demonstrate acquired knowledge on written tests and verbally.

2. Title: Thermodynamic principles  
   Outcomes: Student will apply basic thermodynamics concepts learned to heat transfer coefficients relating to the solar energy field.
   
   Assessment: Student will demonstrate acquired knowledge on written tests and verbally.

3. Title: Thermal Storage  
   Outcomes: Student will demonstrate knowledge of thermal storage for use in a HVAC system.
   
   Assessment: Student will demonstrate acquired knowledge on written tests and verbally.

B. Unit Solar Energy
1. **Title: Different applications**  
   **Outcomes:** The student will list the uses of solar energy in residential, commercial and industrial applications.

   **Assessment:** Student will demonstrate acquired knowledge on written tests and verbally.

2. **Title: Passive vs. Active**  
   **Outcomes:** The student will compare and contrast the differences and similarities between active and passive solar systems.

   **Assessment:** Student will demonstrate acquired knowledge on written tests and verbally.

3. **Title: Collectors**  
   **Outcomes:** The student will identify different collectors for capturing solar energy and their applications.

   **Assessment:** The student will demonstrate acquired knowledge on written tests and verbally.

C. **Unit Practical Uses**

1. **Title: Design**  
   **Outcomes:** The student will break down the process of design and sizing for a particular application.

   **Assessment:** The student will demonstrate acquired knowledge on written tests and verbally.

2. **Title: Lab practical**  
   **Outcomes:** The student will demonstrate sizing and design in a simulated type of installation.

   **Assessment:** The student will demonstrate acquired knowledge on lab equipment available.

3. **Title: Controls**  
   **Outcomes:** The student will differentiate the controls used for a particular installation and how they differ from one system to another.

   **Assessment:** The student will demonstrate acquired knowledge on written tests and verbally.

III. **Textbook and Materials Required**
List text book and materials: As selected by instructor

IV. Suggested Bibliography: Text and various publications from green energy type literature

V. Methods of Presentation: Use available classroom technology

VI. Methods of Evaluation: midterm, final, class participation, individual presentation on Related subject matter all weighted equally

Grade Scale: 90% A, 80%B, 70%C, 60%D. Less than 60% F
SAUK VALLEY COMMUNITY COLLEGE
COURSE OUTLINE

Course Title
EN 145 Geothermal Energy

Prepared by: Christopher Carlson 6/5/2010

I. Complete Catalog Description of Course
   A. Description: This course covers the theory of geothermal heating and cooling, design and installation. Heat transfer will be studied and the different modes involved in a geothermal system. Different designs and control strategies will be explored along with the advantages and disadvantages of each. Residential, commercial and industrial systems will be covered.
   B. Number of Hours Per Week: 3 lecture for 3 credit hours
   C. Prerequisite: ELT 160 or consent of instructor. HRS 160 will be helpful but not required.

II. Topical Outline and Course Objectives (OBE Outcomes)
   A. Unit
      1. Title: Heat transfer
         Outcomes: The student will identify heat transfer methods and how a heat exchanger works.
         Assessment: The student will demonstrate understanding through written tests and verbal communication.
      2. Title: Geothermal systems
         Outcomes: The student will identify the basic equipment in a geothermal system and how it is connected.
         Assessment: The student will apply learned knowledge and construct a geothermal system using lab equipment available.
      3. Title: Vertical loop
         Outcomes: The student will compare and contrast the steps involved in installing a vertical loop geothermal system with other installation possibilities.
Assessment: The student will demonstrate understanding of the concepts involved for a vertical loop on written tests.

B. Unit

1. Title: Horizontal loop
   Outcomes: The student will compare and contrast the steps involved in installing a horizontal loop geothermal system with other installation possibilities.

   Assessment: The student will demonstrate understanding of the concepts involved for a horizontal loop on written tests.

2. Title: Open loop
   Outcomes: The student will compare and contrast the steps involved in installing an open loop geothermal system with other installation possibilities.

   Assessment: The student will demonstrate understanding of the concepts involved for an open loop on written tests.

3. Title: Pond loop
   Outcomes: The student will compare and contrast the steps involved in installing a pond loop geothermal system with other installation possibilities.

   Assessment: The student will demonstrate understanding of the concepts involved for a pond loop on written tests.

C. Unit

1. Title: Troubleshooting geothermal heat pumps
   Outcomes: The student will identify how to properly troubleshoot the air side and water side of a geothermal heat pump for proper operation.

   Assessment: The student will assess different service problems on the lab equipment and decide what would be the best option for repair.

2. Title: Servicing geothermal heat pumps
   Outcomes: The student will demonstrate the proper service procedure for a geothermal heat pump to be able to maintain the most efficient operation.

   Assessment: The student will demonstrate proper maintenance procedures in the lab to obtain efficient and safe operation.
3. Title: System design
Outcomes: The student will identify how to properly design and price a geothermal system for a customer’s home or business.

Assessment: The student will demonstrate understanding through a verbal presentation in the classroom.

III. Textbook and Materials Required

List text book and materials: TBD possibilities include sections from purchased Books including Heat Pumps & Modern Hydronic

IV. Suggested Bibliography: text, handouts, internet, and library

V. Methods of Presentation: lecture, available technology

VI. Methods of Evaluation: quizzes, homework, midterm, final, labs
Grade Scale: 90% A, 80% B, 70% C, 60% D, below 60%
Hi Alan,

We talked about a couple classes for data collection next spring the following is a paragraph from methodology section

The data collection will begin in January 2014 at the beginning of the Spring 2014 semester and continue up to the end of the semester in May 2014. In the Spring 2014 semester the following classes will be offered in HVAC: HRS 120, 130, 160, 170, and 222. In Renewable Energy: ENE 102, 130, 140 and 145. The classes that will be taught as hybrid include HRS 160, and 170, and ENE 140 and 145 (see Appendix B for course outlines including HRS160, 170 & ENE 140, 145). The classes have not been instructed as hybrid before and I have been given permission to run as hybrid by the administration (see Appendix C). The remaining classes HRS 120, 130, 222, and ENE 102 and 130 will be taught as they always have in a face-to-face traditional setting. Since this is an exploratory study to see if students will accept the method of delivery the course content is not relevant, the ability of the students to actively participate cognitively and socially is relevant.

Would you be willing to go with the 4 classes as spelled out above the schedule is more than 50% face to face. It adds validity. I will need something from you in response for IRB we talked verbally some however advisor requiring an email for proposal. I am going to submit pretty quickly if you could let me know. I ail supply complete propose when complete thanks
<table>
<thead>
<tr>
<th>Alan Pfeifer</th>
<th>8:43 AM (5 hours ago)</th>
</tr>
</thead>
<tbody>
<tr>
<td>to me</td>
<td></td>
</tr>
</tbody>
</table>

Chris,
It is acceptable to run the HRS 160 and 170 as well as the ENE 140 and 145 as hybrid classes for Spring. A hybrid class as defined at Sauk is a class that meets at least 50% in a face-to-face setting with all lab hours being face-to-face. Please make sure your faculty leader schedules these classes as such and denotes when the classes will meet face-to-face so that students can schedule their time and other classes accordingly.

