Summer 2014

The Effects of Cooperative Grouping Strategies and a Three-Level Evaluation Tool on Student Soft Skills Achievement and Satisfaction Within a Problem-Based Instructional Model in the Soft Sciences

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THE EFFECTS OF COOPERATIVE GROUPING STRATEGIES AND A THREE-LEVEL EVALUATION TOOL ON STUDENT SOFT SKILLS ACHIEVEMENT AND SATISFACTION WITHIN A PROBLEM-BASED INSTRUCTIONAL MODEL IN THE SOFT SCIENCES

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A Dissertation Submitted to the Faculty of
Old Dominion University in Partial Fulfillment of the
Requirements for the Degree of

DOCTOR OF PHILOSOPHY

CURRICULUM & INSTRUCTION

OLD DOMINION UNIVERSITY
August 2014

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ABSTRACT

THE EFFECTS OF COOPERATIVE GROUPING STRATEGIES AND A THREE-LEVEL EVALUATION TOOL ON STUDENT SOFT SKILLS ACHIEVEMENT AND SATISFACTION WITHIN A PROBLEM-BASED INSTRUCTIONAL MODEL IN THE SOFT SCIENCES

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In education, many academic majors can fall within one of two main concentrations: the hard or soft sciences. The hard sciences are defined as the natural sciences and include subjects such as Engineering, Chemistry, and Biology while the soft sciences are defined as the social sciences and include subjects such as English, Sociology, and Anthropology. While instructional approaches have been created to help instructors teach and students learn within each of the scientific areas, few studies have sought to see if instructional approaches from one of the sciences can be used in the other. One such instructional approach is the problem-based one, which has yielded many different instructional models within the hard sciences but remains unused in the soft sciences.

Research has shown that each problem-based model used within the hard sciences has used its own cooperative grouping and assessment strategies, leading to variations in the methods used in hard science classrooms. While the problem-based instructional approach used in the hard sciences values the development of soft skills, this has also been a major learning outcome for courses within the soft sciences. Knowing that the problem-based instructional approach used in the hard sciences values soft skills

development, it is not known if a problem-based approach should be used in the soft sciences classroom, and, if it should, if a traditional problem-based model from the hard science classroom would be effective. As part of a problem-based model for the soft sciences disciplines, it is also not clear which cooperative grouping and assessment strategies should be used since many of the previous problem-based models use a variety of grouping and assessment strategies.

The purpose of this mixed methods study was to investigate which cooperative grouping strategies and assessment method may be effective within two problem-based instructional models used in the soft sciences. The following cooperative grouping strategies were examined for effects on student satisfaction and achievement: homogeneous or heterogeneous teams, small or large teams, and instructor or student-selected job role assignments. A three-level evaluation tool, including peer, self, and tutor evaluation, was also tested as an instructional tool within the problem-based model to see if it had an impact on student's achievement. Pre- and Post-Satisfaction Questionnaires were created to test each model's and cooperative grouping strategy's effect on students' satisfaction with teamwork and team projects.

The participants were undergraduate students enrolled in blended learning sections of an Arts and Sciences senior Capstone course at a private university. Students were enrolled in a course section that used one of eight different grouping combinations: either a traditional or revised problem-based instructional model, which placed students in teams of five to seven or three to four students, respectively; either a homogeneous or heterogeneous teams composition; and either instructor or student-chosen job roles within the teams. Quantitative data were collected on students' achievement via grades based

upon a three-level grading rubric and students' satisfaction ratings via a quantitative pre- and post-questionnaire. Qualitative data were students' satisfaction via ten reflection wikis. The quantitative data were analyzed using statistical procedures, including ANOVA, MANOVA, and MANCOVA; qualitative data were analyzed using phenomenological analysis methods.

The findings show that the traditional and revised problem-based models are equally effective in promoting student achievement and students are equally satisfied in terms on teamwork and team projects in both models. The grouping strategies within the models also had the same effects. However, where the findings differ is in terms of role assignments. While there were no differences among satisfaction in the different role assignments, students' grades did differ depending on the role assignments.

Keywords: instructional model, problem-based, cooperative, undergraduate, blended learning, job roles, teamwork, soft sciences, private, phenomenology, mixed methods.

DEDICATION

"A mother is the truest friend we have, when trials heavy and sudden, fall upon us; when adversity takes the place of prosperity; when friends who rejoice with us in our sunshine desert us; when trouble thickens around us, still will she cling to us, and endeavor by her kind precepts and counsels to dissipate the clouds of darkness, and cause peace to return to our hearts"- Washington Irving

This manuscript is dedicated to my mother, Mrs. Linda Stoneman Worth.

Words could never express my appreciation to you.

Thank you for sacrificing for me, supporting me, and loving me.

Most of all, thank you for making me the way I am.

ACKNOWLEDGMENTS

"I awoke this morning with devout thanksgiving for my friends, the old and the new"
–Ralph Waldo Emerson (1915)

It is important that I take a moment to thank my husband, Jason Rippard, for his support, encouragement, and, most importantly, his love. When my hours, day, months, and years became filled with nothing but work and school, with little time for much else, he never complained, and he never made me feel guilty in my selfish pursuit of a doctoral degree. Words cannot express my appreciation. I love you.

Although he is no longer with us, I'd like to take a moment and remember my father and acknowledge the 13 amazing years we had together. He helped make me the woman I am today, and I would not be where I am had it not been for his hard work and sacrifices during my childhood. I hope that I have made him proud.

I'd also like to thank my mother and stepfather, Linda and George Worth. Not only have you supported my endeavors, you did so with an open mind and an open heart. When I felt like I could not reach the top of the mountain, you had kind words to help me to the top. Thank you for always reading my writing and research, offering words of wisdom and the encouragement I needed to succeed. On that note, it's also important that I thank my other set of parents Debbie and David Rippard and nana Clara Marks for never questioning my academic pursuits or my ability to succeed. I could not have done this without your support and love.

To all of my friends and family, I want you to know that I appreciate each of you and your support. You may not think that you did much to support me, but each of you did in your own way. While I cannot name everyone, I do want to say a special thank you to my aunts Carolyn Stevens and Winnie Stoneman and my uncle Gary Stoneman for always believing in me, to my "big sisters" (Misty Seda-Morales and Kimberly Sampson) for always being a phone call away, to my fellow doctoral students (Elizabeth Burns and Janice Underwood) for their endless support, to my friends who never let me give up or become completely a hermit (Alicia Walsh, Starr Whatley, Leslie Hurst, Susan Blatnik, and Amy Riechl), to my coworkers who showered me with positive encouragement (Michelle Etter, Lauren Franza, Martha Cerkez, and Tiffany Maxey), and to all of my colleagues who participated in my research. Without all of you, I would have never reached this goal.

Lastly, I'd like to offer my thanks to my advisor, Dr. Rick Overbaugh, for his continued support and for pushing me to do my best. A special thanks also goes out to my committee members, Dr. Sue Kimmel and Dr. Shana Pribesh. When I was stuck, when my brain hurt, when I wasn't sure I was making any sense, you both helped me through and taught me so much about education, research, and myself.

Thank you.

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CHAPTER I

INTRODUCTION

Twenty-first century college graduates are entering a significantly different world than college graduates ten years ago. The obvious changes include the rapid growth of technology and the rise of global business and industry; however, other not-so-obvious changes exist. While twenty-first century college graduates still need to know how to use technology and need to be knowledgeable in their discipline, they also need to have soft skills. These skills that graduates will need to be successful in a modern, global economy include digital-age literacy, inventive thinking, effective communication, and high productivity (Solomon & Schrum, 2007) (see Figure 1).

Figure 1. 21st century skills. This figure shows the types of soft skills college graduates will need to be successful in the modern, global economy. Adapted from "enGauge 21st Century Skills: Literacy in the Digital Age" by NCREL and Metri Group, 2003, retrieved from http://pict.sdsu.edu/engauge21st.pdf.

Despite the importance of soft skills knowledge for college graduates, little research has been conducted on the instructional approaches, models, and strategies that can be used to enhance these skills. Some of the research on instructional approaches, models, and strategies has focused on their use within the hard sciences to enhance discipline-specific skills among homogeneous populations of students. One such approach is the problem-based instructional method, which was introduced during the first half of the twentieth century and continues to be heavily used and researched in the hard sciences into the twenty-first century. This approach has been noted to help students construct the discipline-specific knowledge they would need to know and apply in real-world problem situations (Hmelo-Silver, 2004). Although one of the goals of the problem-based approach is to help students develop discipline-specific knowledge, it also values helping students develop soft skills such as teamwork through cooperation (Duch, Groh, & Allen, 2001). Many of the problem-based models used within research studies apply different strategies within the model, including differences in cooperative grouping strategies and assessment method.