Thank you,

Alan

Christopher Carlson <c.a.carlson@svcc.edu>  Dec 10 (1 day ago)

Alan,

This is a copy of the email you originally approved for hybrid classes. Per our conversation this morning I am going to add HRS 120 and HRS 130 to data collection. Same terms apply to the definition of a Hybrid environment as you previously defined. Since it is not written as Hybrid in fast if any students opt out of the hybrid environment when the class begins I will make myself available to come in weekly for them. Please respond to this email and I will include it in the IRB.

Thank you, Chris

Alan Pfeifer 7:30 AM (1 hour ago)

Chris,

Yes, please just get statements of consent from the students participating in the Hybrid project.

Thank you,

Alan

Christopher Carlson <c.a.carlson@svcc.edu>  8:00 AM (34 minutes ago)

to Alan

Thank you for everything when IRB approved I will forward to you and Steve N. Chris
APPENDIX C

COURSE SYLLABI
SAUK VALLEY COMMUNITY COLLEGE
Department HVAC
Spring 2014

Course: HRS 120, Basic Refrigeration

CRN#: 60680

Credit Hours: 3

Location and time: 1C05, 1B01, Mon 6:00-9:30

Instructor: Chris Carlson

E-mail: carlsonc@svcc.edu

Office Phone: 815-288-5511 ext221

Office Hours: As posted


Safety glasses in lab area

Assessment: Sauk Valley community college is an institution dedicated to continuous instructional improvement. As part of our assessment efforts, it is necessary for us to collect and analyze course level data. Data drawn from students work for the purposes of institutional assessment will be posted in aggregate, and will not identify individual students. Your continued support in our on-going effort to provide quality instructional services at SVCC is appreciated.

Course Description: This course will reinforce the refrigeration concepts acquired in HRS 105. Along with this the student will learn and demonstrate proper usage of common tools used in the trade.

Course Objectives: Upon completion of this course the student will have an understanding of the refrigeration cycle and demonstrate the proper skills needed to perform service and installation of an AC system.

Attendance: Attendance is required and not optional. If you have to miss class you will need to inform me by e-mail or phone. It will be your responsibility to get any information missed. One excused absence will be allowed anything more than this can affect your grade. If you miss two sessions you will receive a grade of F this includes on-line component
**Plagiarism:** All work you submit must be your own work. If you use a quote in a paper please use proper citation. A grade of “F” will be given if it is found you plagiarize.

**Cheating:** Cheating will not be tolerated and will result in an “F” for a final grade.

**Withdrawals:** Follow school guidelines for dropping or withdrawing from a course.

**Class Participation:** Class participation will help your grade if you end up in-between grades. Ask questions and treat others with respect, everyone in the room has something to learn.

**Grading:** 100%-90% A, 90%-80% B, 80%-70% C, 70%-60% D, below 60% F. Grade will be comprised of tests, homework and labs. Late homework or missed labs cannot be made up without prior approval.

**Disabilities:** If you have a disability or suspect that you have one and want to request a classroom accommodation, it is your responsibility to inform your instructor. Reasonable accommodations will be made after verification from the Students Needs Coordinators Office located in Room 1G24, or by calling extension 246.

**Privacy:** The college policy on student records complies with the “Family Educational Rights and Privacy Act.” This act is designed to protect the privacy of educational records, to establish the rights of students to inspect and review their education records, and to provide guidelines for correction of incorrect or misleading data through formal hearings. A copy of the Act or questions concerning the Family Educational Rights and Privacy Act may be referred to the Dean of Student Services, Ext. 271.

**Notification of recording:** All classes at Sauk Valley Community College may be recorded for a variety of reasons to include compliance with the American with Disabilities Act in providing reasonable accommodations to person with disabilities. By enrolling in this course, students’ hereby consent to recording of classes.

**Course Outline**
Mon. 1/13- Introduction, Consent Form Demographics, Groupings, Computer Aptitude, Start Module 1 (f2f)

Mon. 1/20- No class school closed

Mon. 1/27- Module 1 (online)

Mon. 2/3- Module 1, Lab 1 (f2f)

Mon. 2/10- Module 1 (online)

Mon. 2/17- Module 1 Test, Module 2, Lab 2 (f2f)
Mon. 2/24- Module 2 (online)
Mon. 3/3- Module 2 Discussion Q&A, Lab 3 (f2f)
Mon. 3/10- Spring Break
Mon. 3/17- Module 2 (online)
Mon. 3/24- Module 2 Test, Module 3 Q&A, Lab 4 (f2f)
Mon. 3/31- Module 3 (online)
Mon. 4/7- Module 3 Discussion Q&A, Lab 5 (f2f)
Mon. 4/14- Module 3 (online)
Mon. 4/21- Test Module 3, Module 4 Q&A, Lab 6 (f2f)
Mon. 4/28- Module 4 (online)
Mon. 5/5- Test Module 4 (f2f), Interviews

Monday 5/12 thru Friday 5/16 Final Exam Week No Final Possible Interview

Subject to change but will follow this general direction, all submissions of work, tests, etc. will be on Moodle
Course: HRS 130, Basic Heating

CRN#: 60681

Credit Hours: 3

Location and time: 1C05&1B01 T 6:00-9:30

Instructor: Chris Carlson

E-mail: carlsonc@svcc.edu

Office Phone: 815-288-5511 ext221

Office Hours: As posted

Text: Warm Air Heating for Climate Control 5th edition, Cooper ISBN# 0-13-048390-7

Safety glasses in lab area

Assessment: Sauk Valley community college is an institution dedicated to continuous instructional improvement. As part of our assessment efforts, it is necessary for us to collect and analyze course level data. Data drawn from students work for the purposes of institutional assessment will be posted in aggregate, and will not identify individual students. Your continued support in our on-going effort to provide quality instructional services at SVCC is appreciated.

Course Description: This course will cover the basics of forced air heating and the combustion process for the fuel being used.

Course Objectives: Upon completion of the course the student will have a complete understanding of the combustion process and how it works. The student will gain an understanding of how the basic furnace and all the components work. The student will demonstrate safe practices while troubleshooting.

Attendance: Attendance is required and not optional. If you have to miss class you will need to inform me by e-mail or phone. It will be your responsibility to get any information missed. One excused absence will be allowed anything more than this can affect your grade. . If you miss two sessions you will receive a grade of F this includes on-line component
Plagiarism: All work you submit must be your own work. If you use a quote in a paper please use proper citation. A grade of “F” will be given if it is found you plagiarize.

Cheating: Cheating will not be tolerated and will result in an “F” for a final grade.

Withdrawals: Follow school guidelines for dropping or withdrawing from a course.

Class Participation: Class participation will help your grade if you end up in-between grades. Ask questions and treat others with respect, everyone in the room has something to learn.

Grading: 100%-90% A, 90%-80% B, 80%-70% C, 70%-60% D, below 60% F. Grade will be comprised of tests, homework and labs. Late homework or missed labs cannot be made up without prior approval.

Disabilities: If you have a disability or suspect that you have one and want to request a classroom accommodation, it is your responsibility to inform your instructor. Reasonable accommodations will be made after verification from the Students Needs Coordinators Office located in Room 1G24, or by calling extension 246.

Privacy: The college policy on student records complies with the “Family Educational Rights and Privacy Act.” This act is designed to protect the privacy of educational records, to establish the rights of students to inspect and review their education records, and to provide guidelines for correction of incorrect or misleading data through formal hearings. A copy of the Act or questions concerning the Family Educational Rights and Privacy Act may be referred to the Dean of Student Services, Ext. 271.