Gaps in the research exist in terms of which cooperative grouping strategies and assessment methods are the best. Likewise, gaps can also be seen in trying to determine a specific problem-based model to help students develop soft skills. Questions exist over how the problem-based approach can claim to help students develop soft skills since some of the research has only assessed student mastery of discipline-specific knowledge (Hmelo-Silver, 2004). Also, since some of the research on the approach has been focused around homogeneous populations of same-discipline students, it is not clear if the approach could be effective among heterogonous populations of students (such as those students from different disciplines in soft sciences classes). Therefore, there is a need to take the instructional approach and test if and how it may help students master soft skills, if the model can be used as effectively in the soft sciences, which cooperative grouping strategies are best, and if there is a best assessment method.

Problem-Based Instructional Models

The problem-based instructional approach values both discipline-specific knowledge and the development of soft skills. The method has been widely used within the medical (Benson, Noesgaard, & Drummon-Young, 2001; Donner & Bickley, 1993; Matheson & Haas, 2010; Rideout & Carpio, 2001) and engineering sciences (Noordin, Nasir, Ali, & Nordin, 2011; Perrenet, Bouhuijs & Smits, 2000) and as such has been argued to be an effective instructional approach within the hard science disciplines. The traditional problem-based instructional approach values:

> Carefully selected and designed problems that demand from the learner acquisition of critical knowledge, problem solving proficiency, self-directed learning strategies, and team participation skills. The process replicates the commonly used systemic approach to resolving problems or meeting challenges that are encountered in life and career. (Donnelly & Fitzmaurice, 2005, p. 88)

Based on these values, the traditional problem-based model also has four universal instructional methods as described by Savery (2009) and Nelson (1999):

1. Uses authentic and meaningful real-world problems that are holistic, practice-based, ill-structured, and contemporary.
2. The instructor acts as tutor.
3. Uses authentic assessment (including self-assessment).

4. Uses debriefing activities.

However, there are differences between the specific strategies that researchers, theorists, and practitioners suggest should be used within problem-based models. Nelson's (1999) model has nine specific steps for using the problem-based approach (see Table 1):

Table 1

Nelson's Collaborative Problem Solving Model

Process Activity	Process Description
1. Build readiness.	Provide overview of problem-solving process, develop authentic problem/scenario, provide instruction, practice group processes.
2. Form and norm groups.	Small groups (3, no more than 6), should be heterogeneous (except age and interest). Groups establish their own ground rules.
3. Determine a preliminary problem definition.	Groups develop a common understanding of the problem, identify goals and issues, brainstorm solutions, develop a plan, identify resources needed, and gather information.
4. Define and assign roles.	Identify roles needed to complete deliverables, negotiate role assignments.
5. Engage in an iterative collaborative problem solving process.	Revise plan as needed, identify and assign tasks, collect information, collaborate with instructor, evaluate collected information, engage in solution development, self-reflect and group process reflect, and evaluate the solution.
6. Finalize the solution or project.	Draft the solution, evaluate it again, revise and complete final draft.
7. Synthesize and reflect.	Identify learning gains, debrief and reflect on group and individual processes.
8. Assess products and processes.	Evaluate the deliverable and evaluate the process.
9. Provide closure.	Formalize group adjournment.

Savery's (2009) model is far less specific in regards to the strategies for using the problem-based approach (see Table 2):

Table 2

Savery's Problem-Based Approach to Instruction

Process Activity	Process Description
1. Select problems	Problems should be authentic, fit within the discipline's curriculum, but also encourage cross-discipline thinking. Problems should also fit professional practice, be ill-structured, and contemporary.
2. Instructor's role	Serve as a tutor, asking questions to promote thinking, encourage group processes, supports self-regulation, avoids being information provider, and adjusts problem as needed.
3. Authentic assessment	Access the content knowledge or skill, problem-solving skills, and higher-order thinking. Formative assessment may be used anytime as well as summative assessment at the end.
4. Debrief	Help learners recognize new knowledge and how to apply this knowledge, allow all participants to participate, establish a protocol, ask questions and provide conceptual maps to help learners assess what they learned.

Nelson's and Savery's models include the universal instructional methods commonly found within problem-based approaches such as using authentic problems and assessment, the instructor serving as tutor, and applying debriefing activities. However, the models also have their differences. Nelson's process description begins with preparing learners to engage in problem-based methods by not only going over the actual problem like Savery's process description suggests, but by also explaining the actual process being used to solve the problem. Savery does not suggest a large degree of instructor control, only suggesting the instructor serve as tutor and help promote the process. Nelson suggests a greater degree of instructor control since it is suggested that instructors form and norm the groups, define and assign roles, and follow steps to guide students through the process.

Although it has not been a large area of current research, a possible problem-based model for use in the soft sciences might have some strategic differences from the traditional models used in the hard sciences and described by Savery (2009) and Nelson (1999). These differences may arise because of the focus on soft skills and not on discipline-specific skills. A proposed problem-based model for the soft sciences might be similar in regards to Nelson's steps and both Nelson and Savery's conclusion/debriefing activities, but key differences may need to exist in terms of the problem itself, the tutor's role, assessment strategy, and cooperative grouping strategies. The first difference may be the use of a real-world, ill-structured, contemporary problem that may not need to specific to a student's professional practice or discipline since soft sciences courses tend to have a mixture of students from many different majors and professions. Second, the instructor's role in a soft science's model may still be as a tutor, but some direct instruction on the learning process and guided practice might be needed to help learners adjust to the new type of learning expected of them. Third, the students in a soft sciences model may need to participate in formative assessment on both their group and individual processes throughout the process and summative assessment may include peer, self, and tutor evaluation of soft skills mastery, not the actual deliverable produced and hard science knowledge learned. Lastly, the major difference that may exist in a soft science's model might be that the cooperative grouping strategies may have to include heterogeneous groups.

Overall, the problem-based instructional approach's values and methods may help students develop many of the soft skills listed within Figure 1, but use of a model in the soft sciences and within heterogeneous discipline groups needs to be tested in different environments before it may be generalizable. Within the available research that uses problem-based instructional models in the hard sciences, differences exist, leaving instructors with questions regarding the best grouping and assessment strategies to use with the approach. These differences make it hard to determine a general problem-based instructional model that can easily be used by any instructor in any discipline.

Cooperative Groups

One of the most important soft skills for students to develop is the ability to work in teams or groups. Teamwork is also a key characteristic of the problem-based instructional approach; however, there is confusion over if collaborative or cooperative teams are better. The confusion with the type of grouping strategy within the model exists because of the varied definitions and misuse of the two terms in the literature. While attempts have been made to clearly define what it means to collaborate (Bruffee, 2000; Dillenbourg, 1999) or cooperate (Brindley, Walti & Blaschke 2009; Panitz, 2001) in groups or teams, the differences lie in the degree of instructor control and how students complete the task (McInnerney & Roberts, 2004). Nickel (2010) states, "teamwork skills and group processing is not emphasized in collaborative learning" (p. 29). She continues by explaining, "The purpose of cooperative learning is to successfully co-investigate a topic and co-create an end product" (p. 29). This suggests that the use of collaboration in a problem-based instructional model might not make sense since the model values teamwork skills. Therefore, groups within the problem-based model should be cooperative and demonstrate those characteristics most often valued in cooperative groups as defined by Johnson (1991):

- Positive independence
- Individual accountability
- Promotive interaction
- Teamwork skills
- Group processing

Despite this clear distinction as to the type of grouping that should be used in the problem-based learning environment, further research is needed to determine the specific cooperative grouping strategies that may be most effective. This includes how instructors should put together the groups (homogeneity or heterogeneity) and how much control the instructors should have over each student's job role within the group.

Achievement

One way to evaluate the effectiveness of specific strategies applied within an instructional model may be to evaluate any increases and decreases that appear among students' grades. While research has found that cooperative grouping results in higher achievement and greater productivity (Slavin, 1996), there are still questions about why, how, and under what conditions achievement occurs (Li & Lam, 2013). Therefore, it would be beneficial to collect achievement data when comparing two different cooperative grouping strategies within a problem-based instructional model; this would help to determine which strategy was the most effective.

Also, the method of collecting student achievement data has varied among those using problem-based instructional approaches. While some instructors have collected student achievement data through formative assessment, others have only used summative assessment. In Savery's (2009) problem-based model, he suggests the use of authentic assessment, including both formative and summative methods. He describes authentic assessment as having three parts: the content/skills knowledge, problem-solving skills, and higher-order thinking. However, in Nelson's (1999) collaborative problem solving model she suggests multiple formal and informal evaluation methods by both the instructor and students, resulting in a final grade that is based on the group deliverable and individual efforts. Dochy, Segers, Van den Bossche, and Gijbels' (2003) meta-analysis of problem-based learning studies found that a variety of assessment methods have been used to measure student achievement, including national and state tests, performance tests, selected-response tests, different types of essays, presentations, and cases. This means that there is not a clear way to assess students within a problem-based model, though the assessment method used has been noted to affect student achievement findings (Dochy, Segers, & Buehl, 1999).

If the assessment method affects student achievement, then it is important for an instructor to know which assessment methods result in higher or lower student achievement and to use this knowledge to choose the method that results in a higher student achievement. This makes the assessment method a strategy for learning within the instructional model. When comparing the assessment methods of different groups of students within the problem-based instructional environment, research has not suggested a best assessment strategy. Some advocate for assessment that has three-levels of evaluation: through self (through learning contracts or reflection), peer (formative), and collaborative (focusing on iterative, not social comparison) assessment (Pengelly, 2010).

Others suggest an instructor should choose at least one of many types of authentic assessment, including outside evaluation by experts, content analysis of the deliverable, focus groups, peer evaluation, journals, or personal reflections (Major & Palmer, 2001). Research that has attempted to discern which assessment strategy is most accurate in assessing students' achievement has not shown that one type is more accurate than another in a problem-based learning environment (Elizondo-Montemayor, 2004; Engel, 1991; Tousignant & DesMarchais, 2002). Others point out that while the problem-based approach calls for formative reflection, student end achievement has really been measured through the tutor summative evaluation of the final product such as a project or test (Norman, 2005; Walker & Leary, 2009).

Another topic to consider is how soft skills should be assessed. According to Silva (2009), "new models of assessment that measure both content and skills are emerging and hold the potential to move us toward an assessment system that is more aligned with what students need to know" (p. 632). In her review she finds the College Work Readiness Assessment (CWRA) and Collegiate Learning Assessments (CLA), which both test students' skills in terms of information literacy, problem-solving, and written communication might be two ways to assess students' mastery of soft skills. However, these tests have been rarely used across higher education institutions and there is little research that aligns either assessment with learning outcomes. Biggs (1999) finds that successful soft skills assessment methods are directly mapped or aligned to learning outcomes; in other words, the soft skills being measured must actually be part of the lesson's or course's learning outcomes. He gives the problem-based approach as an effective instructional model for developing soft skills because of its assessment of a student's effective or ineffective problem-solving abilities as part of the model's learning outcomes. Likewise, integrated assessment strategies, which are often called evidence-centered designs, link learning theory and/or instructional approaches to assessment methods and are often suggested for accurately measuring student achievement of soft skills. These methods include summative evaluation, observation of student engagement, review of student produced artifacts, and evaluation of performance in professional or social contexts (Oblinger, 2007; Shaffer, Svarovsky, Nash, Nulty, Bagley, Frank, Rupp, & Mislevy, 2009). It is important, therefore, for any instructional model attempting to help student develop soft skills to be aligned to the course's learning outcomes and that the assessment strategies also be aligned to both the learning outcomes and values of the model.

Satisfaction

The degree of satisfaction is another topic that can be used to measure the success of an instructional approach or model. Measures of satisfaction are important because much of the previous research on student satisfaction has argued that student success may be related to individual satisfaction (Dewiyanti, Brand-Gruwel, Jochems, & Broers, 2007; Gülbahar & Madran, 2009; Johnson, Aragon, Shaik, & Palma-Rivas, 2000; Jung, Choi, Lim, and Leem, 2002; Zhu, 2012). While some may argue that the goal of education is achievement and learning (Lawson, Leach, & Burrows, 2012), student satisfaction is becoming an increasingly important topic. According to Elliott and Shin (2002),

> Due to an increasingly competitive and dynamic educational environment, as well as numerous challenges, such as declining enrollments and a general public

demanding accountability of tax dollars, universities are becoming more aware of the importance of student satisfaction. (p. 197)

This growing emphasis on student satisfaction is appearing more frequently in higher education literature and is even sparking conceptual models (Denson, Loveday, & Dalton, 2010; Gibson, 2010; Law, 2010; Schertzer & Schertzer, 2004).

One such conceptual model is the Sloan Consortium's Five Pillars of Quality Framework (see Figure 2). The purpose of these principles is to continuously improve learning outcomes by focusing on learning effectiveness, access, faculty satisfaction, student satisfaction, and cost effectiveness. Each pillar or principle impacts the quality of education. In this model, learning effectiveness reflects the most effective ways to teach; access is how well learners can access learning; faculty satisfaction is how well faculty are appreciating or satisfied; student satisfaction is how well students are pleased with both their experiences and interaction; and cost effectiveness is how well improved services can reduce costs (Moore, 2005). Overall quality of an education environment is dependent upon each of the five pillars. For example, by using the five pillars figure below, if student satisfaction was low, this could affect faculty satisfaction, learning effectiveness, access, and cost effectiveness; this could result in a low quality rating of the learning environment.

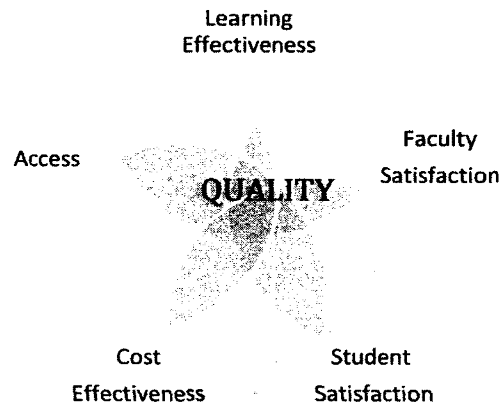

Figure 2. The Five Pillars of Quality for Online Learning. This figure shows how learning effectiveness if a part of determining the quality in an online class. Learning effectiveness also overlaps with the other quality concepts of access, scale, and faculty and student satisfaction. Adapted from "The Sloan Consortium Quality Framework And The Five Pillars by J. C. Moore, 2005, p. 3. Copyright 2005 by Sloan-C.

The Sloan Consortium's *Pillar Reference Manual* (2002) suggests what attitudes reflect student satisfaction: discussion and interaction with instructors and peers, actual learning experiences match expectations; satisfaction with services (advising, registration, and access to materials); orientation for how to learn; and outcomes are useful for career, professional, and academic development. Moore (2009) suggests that learners are more satisfied if learning is "convenient, flexible, relevant, personalized, and engaging; it offers learners options for learning activities and for controlling the pace of learning" (p. 78).

However, some of the research on student satisfaction has been less focused on student satisfaction with instructional strategies within a problem-based model and more focused on investigating if motivation is linked to satisfaction (Bryant, Kahle, & Schafer, 2005) or on comparing problem-based learning satisfaction in online versus face-to-face learning environments (Hirschheim, 2005; Ponzurick, France, & Logar, 2000; Topper, 2007). The research that has investigated student satisfaction in problem-based instructional models has sometimes evaluated satisfaction based on gains in discipline-specific content knowledge, not on the strategies used to master soft skills learning objectives within the model (Antepohl & Herzig, 1999; Ochoa, Gottschall, & Stuart, 2004; Woltering, Herrler, Spitzer, Spreckelsen, 2009). Research is needed to examine student satisfaction with the strategies that can be used to enhance soft skills in a problem-based instructional approach.

Definition of Terms

A **problem-based instructional model** is a defined as a way of teaching in which learning is organized around complex problem-solving through cooperative group activities.

A **traditional problem-based instructional model** is defined as a way of teaching the problem-based instructional approach using groups of five to seven students.

A **revised problem-based instructional model** is defined as a way of teaching the problem-based instructional approach using groups of three to four students.

Cooperative groups are defined as "students working together, for one period to several weeks, to achieve shared learning goals…any course requirement or assignment may be structured [by the instructor]" (Johnson, Johnson, & Smith, 1998). In cooperative groups, the instructor has control over how the students will complete the project.

Cooperative grouping strategies are defined as the methods an instructor uses to form group membership and size and to organize the group member's responsibilities.

Role assignments are defined as assigned or chosen group member roles used to complete the group activity and achieve group goals (Eberspacher & Joab, 2005). These role assignments typically define the many different actions that must be completed to successfully complete the assignment.