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Course Outline
Tue. 1/14- Introduction, Consent Form Demographics, Groupings, Computer Aptitude, Start Module 1 (f2f)

Tue. 1/21- Module 1 Q&A, Lab 1 (f2f)

Tue. 1/28- Module 1 (online)

Tue. 2/4- Module 1, Lab 2 (f2f)

Tue. 2/11- Module 1 (online)

Tue. 2/18- Module 1 Test, Module 2, Lab 3 (f2f)
Tue. 2/25- Module 2 (online)

Tue. 3/4- Module 2 Discussion Q&A, Lab 4 (f2f)

Tue. 3/11- Spring Break

Tue. 3/18- Module 2 (online)

Tue. 3/25- Module 2 Test, Module 3 Q&A, Lab 5 (f2f)

Tue. 4/1- Module 3 (online)

Tue. 4/8- Module 3 Discussion Q&A, Lab 6 (f2f)

Tue. 4/15- Module 3 (online)

Tue. 4/22- Test Module 3, Module 4 Q&A, Lab 7 (f2f)

Tue. 4/29- Module 4 (online)

Tue. 5/6- Test Module 4 (f2f), Interviews

Monday 5/12 thru Friday 5/16 Final Exam Week No Final Possible Interview

Subject to change but will follow this general direction, all submissions of work, tests, etc. will be on Moodle
Sauk Valley Community College
Department HVAC
Spring 2014

Course: HRS 160, Heat Pumps
CRN#: 60609
Credit Hours: 3
Location and time: 1C05 & 1B01, MW 1:30-3:15
Instructor: Chris Carlson
E-mail: carlsonc@svcc.edu
Office Phone: 815-288-5511 ext221
Office Hours: As posted


Assessment: Sauk Valley community college is an institution dedicated to continuous instructional improvement. As part of our assessment efforts, it is necessary for us to collect and analyze course level data. Data drawn from students work for the purposes of institutional assessment will be posted in aggregate, and will not identify individual students. Your continued support in our on-going effort to provide quality instructional services at SVCC is appreciated.

Course Description: This course will cover heat pumps and how they operate along with supplemental heat. The refrigeration cycle will be reviewed than the heat pump cycle will be presented. The heat pump cycle will be covered and how it benefits a mechanical system from an energy standpoint. Supplemental heat is a design aspect of this system and electric heat will be addressed in the class.

Course Objectives: Upon completion of this course the student will have a complete understanding of the refrigeration cycle and the components. The student will be able to compare and contrast the operation of a heat pump and normal air-conditioning system. Along with the different cycles the student will demonstrate proper tool usage and safety practices in a shop environment.
**Attendance:** Attendance is required and not optional. If you have to miss class you will need to inform me by e-mail or phone. It will be your responsibility to get any information missed. If you miss four sessions you will receive a grade of F this includes on-line component

**Plagiarism:** All work you submit must be your own work. If you use a quote in a paper please use proper citation. A grade of “F” will be given if it is found you plagiarize.

**Cheating:** Cheating will not be tolerated and will result in an “F” for a final grade.

**Withdrawals:** Follow school guidelines for dropping or withdrawing from a course.

**Class Participation:** Class participation will help your grade if you end up in-between grades. Ask questions and treat others with respect, everyone in the room has something to learn.

**Grading:** 100%-90% A, 90%-80% B, 80%-70% C, 70%-60% D, below 60% F. Grade will be comprised of tests, homework and labs. Late homework or missed labs cannot be made up without prior approval

**Disabilities:** If you have a disability or suspect that you have one and want to request a classroom accommodation, it is your responsibility to inform your instructor. Reasonable accommodations will be made after verification from the Students Needs Coordinators Office located in Room 1G24, or by calling extension 246.

**Privacy:** The college policy on student records complies with the “Family Educational Rights and Privacy Act.” This act is designed to protect the privacy of educational records, to establish the rights of students to inspect and review their education records, and to provide guidelines for correction of incorrect or misleading data through formal hearings. A copy of the Act or questions concerning the Family Educational Rights and Privacy Act may be referred to the Dean of Student Services, Ext. 271.

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**Course Outline**

Mon. 1/13- Introduction, Consent Form (f2f)

Wed. 1/15- Demographics, Groupings, Computer Aptitude (f2f)

Mon. 1/20- No class school closed

Wed.1/23- Computer Aptitude, Start Module 1 (f2f)

Mon. 1/27- Module 1 (online)
Wed. 1/29 - Module 1 (online)
Mon. 2/3 - Module 1 Discussion Q&A, Start Lab 1 (f2f)
Wed. 2/5 - Lab Exercise 1 (f2f)
Mon. 2/10 - Module 1 (online)
Wed. 2/12 - Module 1 (online)
Mon. 2/17 - Module 1 Test (f2f)
Wed. 2/19 - Module 2 discussion
Mon. 2/24 - Module 2 (online)
Wed. 2/26 - Module 2 (online)
Mon. 3/3 - Module 2 Discussion Q&A, Start Lab 2 (f2f)
Wed. 3/5 - Lab Exercise 2 (f2f)
Mon. 3/10 - Spring Break
Wed. 3/12 - Spring Break
Mon. 3/17 - Module 2 (online)
Wed. 3/19 - Module 2 (online)
Mon. 3/24 - Module 2 Test (f2f)
Wed. 3/26 - Module 3 Discussion (f2f)
Mon. 3/31 - Module 3 (online)
Wed. 4/2 - Module 3 (online)
Mon. 4/7 - Module 3 Discussion Q&A, Start Lab 3 (f2f)
Wed. 4/9 - Lab Exercise 3 (f2f)
Mon. 4/14 - Module 3 (online)
Wed. 4/16 - Module 3 (online)
Mon. 4/21 - Test Module 3 (f2f)
Wed. 4/23- Module 4 Discussion (f2f)
Mon. 4/28- Module 4 (online)
Wed. 4/30- Module 4 (online)
Mon. 5/5- Test Module 4 (f2f)
Wed. 5/7- Interviews

Monday 5/12 thru Friday 5/16 Final Exam Week No Final Possible Interview

Subject to change but will follow this general direction, all submissions of work, tests, etc. will be on Moodle
Course: HRS 170, Hydronics
CRN# 60610
Credit Hours: 3
Location and time: 2M03 & 1B01, MW 10:00-11:45
Instructor: Chris Carlson
E-mail: carlsonc@svcc.edu
Office Phone: 815-288-5511 ext221
Office Hours: As posted

Safety glasses in lab area

Assessment: Sauk Valley community college is an institution dedicated to continuous
instructional improvement. As part of our assessment efforts, it is necessary for us to collect and
analyze course level data. Data drawn from students work for the purposes of institutional
assessment will be posted in aggregate, and will not identify individual students. Your continued
support in our on-going effort to provide quality instructional services at SVCC is appreciated.

Course Description: This course will cover Hydronic heat and how it operates in residential,
commercial and industrial settings. The necessary control for a safe and efficient system will be
covered and how to properly hook up and troubleshoot. Piping design and installation will be
covered along with the advantages and disadvantages of different systems.

Course Objectives: Upon completion of this course the student will have an understanding of
how a hydronic system is constructed and controlled. The student will demonstrate in the lab
proper techniques for service and installation.