Instructor-chosen roles are the assigned group member roles as specified by the instructor. Students are not given the option to choose roles that they want to go.

Student-chosen roles are the chosen group member roles as selected by the students. Instructors are not given the option to assigned roles to students.

Soft sciences are defined as the social sciences, such as English, Sociology, and Anthropology.

Hard sciences are defined as the natural sciences, such as Engineering, Chemistry, and Biology.

Soft skills or twenty-first century skills are defined as the non-discipline specific skills students need, such as effective written and oral communication and the ability to work well in groups.

Group work or teamwork is defined as a course assignment that is completed when students work together to complete one task.

Purpose of the Study

The purpose of this study was to investigate if a traditional problem-based instructional model or a revised problem-based instructional model, both with specific grouping and assessment strategies, works best in the soft sciences' classroom. The study also examined whether instructor-chosen roles are more effective than student-chosen roles within the problem-based cooperative groups. Additionally, the possible effect of using a three-level peer, self, and tutor evaluation tool was also studied.

Research Questions

In order to investigate the possible effects of the problem-based instructional models, cooperative grouping strategies, and assessment strategies, the following research questions were examined:

1. To what extent do traditional problem-based model participants as compared to revised problem-based model participants vary in student achievement and satisfaction?
2. To what extent do traditional problem-based model participants in heterogeneous and homogeneous groups as compared to revised problem-based model participants in heterogeneous and homogeneous groups vary in achievement and satisfaction?
3. To what extent do traditional problem-based model participants in heterogeneous and homogeneous groups with instructor or student selected job roles as compared to revised problem-based model participants in heterogeneous and homogeneous groups with instructor or student selected job roles vary in achievement and satisfaction?
4. What do students report about professionalism, cooperation, learning objectives, and group participation in problem-based instructional models?

Significance of the Study

The ability to effectively work in teams and problem solve has been identified as one of the most important skills for college graduates in today's job market (Cranmer, 2006; Texley, 2007). A survey of 302 employers performed on behalf of The Association of American Colleges and Universities (2010) found that 71% of the employers surveyed listed problem-solving and teamwork skills and the ability to work with others as a learning outcome more colleges should emphasize. Likewise, effective communication within groups is an increasingly important skill because of the changing and variety in demographics across the United States pose new communication challenges (Becker, Erwin, Winn, & Baker, 2012; Castells, 2007). In order to negotiate this change and communicate effectively, students need to be able to work within diverse teams, be flexible and helpful to complete a common goal, share responsibility, and value each team member's contribution (Trilling & Fadel, 2009).

The need to have college graduates who have the soft skills listed above reflects a change in the postsecondary learning environment. Previously, discipline-specific knowledge was the end goal for higher education. This shift in knowledge and skill type does not mean new instructional strategies are needed. The problem-based instructional approach, which lists various soft skills as valued learning outcomes, has long been used in the hard sciences, and it may help students further develop their soft skills in the soft sciences. This study examined one such way to apply the problem-based instructional approach with cooperative grouping strategies by testing how the model and strategy along with a three-level evaluation tool (self, peer, and tutor) affected student achievement and satisfaction.

Further, given the variety of studies on problem-based instruction that offer different grouping and assessment suggestions, the basic how-to's of what does and does not work when structuring groups and assessing learning is missing. Likewise, the question faced by many in today's postsecondary institution is how learning can be maximized (Derntl & Motschnig-Pitrik, 2005). Some of the current research consists of descriptive or experience-based reports, not best practices that have been researched. This correlational research study offered one possible answer to how learning can be maximized so that instructors can have one instructionally sound approach to increasing soft skills by facilitating a problem-based cooperative teamwork environment.

Overview of the Study

This study examined the effects of two variations of the problem-based instructional approach, both using the same assessment strategy but using different cooperative grouping strategies in a soft sciences courses. The sample consisted of undergraduate students enrolled in a senior Arts and Sciences Capstone blended learning course at a private university. The study investigated the influence of three independent variables: type of problem-based instructional model, type of cooperative group formation, and job role assignments. The dependent variables examined were student achievement and satisfaction within the different problem-based instructional models, student achievement and satisfaction within the different cooperative grouping strategies, and student achievement and satisfaction using different job role assignment methods.

CHAPTER II

LITERATURE REVIEW

Introduction

Empirical data has shown that the problem-based instructional approach can be effective within the hard sciences; it may help students develop decision-making skills by enhancing their self-direction and familiarity with real-world tasks (Savery, 2009). However, since some of the research has occurred within the hard science disciplines and achievement data has been based on mastery of discipline knowledge, it is not clear if a problem-based model should be used in the soft sciences or how it is helpful in improving students' soft skills. Research is needed to determine if the same, traditional model and strategies used with the hard sciences would work or if a revised problem-based instructional model and strategies is needed for the soft sciences. In many of the researched problem-based instructional models, students work within cooperative groups that are structured in many different ways, leaving questions about the best grouping strategy. Within the models, the ways students have been evaluated or assessed has also varied with assessment largely based on the mastery of discipline knowledge, not soft skills. This study aimed to provide answers regarding which cooperative grouping and assessment strategies within a problem-based instructional model might be more effective in the soft sciences.

Theoretical Foundations

An instructional method or strategy and all of its parts should not be blindly taken and applied in different learning environments. The theory behind an instructional strategy and any other model or tool for learning must first be examined so that instructional decisions are based upon those theories that will achieve the desired results

(Knowles, 1978). By identifying the theories that support the various components, values, and contexts in an instructional model, research can "make testable hypotheses about the preconditions and activities likely to result in a high level of learning" (Shea, 2007). The models and strategies used within the models in the proposed study are all based upon learning theories.

Social constructivism. In his 1938 book *Experience and Education*, John Dewey stated, "education is essentially a social process" (p. 58). His belief has remained a part of instructional and learning theory since. One such theory that values the social part of education is the social constructivist perspective. Based upon Vygotsky's *Mind in Society: The Development of Higher Psychological Processes* (1978), this theory focuses on the importance of social learning through peer interactions within and outside of each learner's own culture. It suggests that social learning and interaction with peers helps students gain deeper knowledge that they could use for critical thinking and problem-solving skills later in life. Vygotsky found that when a student did not possess knowledge on his or her own, that he or she expanded learning by working with others (Gokhale, 1995).

Therefore, through a social constructivist view, social activities are important because the learner is limited by his or her own culture; learning can be further developed through interaction with others. According to Vygotsky, engaging in this type of learning would be internalized over time and improve the student's ability to think critically and problem-solve. The learner's ability to achieve more when he or she collaborates is what Vygotsky called the zone of proximal development. The zone of proximal development lies between two mediating factors: the learner's physical mental development and his or her potential for development (see Figure 3). As displayed in the image, the learner's mental development can be expanded with assistance and cooperation; however, without the social activity, the learner cannot reach beyond his or her current ability range.

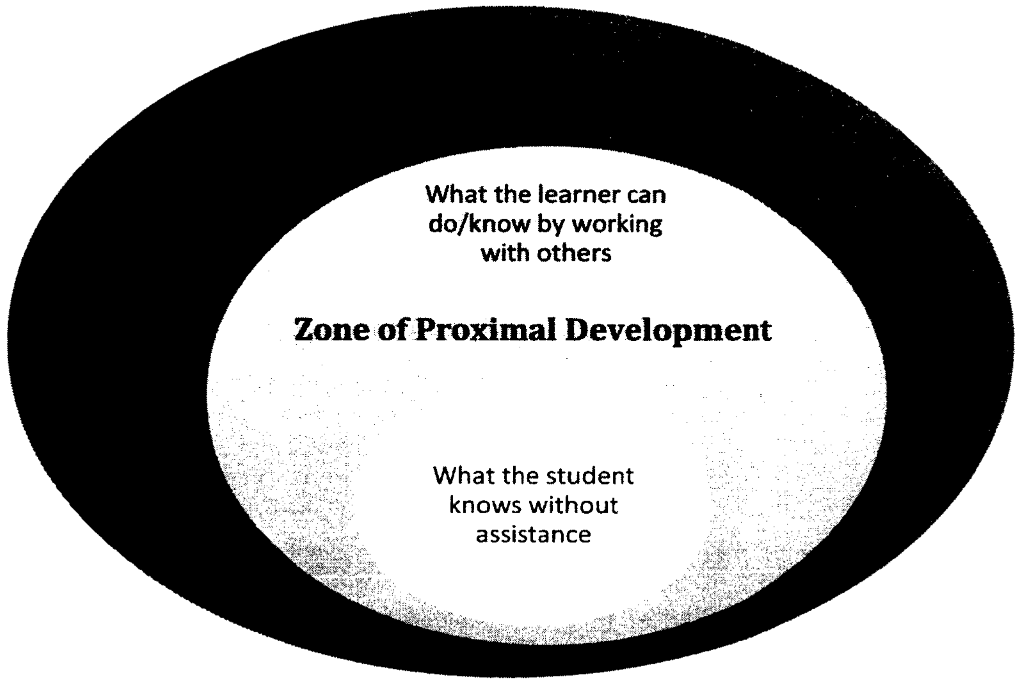

Figure 3. Zone of Proximal Development. This figure shows the limited knowledge the learner possesses without assistance. Adapted with permission from "Using the 'Zone' to Help Reach Every Learner," by D. Silver, 2011, *Kappa Delta Pi Record, 47*, p 30. Copyright 2011 by Kappa Delta Pi Record.

In summary, the social constructivist perspective has three underlying assumptions: reality is constructed by human interaction, knowledge is socially and culturally constructed by humans, and learning occurs through social engagement (Kim, 2001). Through this perspective on education, learning is a shared experience and social processes are necessary to the learning process (Rovai, Ponton, and Baker, 2008). Ronteltap and Eurelings (2002) explain that since problem-based instructional models require students to make choices and direct their own learning through collaboration, it is a social constructivist approach to learning. Harland's (2003) study successfully applied the social learning theory of Vygotsky's zone of proximal development (ZPD) in a problem-based Zoology program. His research has been cited as providing a theoretical framework for problem-based education. Harland suggests that a problem-based learning environment should follow the same pattern of learning as specified in the theory behind the ZPD: Start with the learner's current knowledge and skills; put learners into groups; learners discuss what they know about the problem; learners decide what they need to find out about the problem (setting their own learning objectives); the instructor provides scaffolding as needed; and scaffolding is reduced so that learners become confident in their own abilities. Much of what Harland has outlined can be found in the problem-based instructional models used in the hard sciences.

Andragogy. Another theory to consider when reviewing instructional models is that of the learner's age. Debates over theories of pedagogy and andragogy have spanned the twentieth and Twenty-first century and have often been brought up during discussion of best instructional models. This is an important area to research since the social constructivist perspective may neglect to address what some have suggested are developmental differences between humans at different ages. One of the first researchers to theorize differences between the learning of adults and children and suggest a change from the practices of pedagogy to andragogy was Malcolm Knowles. In his writings, Knowles (1970, 1978) states that adult learners have unique characteristics. He explained that adult learning and the practice of andragogy is different from the practice of pedagogy in four ways:

- Self-concept: adults need to be viewed as self-directing, whereas children are dependent.

- Learner experience: adults see their experiences as who they are and that they are important, whereas children define themselves through others and experiences.
- Readiness to learn: adults learn for performance in social roles, whereas children learn for academic or biological development.
- Learning orientation: adults need immediacy in knowledge application or a problem-centered approach, whereas children need a subject-centered approach.

Later, Knowles (1984) added a fifth difference:

- Motivation to learn: adults are motivated by internal factors such as self-esteem, whereas children are motivated by external factors such as parents and instructors.

More recently, Knowles, Holton, and Swanson (2005) added an additional sixth difference:

- Need to know: adults need to first understand why they should learn something, whereas children only need to know what is required for grade promotion.

These six assumptions regarding adult learning provide a model for andragogy in practice (see Figure 4).

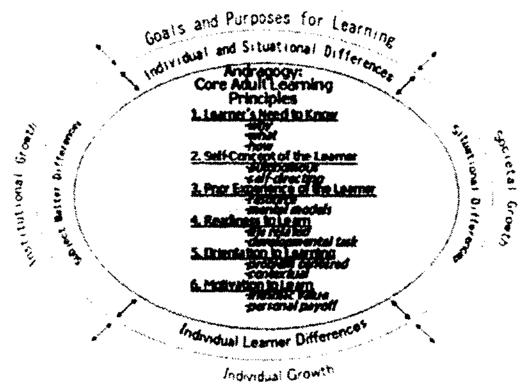

Figure 4. A Model for Andragogy. This figure shows the six assumptions of adult learning and explains these assumptions in relation to other factors such as cognitive development, societal or cultural constraints. Adapted with permission from *The adult learner: The definitive classic in adult education and human resource development* by M. S. Knowles, E. F. Holton III, & R. A. Swanson, 2011, p. 4. Copyright 2011 by Elwood F. Holton and Richard A. Swanson.

As shown in Figure 4, the theory of adult learning occurs within a cultural or social context. The influence of culture and society on adult learning has been examined by other researchers. Jarvis (2012) stated, "once people have learned, they have become more experienced and have therefore changed, so that learning is itself one of the social processes that helps create the conditions for yet more learning" (p. 209). Jarvis continues to explain that this change continues throughout life. Therefore, the theory is that adult learning cannot be separated from the cultural or social context in which it occurs.

However, is age an important factor for choosing an instructional approach? Would the age of students affect their ability to achieve within an instructional model? Knowles's early theory of andragogy would suggest that age is a factor and that older students will learn differently and need to be taught in a different instructional model. A decade later Knowles (1989) revised his early statement that andragogy was a theory of adult learning, suggesting that instead it was a theory of assumptions about learning. He also began to suggest that andragogy was not based upon a learner's age, but based upon a learner's ability to self-directedness. An adult may learn in what some may term a pedagogical model (instructor-directed) while a child may learn in what some may term an andragogical model (student-directed). Despite this acknowledgement, there are still debates between adult learning and child learning, with some suggesting age does have an impact on a student's achievement and age should be considered when choosing instructional models.

Adding to the confusion, some researchers refer to instructional approaches, models, and strategies used as pedagogy while others refer to them as andragogy, suggesting a model is best used with either adults or children. One such approach is the problem-based one. As the approach continues to be researched, some researchers say it clearly supports andragogical assumptions about learning because of the focus on student-directed learning and soft skills (Biley & Smith, 1999; Milligan, 1999; Williams, 2001). Despite this growing acknowledgement, research on the problem-based approach continues to be described as pedagogical (Hmelo-Silver, 2004; Kirschner, Sweller & Clark, 2006; Major & Palmer, 2001; Milne & McConnell, 2001; Savin-Baden & Major, 2004; Smith, Sheppard, Johnson, & Johnson, 2005), incorrectly implying that the approach is more instructor-directed and best fit for a child. The inconsistent use of the terms pedagogy and andragogy makes it hard to determine if researchers use of the terms mean an approach is effective only within a certain age group or if an approach is more instructor-or student-directed.

Community of Practice. Another theory that should guide the use of an instructional model or strategy is the values associated with the learning system. While social constructivists theorize that social cooperation is important for a learner to reach higher levels of knowledge and andragogy theorizes that student-directed learning must consider the culture in which the learning takes place, the community of practice theory provides a framework for bringing the values of both learning theories together to create a framework for a learning system. In short, a community of practice provides the "basic building blocks of a social learning system because they are the social 'containers' of the competencies that make up such a system" (Wenger, 2000, p. 229). According to Wenger, the three parts of the theory include group members understanding their purpose as a group and being responsible to each other (mutual engagement) working together (joint enterprise), and sharing resources (shared repertoire). By engaging in the three parts of the theory, members of the group form a community and learn to be a part of a group or community, too (Holmes & Meyerhoff, 1999).

Each part of the theory, then, provides principles that could be used to foster a community of practice learning environment. According to Rogers' (2000) research that tested the application of a community of practice framework in an instructor preparation program, the principles provide the necessary guidelines to foster community in a learning environment (see Table 3).

Table 3

Principles of a Community of Practice Framework

Principles to Facilitate Mutual Engagement	Principles to Facilitate Joint Enterprise	Principles to Facilitate Shared Repertoire
Structuring activities so that each learner has the possibility to assume an active and central role. With less experienced members, the instructor may have to help them determine appropriate roles and trajectories.	Structuring activities so that the participants are able to negotiate successful completion of goals (e.g. provide ill-defined problems for which the solution trajectory as well as the solution itself is negotiated).	Encouraging exploration and evaluation of the artifacts within the community.
Structuring activities to tap into the background/experience/knowledge of the participants. These activities may also be targeted at emergent experiences and knowledge (i.e. those that a unit is focused on).	Rather than assuming a more traditional teaching role, assuming the role of mentor providing guidance but not (always) answers.	Bringing in knowledgeable members who might be available to help the students understand:
	Encouraging reflection during the process	How one goes about 'doing things' in this community (the processes)?
	Encouraging development of multiple viewpoints	What is the shared culture (values, identities, roles)?
	Allowing for individual trajectories of participation (students may want to assume different roles at different times)	

The principles in this framework support the values of social constructivist and andragogical theory. This means if the framework was applied to the learning environment and the design of the instructional model and strategies, that environment and instructional model may support learning through social interaction and student-directed learning (see Table 4).