Attendance: Attendance is required and not optional. If you have to miss class you will need to
inform me by e-mail or phone. It will be your responsibility to get any information missed. One
excused absence will be allowed anything more than this can affect your grade. If you miss
four sessions you will receive a grade of F this includes on-line component

**Plagiarism:** All work you submit must be your own work. If you use a quote in a paper please
use proper citation. A grade of “F” will be given if it is found you plagiarize.

**Cheating:** Cheating will not be tolerated and will result in an “F” for a final grade.

**Withdrawals:** Follow school guidelines for dropping or withdrawing from a course.

**Class Participation:** Class participation will help your grade if you end up in-between grades.
Ask questions and treat others with respect, everyone in the room has something to learn.

**Grading:** 100%-90% A, 90%-80% B, 80%-70% C, 70%-60% D, below 60% F. Grade will be
comprised of tests, homework and labs. Late homework or missed labs cannot be made up
without prior approval

**Disabilities:** If you have a disability or suspect that you have one and want to request a
classroom accommodation, it is your responsibility to inform your instructor. Reasonable
accommodations will be made after verification from the Students Needs Coordinators Office
located in Room 1G24, or by calling extension 246.

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reasonable accommodations to person with disabilities. By enrolling in this course, students’
hereby consent to recording of classes.

**Course Outline**

Mon. 1/13- Introduction, Consent Form (f2f)

Wed. 1/15- Demographics, Groupings, Computer Aptitude (f2f)

Mon. 1/20- No class school closed

Wed. 1/23- Computer Aptitude, Start Module 1 (f2f)

Mon. 1/27- Module 1 (online)
Wed. 1/29- Module 1 (online)
Mon. 2/3- Module 1 Discussion Q&A, Start Lab 1 (f2f)
Wed. 2/5- Lab Exercise 1 (f2f)
Mon. 2/10- Module 1 (online)
Wed. 2/12- Module 1 (online)
Mon. 2/17- Module 1 Test (f2f)
Wed. 2/19- Module 2 discussion
Mon. 2/24- Module 2 (online)
Wed. 2/26- Module 2 (online)
Mon. 3/3- Module 2 Discussion Q&A, Start Lab 2 (f2f)
Wed. 3/5- Lab Exercise 2 (f2f)
Mon. 3/10- Spring Break
Wed. 3/12- Spring Break
Mon. 3/17- Module 2 (online)
Wed. 3/19- Module 2 (online)
Mon. 3/24- Module 2 Test (f2f)
Wed. 3/26- Module 3 Discussion (f2f)
Mon. 3/31- Module 3 (online)
Wed. 4/2- Module 3 (online)
Mon. 4/7- Module 3 Discussion Q&A, Start Lab 3 (f2f)
Wed. 4/9- Lab Exercise 3 (f2f)
Mon. 4/14- Module 3 (online)
Wed. 4/16- Module 3 (online)
Mon. 4/21- Test Module 3 (f2f)
Wed. 4/23 - Module 4 Discussion (f2f)

Mon. 4/28 - Module 4 (online)

Wed. 4/30 - Module 4 (online)

Mon. 5/5 - Test Module 4 (f2f)

Wed. 5/7 - Interviews

Monday 5/12 thru Friday 5/16 Final Exam Week No Final Possible Interview

Subject to change but will follow this general direction a lab component will be added as we go through the semester
Sauk Valley Community College

Department ENE

Spring 2014

Course: ENE 140, Solar Thermal

CRN#: 60677

Credit Hours: 3

Location and time: 1C05 & 1A1A, TTH 3:30-4:45

Instructor: Chris Carlson

E-mail: carlsonc@svcc.edu

Office Phone: 815-288-5511 ext221

Office Hours: As posted


Safety glasses required in lab area

Assessment: Sauk Valley community college is an institution dedicated to continuous instructional improvement. As part of our assessment efforts, it is necessary for us to collect and analyze course level data. Data drawn from students work for the purposes of institutional assessment will be posted in aggregate, and will not identify individual students. Your continued support in our on-going effort to provide quality instructional services at SVCC is appreciated.

Course Description: This course provides an introduction to the identification and analysis of the components and systems of a solar thermal system. Students will be introduced to controls and other mechanical components that make up a solar thermal system.

Course Objectives: Upon completion of this course the student will have a basic understanding of the mechanical and electrical operations of a solar thermal system.

Attendance: Attendance is required and not optional. If you have to miss class you will need to inform me by e-mail or phone. It will be your responsibility to get any information missed. One excused absence will be allowed anything more than this can affect your grade. If you miss four sessions you will receive a grade of F this includes on-line component
**Plagiarism:** All work you submit must be your own work. If you use a quote in a paper please use proper citation. A grade of “F” will be given if it is found you plagiarize.

**Cheating:** Cheating will not be tolerated and will result in an “F” for a final grade.

**Withdrawals:** Follow school guidelines for dropping or withdrawing from a course.

**Class Participation:** Class participation will help your grade if you end up in-between grades. Ask questions and treat others with respect, everyone in the room has something to learn.

**Grading:** 100%-90% A, 90%-80% B, 80%-70% C, 70%-60% D, below 60% F. Grade will be comprised of tests, homework and labs. Late homework or missed labs cannot be made up without prior approval. Grades will be posted on Moodle

**Disabilities:** If you have a disability or suspect that you have one and want to request a classroom accommodation, it is your responsibility to contact the Student Needs Office. Reasonable accommodations will be made after verification from the Student Needs Coordinator's Office located in Room 1G04, or by calling extension 246.

**Privacy:** The college policy on student records complies with the “Family Educational Rights and Privacy Act.” This act is designed to protect the privacy of educational records, to establish the rights of students to inspect and review their education records, and to provide guidelines for correction of incorrect or misleading data through formal hearings. A copy of the Act or questions concerning the Family Educational Rights and Privacy Act may be referred to the Dean of Student Services, Ext. 271.

**Notification of recording:** All classes at Sauk Valley Community College may be recorded for a variety of reasons to include compliance with the American with Disabilities Act in providing reasonable accommodations to person with disabilities. By enrolling in this course, students’ hereby consent to recording of classes.

**Course Outline**

Tue. 1/14- Introduction, Consent Form (f2f)

Thur. 1/16- Demographics, Groupings, Computer Aptitude (f2f)

Tue. 1/21- Computer Aptitude, Start Module 1 (f2f)

Thur. 1/23- Module 1 (f2f)

Tue. 1/28- Module 1 (online)

Thur. 1/30- Module 1 (online)

Tue. 2/4- Test Module 1 (f2f)
Thur. 2/6- Lab, Module 2 (f2f)
Tue. 2/11- Module 2 (online)
Thur. 2/13- Module 2 (online)
Tue. 2/18- Module 2 discussion (f2f)
Thur. 2/20- Lab
Tue. 2/25- Module 2 (online)
Thur. 2/27- Module 2 (online)
Tue. 3/4- Test Module 2 (f2f)
Thur. 3/6- Lab (f2f)
Tue. 3/11- Spring Break
Thur. 3/13- Spring Break
Tue. 3/18- Module 3 (online)
Thur. 3/20- Module 3 (online)
Tue. 3/25- Module 3 (f2f)
Thur. 3/27- Lab
Tue. 4/1- No class school closed
Thur. 4/3- Module 3 (online)
Tue. 4/8- Test Module 3 (f2f)
Thur. 4/10- Lab (f2f)
Tue. 4/15- Module 4 (online)
Thur. 4/17- Module 4 (online)
Tue. 4/22- Module 4 discussion (f2f)
Thur. 4/24- Lab
Tue. 4/29- Module 4 (online)
Thur. 5/1- Module 4 (online)