Table 4

Social Constructivist and Andragogy Theory within the Community of Practice Framework

Principles to Facilitate Mutual Engagement	Principles to Facilitate Joint Enterprise	Principles to Facilitate Shared Repertoire
Structuring activities so that each learner has the possibility to assume an active and central role. With less experienced members, the instructor may have to help them determine appropriate roles and trajectories. **Supports the social constructivist value of learning occurring through social engagement.* **Supports the andragogical principle of valuing the self-concept of the learner.*	Structuring activities so that the participants are able to negotiate successful completion of goals (e.g. provide ill-defined problems for which the solution trajectory as well as the solution itself is negotiated). **Supports the social constructivist value of reality being constructed by human interaction.* **Supports the andragogical principle of learner's need to know.*	Encouraging exploration and evaluation of the artifacts within the community. **Supports the social constructivist value of knowledge being socially and culturally constructed by humans.* **Supports the andragogical principle of orientation to learning.*
Structuring activities to tap into the background/ experience/knowledge of the participants. These activities may also be targeted at emergent experiences and knowledge (i.e. those that a unit is focused on). **Supports the social constructivist value of learning occurring through social engagement.* **Supports the andragogical principle of using the prior experience of the learner*	Rather than assuming a more traditional teaching role, assuming the role of mentor providing guidance but not (always) answers. **Supports the social constructivist value of learning occurring through social engagement.* **Supports the andragogical principle of valuing the self-concept of the learner.*	Bringing in knowledgeable members who might be available to help the students understand: -How one goes about 'doing things' in this community (the processes)? -What is the shared culture (values, identities, roles)? **Supports the social constructivist value of knowledge being socially and culturally constructed by humans.* **Supports the andragogical principle of motivation to learn.*

Principles to Facilitate Mutual Engagement	Principles to Facilitate Joint Enterprise	Principles to Facilitate Shared Repertoire
	Encouraging reflection during the process. *Supports the social constructivist value of learning occurring through social engagement. *Supports the andragogical principle of readiness to learn. Encouraging development of multiple viewpoints. *Supports the social constructivist value of reality being constructed by human interaction. *Supports the andragogical principle of orientation to learning. Allowing for individual trajectories of participation (students may want to assume different roles at different times). *Supports the social constructivist value of learning occurring through social engagement. *Supports the andragogical principle of orientation to learning.	

Soft Skills

While the theories that make up an instructional model are important, it is equally important to look at the desired results or learning outcomes one hopes students will achieve from learning in a particular model. This is important because a model should not be used if the learning outcomes do not align with the values or goals of the model. The types of outcomes should help instructors choose the underlying framework and instructional approach. The mastery of soft skills is one set of learning outcomes being emphasized in the twenty-first century college classroom. Soft skills are often called twenty-first century skills; however, many have pointed out the skills themselves are not unique to the twenty-first century (Rotherham & Willingham, 2010; Silva, 2009). Students across the decades have been expected to have soft skills, including the ability to problem-solve, think critically, and communicate. Levy and Murnane (2004) point out that these skills are just more important in the twenty-first century workforce because of the shift from hands-on tasks to computer-mediated or internet-specific tasks. In short, workers need to be able to access information using a computer, including demonstrating problem solving, critical thinking, and effective communication using technology. The environment in which students will need soft skills is different in the Twenty-first century because of the use of technology and global business (Kaufman, 2013). The re-emergence of the soft skills discussion reflects the shift from teaching students a standards-only mastery of discipline skills to teaching students to work in the new technology-rich and culture-diverse environment, which is more heavily dependent upon soft skills that previous centuries (Elrod, 2010; Rotherham & Willingham, 2010).

Despite the twenty-first century skills term, during the last decade of the twentieth century, educators, industry professionals, and researchers began to realize the need to include more than discipline-specific knowledge in one's college education (Caudron, 1999; Connell, 1998; Murnane, 1996). Soft skills were being recognized as the "skills, abilities, and traits that pertain to personality, attitude, and behavior rather than to formal or technical knowledge" (Moss & Tilly, 1996, p. 256). Specifically, it was felt soft skills should include interaction and motivation, including spoken communication, teamwork, commitment, and dependability.

Now in the twenty-first century, researchers, industry professionals, and educators have continued to advocate for students to learn soft skills during their postsecondary education. Educators have started to suggest that employers are beginning to place a greater emphasis on soft skills over technical skills (Grugulis & Vincent, 2009) and that "soft skills should be taught throughout programs, from the core to electives" (Stephens, 2013, Further Skills, para. 2). Industry professionals also suggest the lack of soft skills mastery among college graduates hurts these graduates with employability because they do not have the skills companies require (Microsoft, 2012). In a 2012 report based upon an alliance between Cisco, Intel, and Microsoft, the companies found that "one in four chief executives said they were unable to pursue a market opportunity or had to cancel or delay a strategic initiative because they could not hire the right talent" (Microsoft, para. 3). Another finding was that "one in three of the 1,258 international CEOs polled for the report expressed concern that skills shortages will impact their company's ability to innovate" (Microsoft, 2012, para. 3). Likewise, research is emerging that identifies which soft skills are most appropriate within the disciplines and sometimes making curriculum suggestions on how to facilitate such skill knowledge within the disciplines: business (Adams & Morgan, 2007; Bennis & O'Toole, 2005), computer science (Bancino & Zevalkink, 2007; Zhang & Spiteri, 2012), engineering (Kumar & Hsiao, 2007), and medical sciences (Gonzales, Kasim, & Naimie, 2013; Sherman & Pross, 2010).

Hearing the cry for soft skills education, organizations such as the Partnership for 21st Century Skills, the North Central Regional Educational Laboratory (NCREL), the Metri Group, and the Educational Testing Service (ETS) have each attempted to define soft skills and provide frameworks to guide curriculum. Specifically, the NCREL and

Metri group (2003) specified four areas of needed soft skill development and explained what type of knowledge should be gained within each category (see Table 5): digital-age literacy, inventive thinking, effective communication, and high productivity.

Table 5

Soft Skills and Their Components

Digital Age Literacy	Inventive Thinking	Effective Communication	High Productivity
Basic Literacy: Language proficiency at levels necessary to function on the job	***Adaptability and Managing Complexity:*** The ability to modify one's thinking, attitude, or behavior to be better suited to current or future environments; and the ability to handle multiple goals, tasks, and inputs, while understanding and adhering to constraints of time, resources, and systems (e.g., organizational, technological).	***Teaming and Collaboration:*** Cooperative interaction between two or more individuals working together to solve problems, create novel products, or learn and master c ntent.	***Prioritizing, Planning, and Managing for Results:*** The ability to organize to efficiently achieve the goals of a specific project or problem.

Digital Age Literacy	Inventive Thinking	Effective Communication	High Productivity
Scientific Literacy: Knowledge and understanding of the scientific concepts	***Self-Direction:*** The ability to set goals related to learning, plan for the achievement of those goals, independently manage time and effort, and independently assess the quality of learning and any products that result from the learning experience.	***Interpersonal Skills:*** The ability to read and manage the emotions, motivations, and behaviors of oneself and others during social interactions or in a social-interactive context.	***Effective Use of Real-World Tools:*** The ability to use real-world tools—the hardware, software, networking, and peripheral devices used by information technology (IT) workers to accomplish 21st century work—to communicate, collaborate, solve problems, and accomplish tasks.
Economic Literacy: The ability to identify economic problems, alternatives, costs, and benefits and analyze the incentives at work in economic situations.	***Curiosity:*** The desire to know or the spark of interest that leads to inquiry.	***Personal Responsibility:*** Depth and currency of knowledge about legal and ethical issues related to technology, combined with one's ability to apply this knowledge to achieve balance, integrity, and quality of life as a citizen, a family and community member, a learner, and a worker.	***Ability to Produce Relevant, High-Quality Products:*** The ability to produce intellectual, informational, or material products that serve authentic purposes and occur as a result of students using real-world tools to solve or communicate about real-world problems. These products include persuasive communications in any media (print, video, the Web, verbal presentation), synthesis of resources into more useable forms (databases, graphics, simulations), or refinement of questions that build upon what is known to advance one's own and others' understanding.