Tue. 5/6- Test Module 4 (f2f)

Thur. 5/8- Interviews

Monday 5/12 thru Friday 5/16 Final Exam Week No Final Possible Interview

Subject to change but will follow this general direction a lab component will be added as we go through the semester
Sauk Valley Community College  
Department ENE  
Spring 2014

Course: ENE 145, Geothermal  
CRN#: 60749  
Credit Hours: 3  
Location and time: 1C05 and 1A1A, TTH 3:30-4:45  
Instructor: Chris Carlson  
E-mail: carlsonc@svcc.edu  
Office Phone: 815-288-5511 ext221  
Office Hours: As posted  

Assessment: Sauk Valley community college is an institution dedicated to continuous instructional improvement. As part of our assessment efforts, it is necessary for us to collect and analyze course level data. Data drawn from students work for the purposes of institutional assessment will be posted in aggregate, and will not identify individual students. Your continued support in our on-going effort to provide quality instructional services at SVCC is appreciated.

Course Description: This course will covers geothermal systems and how they operate along with supplemental heat. The refrigeration cycle will be reviewed than the heat pump cycle applied to geothermal systems will be presented. Supplemental heat is a design aspect of this system and electric heat will be addressed in the class.

Course Objectives: Upon completion of this course the student will have a complete understanding of the geothermal systems. The student will be able to compare and contrast the operation of different geothermal systems. Along with the different systems the student will demonstrate proper tool usage and safety practices in a shop environment.

Attendance: Attendance is required and not optional. If you have to miss class you will need to inform me by e-mail or phone. It will be your responsibility to get any information missed. One excused absence will be allowed anything more than this can affect your grade.
**Plagiarism:** All work you submit must be your own work. If you use a quote in a paper please use proper citation. A grade of “F” will be given if it is found you plagiarize.

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**Disabilities:** If you have a disability or suspect that you have one and want to request a classroom accommodation, it is your responsibility to inform your instructor. Reasonable accommodations will be made after verification from the Students Needs Coordinators Office located in Room 1G24, or by calling extension 246.

**Privacy:** The college policy on student records complies with the “Family Educational Rights and Privacy Act.” This act is designed to protect the privacy of educational records, to establish the rights of students to inspect and review their education records, and to provide guidelines for correction of incorrect or misleading data through formal hearings. A copy of the Act or questions concerning the Family Educational Rights and Privacy Act may be referred to the Dean of Student Services, Ext. 271.

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Thur. 2/27- Module 2 (online)
Tue. 3/4- Test Module 2
Thur. 3/6- Lab (f2f)
Tue. 3/11- Spring Break
Thur. 3/13- Spring Break
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Thur. 3/20- Module 3 (online)
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Thur. 3/27- Lab
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Thur. 4/3- Module 3 (online)
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Thur. 4/10- Lab (f2f)
Tue. 4/15- Module 4 (online)
Thur. 4/17- Module 4 (online)
Tue. 4/22- Module 4 discussion (f2f)
Thur. 4/24- Lab
Tue. 4/29- Module 4 (online)
Thur. 5/1 - Module 4 (online)

Tue. 5/6 - Test Module 4 (f2f)

Thur. 5/8 - Interviews

Monday 5/12 thru Friday 5/16 Final Exam Week No Final Possible Interview Subject to change but will follow this general direction a lab component will be added as we go through the semester
APPENDIX D

CONSENT IRB APPROVAL
Initial Review

TO: Chris Carlson Educational Technology, Research, and Assessment

RE: Protocol # HS13-0388 “The implementation of a hybrid learning environment at a community college in the mechanical trades”

Your Initial Review submission was reviewed and approved under Expedited procedures by Institutional Review Board #2 on 11-Dec-2013. Please note the following information about your approved research protocol:

Protocol Approval period: 11-Dec-2013 - 10-Dec-2014

If your project will continue beyond that date, or if you intend to make modifications to the study, you will need additional approval and should contact the Office of Research Compliance and Integrity for assistance. Continuing review of the project, conducted at least annually, will be necessary until you no longer retain any identifiers that could link the subjects to the data collected. Please remember to use your protocol number (HS13-0388) on any documents or correspondence with the IRB concerning your research protocol.

Please note that the IRB has the prerogative and authority to ask further questions, seek additional information, require further modifications, or monitor the conduct of your research and the consent process.
Unless you have been approved for a waiver of the written signature of informed consent, this notice includes a date-stamped copy of the approved consent form for your use. NIU policy requires that informed consent documents given to subjects participating in non-exempt research bear the approval stamp of the NIU IRB. This stamped document is the only consent form that may be photocopied for distribution to study participants.

It is important for you to note that as a research investigator involved with human subjects, you are responsible for ensuring that this project has current IRB approval at all times, and for retaining the signed consent forms obtained from your subjects for a minimum of three years after the study is concluded. If consent for the study is being given by proxy (guardian, etc.), it is your responsibility to document the authority of that person to consent for the subject. Also, the committee recommends that you include an acknowledgment by the subject, or the subject's representative, that he or she has received a copy of the consent form. In addition, you are required to promptly report to the IRB any injuries or other unanticipated problems or risks to subjects and others. The IRB extends best wishes for success in your research endeavors.
Research Spring 2014 Sauk Valley Community College Supervised by Northern Illinois University ETRA Department

I agree to participate in the research “The Implementation of Hybrid Learning Environment at a community College in the Mechanical Trades” being conducted by Christopher A. Carlson a graduate student at Northern Illinois University, I have been informed that the purpose of the study is to see if the use of Hybrid learning is feasible in the Technology Area at Sauk Valley Community College. The objective of the study is to explore the potential of hybrid learning and to determine if the students are willing to accept the premise of the hybrid learning instructional delivery.

I understand that if I agree to participate in this study, I will allow the researcher to use the following material that I will complete as part of my course requirements for the purposes of his research which includes: actual test grades during the semester, lab grades for the six modules, and final grades for the semester. In addition, as a research participant, I understand that I will be asked to complete reflections of my study habits via Moodle at a minimum of one entry a week and I understand I can make more entries if I choose to. I understand in regards to the reflections there is no specific time or length required for the entries and I can draft the entries as I want to convey my information. Along with the reflections I will provide a predicted test score prior to testing based upon my own personnel study habits. The predictions for the projected outcome will be entered on the module test and in no way will the prediction affect my final grade for the course.

I understand that I may be asked to be interviewed regarding the study, and I understand that I have the right to not participate in the interview process. In the initial 30-minute (approximately) recorded interview(s), I could anticipate open-ended questions asking about my acceptance of or discomfort with the hybrid platform and self-regulated learning theories, and I understand I have the right to not answer any question that makes me feel uncomfortable. By agreeing to the interview I agree to the first initial interview and possibly a second follow-up interview if needed by the researcher for clarification of my answers.

I am aware that my participation is voluntary and that I may withdraw from the study at any time without penalty or prejudice. My decision about whether or not to participate in this study will have no effect on my grade in this course. I understand that if I have any additional questions concerning this study, I may contact Christopher A. Carlson, the instructor/researcher for this project, via email at carlsonc@avcc.edu or by phone at 815-288-5511 ext. 221 or I may contact Hayley Mayall at 815-753-7410. I understand that if I wish further information regarding my rights as a research subject, I may contact the Office of Research Compliance at Northern Illinois University at (815)-753-8588.

I understand that the intended benefits of this study may include the development of soft skills (i.e. computer skills) and I may learn about self-regulation and its importance in learning in the hybrid environment. I understand that all information gathered during the experiment will be kept confidential by being kept locked in an office and any personal computer will be locked from other individuals. I also understand there is no foreseeable risks in the study.

APPROVED

DEC 11 2013
BY N.U.R.B.
VOID ONE YEAR
FROM ABOVE DATE
I realize that Northern Illinois University policy does not provide for compensation for, nor does the University carry insurance to cover injury or illness incurred as a result of participation in University sponsored research projects. I understand my consent to participate in this project does not constitute a waiver of any legal rights or redress I might have as a result of my participation, and I acknowledge that I have received this consent form. I also acknowledge the researcher/instructor has provided me with a copy of the consent form.

Consent to participate in data collection signature

I have read the consent information the Hybrid Learning Environment research project, and I agree/do not agree (circle one) to participate. By signing this consent form, I also acknowledge that I am at least 18 years old.

Printed Name

Signature

Date

Consent to be interviewed and recorded signature

I give my consent for my participation in the interview to be audio recorded. By signing this consent form, I also acknowledge that I am at least 18 years old.

Printed Name

Signature

Date
APPENDIX E

DEMOGRAPHICS
Demographic information: this information will not be used to identify participants. Fill in the blank or circle the best answer.
1. Gender: Male Female
2. Age: ________
3. Ethnicity (Please choose the one you most identify with):
   a. White/Caucasian
   b. Black/African American
   c. Hispanic/Latino
   d. Asian/Pacific Islander
   e. Native American
   f. Other: __________
4. How many semesters (including this one) have you been in college? __________
5. How many online courses (including this one) have you taken? __________
6. How many hybrid courses (including this one) have you taken? __________
7. How many hybrid classes are you taking this semester including this class? __________
8. How many credits are you currently taking? _______
9. How many hours per week are you working? __________
10. How many classes have had group work? ______________
APPENDIX F

OSQL ITEM AND SUBSCALE
<table>
<thead>
<tr>
<th>Item*</th>
<th>Subscale</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. I set standards for my assignments in online courses.</td>
<td>Goal Setting</td>
</tr>
<tr>
<td>2. I set short-term (daily or weekly) goals as well as long-term</td>
<td>Goal Setting</td>
</tr>
<tr>
<td>goals (monthly or for the semester).</td>
<td>Goal Setting</td>
</tr>
<tr>
<td>3. I keep a high standard for my learning in my online courses.</td>
<td>Goal Setting</td>
</tr>
<tr>
<td>4. I set goals to help me manage studying time for my online courses.</td>
<td>Goal Setting</td>
</tr>
<tr>
<td>5. I don't compromise the quality of my work because it is online.</td>
<td>Goal Setting</td>
</tr>
<tr>
<td>6. I choose the location where I study to avoid too much distraction.</td>
<td>Environmental Structuring</td>
</tr>
<tr>
<td>7. I find a comfortable place to study.</td>
<td>Environmental Structuring</td>
</tr>
<tr>
<td>8. I know where I can study most efficiently for online courses.</td>
<td>Task Strategies</td>
</tr>
<tr>
<td>9. I choose a time with few distractions for studying for my online</td>
<td>Task Strategies</td>
</tr>
<tr>
<td>courses.</td>
<td>Task Strategies</td>
</tr>
<tr>
<td>10. I try to take more thorough notes for my online courses because</td>
<td>Task Strategies</td>
</tr>
<tr>
<td>notes are even more important for learning online than in a</td>
<td>Task Strategies</td>
</tr>
<tr>
<td>regular classroom.</td>
<td>Task Strategies</td>
</tr>
<tr>
<td>11. I read aloud instructional materials posted online to fight</td>
<td>Task Strategies</td>
</tr>
<tr>
<td>against distractions.</td>
<td>Task Strategies</td>
</tr>
<tr>
<td>12. I prepare my questions before joining in the chat room and</td>
<td>Task Strategies</td>
</tr>
<tr>
<td>discussion.</td>
<td>Task Strategies</td>
</tr>
<tr>
<td>13. I work extra problems in my online courses in addition to the</td>
<td>Task Strategies</td>
</tr>
<tr>
<td>assigned ones to master the course content.</td>
<td>Task Strategies</td>
</tr>
<tr>
<td>14. I allocate extra studying time for my online courses because I</td>
<td>Time Management</td>
</tr>
<tr>
<td>know it is time-demanding</td>
<td>Time Management</td>
</tr>
<tr>
<td>15. I try to schedule the same time every day or every week to study</td>
<td>Time Management</td>
</tr>
<tr>
<td>my online courses, and I observe the schedule.</td>
<td>Time Management</td>
</tr>
<tr>
<td>16. Although we don't have to attend daily classes, I still try to</td>
<td>Time Management</td>
</tr>
<tr>
<td>distribute my studying time evenly across days.</td>
<td>Time Management</td>
</tr>
<tr>
<td>17. I find someone who is knowledgeable in course content so that</td>
<td>Help Seeking</td>
</tr>
<tr>
<td>I can consult with him or her when I need help.</td>
<td>Help Seeking</td>
</tr>
<tr>
<td>18. I share my problems with my classmates online so we know what</td>
<td>Help Seeking</td>
</tr>
<tr>
<td>we are struggling with and how to solve our problems.</td>
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</tr>
<tr>
<td>19. If needed, I try to meet my classmates face-to-face.</td>
<td>Help Seeking</td>
</tr>
<tr>
<td>20. I am persistent in getting help from the instructor through e-</td>
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</tr>
<tr>
<td>mail.</td>
<td>Help Seeking</td>
</tr>
<tr>
<td>21. I summarize my learning in online courses to examine my</td>
<td>Self-Evaluation</td>
</tr>
<tr>
<td>understanding of what I have learned.</td>
<td>Self-Evaluation</td>
</tr>
<tr>
<td>22. I ask myself a lot of questions about the course material when</td>
<td>Self-Evaluation</td>
</tr>
<tr>
<td>studying for an online course.</td>
<td>Self-Evaluation</td>
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<td>23. I communicate with my classmates to find out how I am doing in</td>
<td>Self-Evaluation</td>
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<tr>
<td>my online classes.</td>
<td>Self-Evaluation</td>
</tr>
<tr>
<td>24. I communicate with my classmates to find out what I am learning</td>
<td>Self-Evaluation</td>
</tr>
<tr>
<td>that is different from what they are learning.</td>
<td>Self-Evaluation</td>
</tr>
</tbody>
</table>