Digital Age Literacy	Inventive Thinking	Effective Communication	High Productivity
Technological Literacy: Knowledge about what technology is, how it works, what purposes it can serve, how it can be used efficiently and effectively to achieve specific goals.	***Creativity:*** The act of bringing something into existence that is genuinely new and original.	***Social and Civic Responsibility:*** The ability to manage technology and govern its use in a way that promotes public good and protects society, the environment, and democratic ideals.	***Prioritizing, Planning, and Managing for Results:*** The ability to organize to efficiently achieve the goals of a specific project or problem.
Visual Literacy: The ability to interpret, use, appreciate, and create images and video using both conventional and 21st century media in ways that advance communication	***Risk Taking:*** The willingness to make mistakes, advocate unconventional or unpopular positions, or tackle extremely challenging problems without obvious solutions, such that one's personal growth, integrity, or accomplishments are enhanced.	***Interactive Communication:*** The generation of meaning through exchanges using a range of contemporary tools, transmissions, and processes.	***Effective Use of Real-World Tools:*** The ability to use real-world tools—the hardware, software, networking, and peripheral devices used by information technology (IT) workers to accomplish 21st century work—to communicate, collaborate, solve problems, and accomplish tasks.

Digital Age Literacy	Inventive Thinking	Effective Communication	High Productivity
Information Literacy: The ability to evaluate information across a range of media; recognize when information is needed; locate, synthesize, and use information effectively; and accomplish these functions using technology, communication networks, and electronic resources. ***Multicultural Literacy:*** The ability to understand and appreciate the similarities and differences in the customs, values, and beliefs of one's own culture and the cultures of others.	***Higher-Order Thinking and Sound Reasoning:*** The cognitive processes of analysis, comparison, inference and interpretation, evaluation, and synthesis applied to a range of academic domains and problem-solving contexts.		***Ability to Produce Relevant, High-Quality Products:*** The ability to produce intellectual, informational, or material products that serve authentic purposes and occur as a result of students using real-world tools to solve or communicate about real-world problems. These products include persuasive communications in any media (print, video, the Web, verbal presentation), synthesis of resources into more useable forms (databases, graphics, simulations), or refinement of questions that build upon what is known to advance one's own and others' understanding. ***Prioritizing, Planning, and Managing for Results:*** The ability to organize to efficiently achieve the goals of a specific project or problem.

Digital Age Literacy	Inventive Thinking	Effective Communication	High Productivity
Global Awareness: The recognition and understanding of interrelationships among international organizations, nation-states, public and private economic entities, sociocultural groups, and individuals across the globe.			

Note. Adapted from "enGauge 21st Century Skills: Literacy in the Digital Age" by NCREL and Metri Group, 2003, retrieved from http://pict.sdsu.edu/engauge21st.pdf

While Table 5 provides a detailed overview of the types of soft skills students need to have, research that suggests clear and effective instructional models and strategies is missing. Instructors, who are experts in their subject matter, may not know how to teach or assess soft skills. Since much of a student's education is composed of mastering discipline knowledge and technical skills, it may be ineffective for the hard sciences to require student mastery of both discipline skills and soft skills at the same time. It may be more effective for soft skill competencies to fall within the general education courses through such soft science courses as English, Humanities, and Communications, where the learning outcomes can be solely soft skills based. In fact, there is a history of soft skill instruction within the general education or soft science courses, but there is no instructional model research that specifically address how instructors should design their courses, use instructional models or strategies, or assess soft skill learning (Beard, Schwieger, Surendran, 2008; Huber, 2002). The best option may be for instructors to look at which instructional models have been used in the hard sciences that foster soft skills and apply these models in the soft sciences' environment.

The disciplines. The mastery of discipline-specific or hard-skills knowledge, such as computer programming for a computer science student or medical terminology for a medical student, may be the job of a student's discipline-specific courses. Therefore, the job of general education and soft science courses may be to educate students on the soft skills they will need to be successful in their professional career. According to Aloi, Gardner, and Lusher (2003), "it is not sufficient for colleges and universities to train students for mere technical competence," implying that soft skills instruction must take place (p. 237). Decades of debate over the role of the general education courses is still ongoing in the Twenty-first century, despite the development of general education competencies that encourage the following soft skills:

- higher-order applied problem-solving skills
- enthusiasm for learning on a continuous basis
- interpersonal skills, including teamwork and collaboration
- oral and written communication skills
- sense of responsibility for action, both personal and collective
- ability to bridge cultural and linguistic barriers
- sense of professionalism (Aloi, Gardner, & Lusher, 2003, p. 241).

Since the role of the general education course can be ambiguous, it is not surprising that studies offering instructional strategies that explain how the general education courses can facilitate soft skills mastery may be rare. The expectation seems to be that the soft science/general education courses will, in some way, help students develop soft skills, but few studies have provided instructors with a complete instructional model they can use (Mazer, Hunt, & Kuznekoff, 2007). Perhaps a new instructional model is not needed; the successful models and strategies used in the hard sciences may work in the soft sciences.

Contemporary Learning Environments

Another component to consider when choosing an instructional model or strategy is the structure of the actual learning environment. The framework used in the actual learning environment should be aligned or overlaid onto the chosen instructional model so that the way students learn fits where and how they are learning. This can be especially difficult in the twenty-first century where students are not receiving their instruction in a face-to-face only learning environment. Students can participate in classes through online-only distance education programs or a combination of an online learning and face-to-face environment, which is often called a blended learning classroom. While there is not a concrete definition for the blended learning classroom and often disagreement over the terminology blended or hybrid, the best description of the blended learning classroom is that it is a learning environment that contains both the virtual and traditional learning environments (Stacey & Gerbic, 2008).

Due to the emphasis on technology integration in the classroom, recent estimates predict that as many as 90% of college courses could someday be defined as using a blended learning environment (Young, 2002). Changes in the learning environment, sometimes based upon the growth of technology, impacts the instructional methods used and students' evaluation of a course's effectiveness and satisfaction. Garrison and Vaughan (2008) point out,

> Higher education institutions must address changing expectations associated with the quality of the learning experience and the wave of technological innovations. Participants in the higher education enterprise are questioning traditional approaches and whether they are achieving the high levels of learning promised. (p. ix)

In order to improve the quality of the learning experience in higher education, the college classroom must use technology in a meaningful and educational way. Any instructional model being proposed must consider how the model supports the learning environment's framework and provides students with a high quality learning experience.

Blended learning environment. Since the blended learning environment is becoming increasingly popular, if an instructor wants to use a model in this environment then he or she should evaluate the values associated with the environment's framework. This may begin with first understanding why the blended environment exists. Garrison and Kanuka (2004) state that one affordance of this environment is that face-to-face lectures can be replaced with more meaningful learning activities. This notion supports an earlier one made by Singh (2003) in which he points out no single learning delivery model can facilitate successful learning and performance because it is limiting; the blended model is better because of its variation in choice. One more affordance of the blended learning space is the flexibility for students. Students today have increasing work and family obligation, resulting in the need for flexible access (Ginns & Ellis, 2007; Oh & Park, 2009). The combination of face-to-face instructional strategies, such as the lecture, with online instructional strategies such as the threaded discussion forum, has been shown to have a positive impact on student learning and in decreasing psychological distance (Gerber, Grund, Grote, 2008; So & Brush, 2008). With these factors in mind, it is important to consider the ways in which an instructional model can be used within a blended learning environment.

Online learning environments. Since frameworks for blended learning environment are limited, the values of the frameworks used in online-only learning environments may be aligned with the instructional model being used. Anderson (2008) suggests a theoretical framework of online learning that includes many of the components found in the problem-based instructional model, but he makes suggestions on how to use technology to build the sense of community so important to student achievement and satisfaction (see Figure 5).