(Barnard, Lan, To, Paton, & Lai, 2009)
APPENDIX G

OSQL UTILIZED IN STUDY
<table>
<thead>
<tr>
<th>Item*</th>
<th>Strongly Agree</th>
<th>Agree</th>
<th>Neutral</th>
<th>Disagree</th>
<th>Strongly Disagree</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. I set standards for my assignments in online courses.</td>
<td>5</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>2. I set short-term (daily or weekly) goals as well as long-term goals (monthly or for the semester).</td>
<td>5</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>3. I keep a high standard for my learning in my online courses.</td>
<td>5</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>4. I set goals to help me manage studying time for my online courses.</td>
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<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
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<tr>
<td>5. I don't compromise the quality of my work because it is online.</td>
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<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
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<td>6. I choose the location where I study to avoid too much distraction.</td>
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<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
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<td>1</td>
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<td>17. I find someone who is knowledgeable in course content so that I can consult with him or her when I need help.</td>
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<td>2</td>
<td>1</td>
</tr>
<tr>
<td>22. I ask myself a lot of questions about the course material when studying for an online course.</td>
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<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>Item*</td>
<td>Strongly Agree</td>
<td>Agree</td>
<td>Neutral</td>
<td>Disagree</td>
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</tr>
<tr>
<td>----------------------------------------------------------------------</td>
<td>----------------</td>
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<td>----------</td>
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</tr>
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<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>24. I communicate with my classmates to find out what I am learning that is different from what they are learning.</td>
<td>5</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
</tbody>
</table>

(Barnard, Lan, To, Paton, & Lai, 2009)
APPENDIX H

CONVERSATIONS WITH MS. BERNARD-BRAK
Hello Ms. Barnard -Brak

My name is Chris Carlson, I am a full-time faculty member at Sauk Valley Community College and I am currently a doctoral student at Northern Illinois University working on my dissertation. The overall topic of my research is looking at self-regulated learning in a hybrid technology trade class in the Community College. I have read a couple of your articles including Measuring self-regulation in online and blended learning environments (2008). I am interested in using the instrument you validated in the study the "Online Self-Regulated Learning Questionnaire". With your permission I would like to use the instrument in my research. If I should direct this question elsewhere could you possibly suggest to whom I should ask. Thank you for your time

Chris Carlson

Hi Chris,

Please feel free to use it but I think it needs to be updated for the mobile learning context.

Thanks,

Lucy

Lucy Barnard-Brak, Ph.D.
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APPENDIX I

COURSE DAILY/WEEKLY LOG AND WEEKLY EXAMPLE IN LMS
April 21 - April 27

Fill out your daily weekly logs

- Hidden from students: Advanced Forum Final discussion Forum Advanced Forum-Class

  Use this to discuss or ask each other of questions regarding topic 2


  Course work preparation is for you to enter what you did to prepare for assignments and or tests on a daily basis or as frequently as you prepare.


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- Hidden from students: Questionnaire OSQL Post-test Questionnaire

- Hidden from students: File Prompts for reflections File

- Hidden from students: Feedback Reflection 4 Feedback

- Hidden from students: Questionnaire Predicted Grade 4 Questionnaire
Test 4
APPENDIX J

INTERVIEW QUESTIONS AND FORMAT
Hybrid Learning Environment in a Community College trade program
Interview Method Semi-Structured

Student Interview

Introduction

Hello, thank you for your participation and your efforts in my research project. As you know having been involved in the class I am doing research for my dissertation and my topic of interest is the hybrid platform. I am associated with Northern Illinois University in this study and I am working directly with my advisor and committee. The results will be published in my dissertation, and I can assure you that you and your name will be kept confidential in the study. Do you have any questions?

Permission

Do I have your permission to record this interview?

Questions

1. What is your background in education?
2. How have you learned in the past?
3. What did you enjoy more the blended environment or the face-to-face environment?
4. Why did you enjoy the specified environment more?
5. In your opinion what do you think the instructors role is in the face-to-face component of the class and how should they contribute?
6. What activities did the instructor provide were most beneficial?
7. In your opinion what do you think the instructors role is in the online component of the class and how should they contribute?
8. What activities did the instructor provide were most beneficial?
9. The hybrid environment utilizes group efforts how did you feel about that component?
10. Would you prefer to learn in that manner or as an individual?
11. The computer mediated environment is also a large part of the blended environment. Did you enjoy that style?
12. Why and did it create too much anxiety?
13. Is there anything else at all you would like to add?

End Interview

Thank you for your time, if you have any questions feel free to contact me, thank you.
APPENDIX K

EXAMPLES OF A STUDENTS MONITORING
Example 1

Daily Log 120

Chapter 3
by- Thursday, January 16, 2014, 2:04 PM. Reading chapter 3
3 words

Chapter 3
by - Friday, January 24, 2014, 11:06 PM. Reading Chapter 3 again!
4 words

Chapter 3
by - Friday, January 31, 2014, 4:26 PM. I have completed chapter 3 questions with [name] as a
group partner, and began reading the next two chapters, and looking at the assignments due on
February 10, 2014. 29 words

Lab 1 and Chapter 4 and 5 Questions
by - Wednesday, February 5, 2014, 7:47 PM. I work on drawing pictorial diagrams of two AC
systems, and one refrigeration system. I still have to put them on a blank piece of paper, and to
define the terms. I also have been working on the chapter 4 and 5 questions. I am staying ahead
of schedule on completing assignments. 52 words

Chapter 4 and 5 Questions
by - Monday, February 10, 2014, 9:36 PM. and [name] have went over the chapter 4 and 5
review sections, and uploaded the file last night. We are going to submit our lab as a complete
set one from each other. I went to the library to get the pictorial diagrams scanned so we can up
load them. 52 words

Lab 1 and Test
by - Wednesday, February 12, 2014, 4:52 PM. Me and have [name] turned in our Lab 1 project
as a group, and I am reading chapter 3 over again since I have become familiar with the
refrigeration components. It also is starting to make more since about some of the terms needed
to be remembered for the test. Lab 1 was very helpful in learning the basic components of the
cycle. 63 words

Test 1
by - Saturday, February 15, 2014, 1:02 PM. I have been reading chapter 3 over mostly to
remember the major terms for the test, also have been looking at pressure/temperature
relationships using the chart in the book for practice. I also have been working on chapter 6
questions for next week. I am focusing the most on the test for Monday. 54 words
Chapter 6, Lab, Test
by - Wednesday, February 19, 2014, 5:12 PM. I have read chapter six and have done the review questions at the end of the chapter. I also am studying for the test I am going to be taken tomorrow, and working on the second lab with my partner. 41 words

Lab 2 and Chapter 6 Questions
by - Friday, February 21, 2014, 7:26 PM. I have completed chapter 6 questions and went over them with [name], we also came in on Thursday to work on the superheat and sub-cooling lab. I am going to be submitting the chapter six questions for our group, and [name] will be submitting the lab 2 for the group. 51 words

Chapter 6 Questions
by - Saturday, February 22, 2014, 4:13 PM. I have uploaded chapter six questions, and [name] is going to be uploading the lab for our group. 20 words

Chapter 7
by - Monday, February 24, 2014, 7:46 PM. I have begun to read Chapter 7 tonight. 8 words

Chapter 7
by - Friday, February 28, 2014, 6:13 PM. I have met with [name] on Friday to go over the study questions, and [name] is going to be uploading the assignment for our group. 26 words

Test 2 and Lab 3
by - Thursday, March 6, 2014, 11:16 PM. I came in Monday to take the second test and started working on how to work with copper pipe, and solder the pieces together for practice. 26 words

Soldering
by - Saturday, March 8, 2014, 8:13 AM. I have been practicing on soldering copper joints. 8 words

Chapter 8 and Soldering
by - Wednesday, March 19, 2014, 5:22 PM. I have begun to read chapter 8 along with studying the other chapters for the test on Monday. I am coming in tonight also to work on practicing soldering joints. 30 words

Chapter 8 and Test
by - Saturday, March 22, 2014, 9:40 AM. I have read chapter 8 and completed the review questions at the end of the chapter, and I am going to meet with [name] to go over review questions. I also am studying chapter 8 thoroughly for the test on Monday. 41 words

Chapter 8
by - Saturday, March 22, 2014, 11:28 PM. I have read chapter eight in the book, and have begun to study the chapter for the test on Monday. 20 words
Lab 5
by - Wednesday, March 26, 2014, 9:03 PM. I came in Tuesday to start practicing on how to reclaim the refrigerant from the rooftop unit, going to come in Thursday to finish reclaiming and put a vacuum pump on unit. I also am using the practice as part of my presentation for my English class. 47 words

LAB 4 and 5
by - Saturday, March 29, 2014, 1:16 PM. I have been coming in to practice each of these labs to get the required information for my mentor project. It is also going to help me complete the labs when I am ready. I am reviewing the material for chapter 8 first, then I will work on chapter 9. 50 words

Chapter 8
by - Wednesday, April 2, 2014, 10:05 PM. I have been doing some intense reading of chapter 8 the last couple of days. I plan on writing down some of the important information for the upcoming test. 29 words

Chapter 8
by - Saturday, April 5, 2014, 1:47 PM. I have been reading over chapter 8 along with taking the notes for the test. 15 words

Test and Lab 3 and 5
by - Wednesday, April 9, 2014, 10:02 PM. I came in to take the test along with working on soldering joints for the remainder of the class on Monday. I came in Tuesday to work on Lab 5 on reclaiming, evacuation, and charging of the unit. I am getting a little more familiar with the steps in lab 5. It also help to practice doing the superheat and sub-cooling for practice. 64 words

Chapter 9 and Labs
by - Saturday, April 12, 2014, 8:52 AM. I have read chapter 9 beginning to answer the review questions at the end of the chapter. When we have class the next time to take the test I plan on completing one of the labs that night, and practice the other one and complete the other one during the week sometime. 52 words

Chapter 9 and Labs
by - Thursday, April 17, 2014, 11:34 PM. I have been studying chapter 9 along with the notes I am taking, I also met with [name] today to go over the answers to our review questions. I am going to do the reclaim lab on Monday night after taking the test. 43 words

Chapter 9 Questions and Test
by - Saturday, April 19, 2014, 9:25 AM. I have type up the questions for [name] and I submitted them already before the due date, and have been studying for the test on Monday. 26 words
Chapter 9 Test and Lab 3
by - Thursday, April 24, 2014, 4:56 PM. I took chapter 9 test on Monday night and also work on lab 3 completing the lab with 10 soldered joints and the ends brazed on both ends with a 1/4 pipe sticking out to pressure test. 38 words

Example 2

Daily log 145

Digital literacy
by - Thursday, January 16, 2014, 5:56 AM. Worked on these in class and at home, found them to be more difficult as I went along. I did well on some and not very well on the last couple. My computer skills need work. Santos. 37 words

Homework
by - Monday, January 20, 2014, 7:56 PM. Spent good amount of time this weekend reading handout material trying to extract information required to answer the questions. I will need some live class interaction to obtain clarity for this assignment. 32 words

Homework
by - Thursday, January 23, 2014, 10:53 AM. Worked on questions and last 5 problems managed to find half the answers concussively and work out 3 of the problems, will have to ask Chris for opinion. 28 words

Homework
by - Sunday, January 26, 2014, 4:38 PM. Working on my homework and looking at conversions and some problems, trying to review, have some questions on material for upcoming test, will talk with Chris. 28 words

Study material and homework
by - Thursday, February 6, 2014, 9:00 AM. Committed great amount of time to homework assignments for understanding. I have revisited, studied all material, handouts and power points for upcoming test. Have communicated with instructor on how to be best prepared as well. I believe I am ready. 40 words

Corrections
by - Wednesday, February 12, 2014, 9:05 AM. I am finding most of my corrections I still can’t find a formula for number15 , I don't know if we are to assume A R- value as, being 1 and having 20 btu loss and B and C having higher R-values so therefore the answer would be a. 1.5 I could use some feedback on this one. 61 words

Corrections/homework
by - Monday, February 17, 2014, 6:10 AM. Worked on test corrections and homework all last week, I will re-read the second handout again in order to better understand content. 23 words
Reading and lab assignment
by - Thursday, February 20, 2014, 5:47 AM. Read two of the handouts, working on the third, I really am liking the reading, working on a better understanding of the content, I think I know what you were trying to tell me Chris. 35 words

questions on reading
by - Tuesday, February 25, 2014, 4:03 PM. Turned in all questions on readings chapt. 18, 15, and 16, for Chris to review, to check and see if I am on the right track. Will read and review the reading material again to prepare for the test on Tuesday. Santos. 42 words

preparing
by - Monday, March 3, 2014, 8:23 PM. Worked hard Friday, sat, sun and today preparing for Tuesdays test, I know I should do very well. Santos. 19 words

lab
by - Wednesday, March 12, 2014, 8:57 PM. I been thinking of some ideas for our lab project, going to try to go in and work on it tomorrow, Santos. 22 words

lab plan
by - Monday, March 17, 2014, 12:55 PM. first finish the electrical connections and then proceed onto figuring out the water tank hook ups and method of operation we will need to spend more time on lab work if we are to complete this project. 37 words

lab
by - Tuesday, March 18, 2014, 7:19 PM. Landed all conductors power and control circuits in the unit today. Landed as best me and Jeremy could interpret from the prints. Will have to discuss with Chris. 28 words

Reading
by - Thursday, March 20, 2014, 2:10 PM. Worked on reading and write ups, very good chapt, I am going to work on my lab drawings tonight. 19 words

geo design
by - Thursday, March 27, 2014, 10:58 AM. Trying to come up with design plan ideas for lab. 10 words

chapt 3,4
by - Monday, March 31, 2014, 8:45 PM. Worked on chapters all weekend, I get the definite understanding of how important having a design that is right on the nats ass is to the success of your project for any installation or method used. 36 words

chapt 5
by - Monday, April 7, 2014, 5:18 AM. Worked on chapter 5 and thought about how to hook up our water source to our GEO unit over the week end. 22 words
chapt 5 and 6
by - Tuesday, April 15, 2014, 9:07 AM. While reading in our text I am finding that with every chapter just how much thought, research, trial and error, and knowledge has been attained from the start of GEO that need to be applied for a system to be successful.
41 words
APPENDIX L

DISCUSSION FORUM EXCHANGE
The function of the "pilot operator of the reversing valve"? I can't seem to find it in the text except the mention in the field problem...not even in the index of the book. Is it the actual piece in the valve that allows the flow of refrigerant through the coils or something else?

A pilot operator uses refrigerant pressure to move spindle in valve it gives more power. An electric coli alone may not be enough to move plunger so pilot pressure used. Same premise inn hydraulics or pneumatics

The pilot operator of the reversing valve uses the pressure generated on the discharge and suction sides of the system to move a piston from the heating (default) position to the cooling position. When the pistons move to new position, the indoor/outdoor coils change functions.