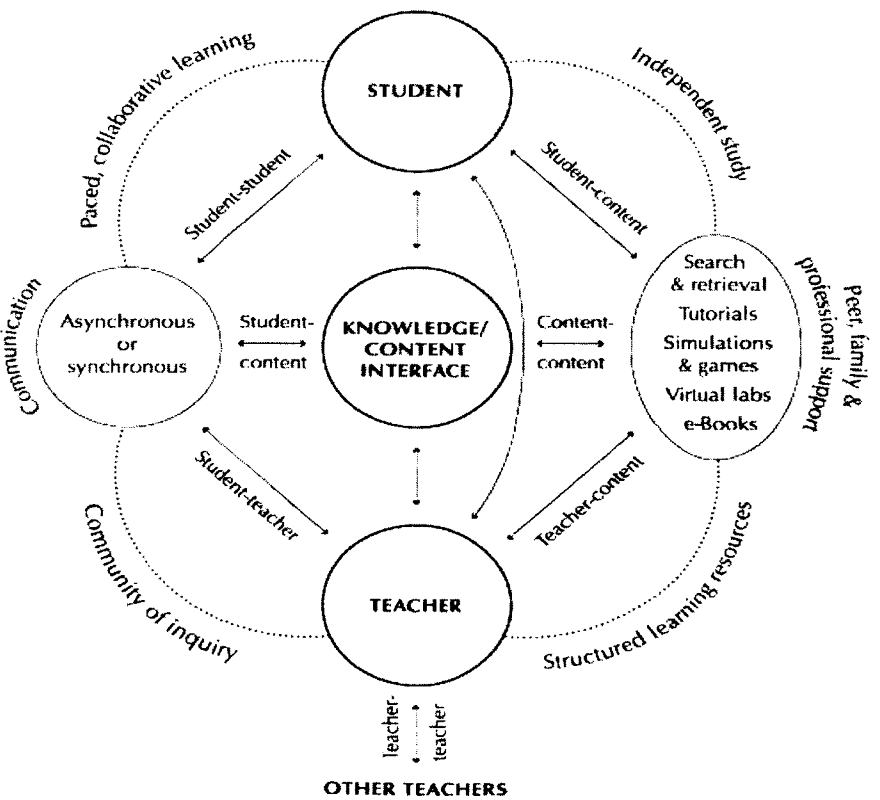

Figure 5. Model for Online Learning. This figure shows a framework for online learning that include multiple types of interaction. Adapted from "Toward a Theory of Online Learning," by T. Anderson, 2008, *Theory and Practice of Online Learning* (2nd ed.), p. 33. Copyright 2004 by Athabasca University.

Anderson's framework places all interaction and instruction within a community. The importance of this community is a vital part of higher learning (Garrison & Arbaugh, 2007; Rovai, 2002). A lack of interaction within the community or a feeling of isolation has often been cited to be a problem with online learning environments (Curry, 2001; Haythornwaite, Kazmer & Robins, 2000). Fostering interaction between students is an important characteristic of the online spaces (Palloff & Pratt, 1999). Moreover, educational quality may be affected by communication and community building, which are considered ideal characteristics to fulfilling the learning effectiveness part of the Sloan Consortium's Five Pillars of Quality Framework (see Figure 2).

Anderson's framework on the importance of community within the online classroom could be applied as values when designing a problem-based instructional model. Also, following the five pillars of quality online learning from the Sloan Consortium, it is obvious that learning effectiveness has an impact on student satisfaction, which is one of the dependent variables in determining the effectiveness of the proposed problem-based model. Therefore, the importance of learning effectiveness should not be ignored. Just as the instructional frameworks proposed for the traditional classroom may have gaps in the research concerning cooperative grouping and evaluation strategies, the online frameworks may not specify the strategies that can be used to facilitate learning in a social, cooperative way. For example, student-to-student interaction is described as a component of Anderson's (2008, 2004) framework for the online learning environment. What a framework does not do is specify which instructional models or strategies should be used to facilitate this type of interaction. There is gap in the research in regards to which models and strategies are successful in facilitating the interaction and social engagement needed for learning and student satisfaction.

Problem-Based Instructional Models

According to Gustafson and Branch (2002), instructional models offer a consistent and reliable way of creating or planning educational experiences. While the first problem-based instructional model was developed in higher education medical programs over forty years ago (Donner & Bickley, 1993), problem-based instructional models vary across different grade levels and within different fields. This makes it difficult to distinguish a consistent and reliable way to use the problem-based approach. Despite its variance in use and methods, problem-based approaches can be broadly defined as one in which learning occurs through student interaction within the context of a problem (Barrows, 1996; Savery & Duffy, 1995).

Problem-based models in the hard sciences. Adding to the lack of consistency, much of the research on problem-based instruction in higher education has been based in the engineering or medical field. In their research with engineering programs, Noordin, Nasir, Ali, and Nordin (2011) suggest that the problem-based instructional model should be based upon solving issues through case study. The students should brainstorm solutions, which are presented to the class. Then the project is divided by the faculty member into six steps: meet the problem, identify/analyze problem, synthesize/apply, review work progress, share solutions, and close the problem. In their description of a problem-based instructional model for engineering courses, specific guidance on grouping strategies and assessment methods are not explained. This leaves those who want to use this model with many different options to facilitate groups and conduct assessment but without clear answers about which strategies are best.

Since the problem-based instructional approach originated in the medical sciences, it is not surprising that most of the research thereafter has occurred in medical disciplines. Benson, Noesgaard, and Drummon-Young (2001) suggest that that problem-based instructional models should specify groups between five and ten students, all students should have clear roles, the learning environment should be face-to-face, and there should be a day between class sessions. Likewise, other medical researchers have suggested that problem-based instruction should begin with the instructor assignment of a problem and review the vocabulary needed to understand the problem. Students should then generate hypotheses, identify information needed, and gather the information. The end product should be a discussion of the learned knowledge, a debate over the solution, and student reflection (Rideout & Carpio, 2001). Others who have applied problem-based instructional models in the medical sciences have warned of students dividing the task and not working together, which in turn shifts the focus from the actual cooperative learning process to completion of a collaborative product (Matheson and Haas, 2010). These researchers stress the importance of having students understand that problem-based learning is about the process, not the task, and that they have "a common goal and share the responsibility of solving the problem, be mutually dependent and value each other's input" (p. 19). In other words, it is important to stress the soft skills valued in the model.

Similarities and differences among problem-based instructional models. Reviewing the numerous research studies on problem-based instructional models across the disciplines, instructional design researchers have attempted to put together clear problem-based instructional models. The following characteristics demonstrate the common characteristics of a problem-based instructional model as defined by Hung, Jonassen, and Liu (2008), Hmelo-Silver (2004), Nelson (1999), and Savery (2009):

- An authentic, real problem
- The problem should be ill-structured
- The instructor should act as tutor, scaffolding where it is needed
- The instructional should end with a closing debriefing or summary
- Students should work on cooperative groups
- Students should have individual responsibilities to the group
- Assessment should be authentic and formative/summative

Despite these similarities, Nelson (1999) and Savery (2009) both outline two problem-based instructional models, but they do not provide answers regarding two of the major components of problem-based instruction: how should cooperative groups should be designed and how should assessment conducted? Savery states, "a small-group format [five-seven members] appears to be the most effective" (p. 160); however, Nelson suggests that groups be composed of three to four members. She also provides more guidance than Savery regarding the type of students within the group. Whereas Savery suggests instructor-created groups, Nelson suggests student-selected groups that are heterogeneous in "gender, ethnicity, relevant pre-existing knowledge or skills, and previous experience with working on a team" (p. 259) but homogenous in age, interest level, and learning ability. She broadly states that students' roles within the group must be defined and that the instructor may find it necessary to help with this process. With the disagreement among experts concerning the use of cooperative grouping strategies in problem-based instructional models, it is not surprising that the research testing problem-based models also varies between using cooperative grouping strategies similar to Nelson's specifications (Cheaney & Ingebritsen, 2005) or Savery's specifications (Lohman & Finkelstein, 2000). This leads those wishing to use a problem-based model to wonder about the best way to facilitate cooperative groups or some to infer that the grouping strategy might not matter.

This inference is incorrect; research on cooperative grouping strategies outside of the problem-based approach has shown differences in achievement between student groups (Johnson, Johnson, Stanne, Garibaldi, 1990; Onwuegbuzie, Collins, & Jiao, 2009). In Johnson, et al's (1990) study, they tested whether group size, instructor or student-directed tasks, and instructor or student-chosen group roles impacted student achievement when working in cooperative problem-solving groups. They found that students in the cooperative, small, randomly chosen (heterogeneous), instructor-directed, and instructor-chosen group roles did achieve higher than students working alone or in a larger, student-directed group. These results would suggest that an instructor should use small, instructor-led heterogeneous cooperative groups. However, in trying to create an active learning environment that emphasizes cooperative grouping among students, Onwuegbuzie, et al.'s (2009) study allowed students to form cooperative groups with classmates of the same academic major or profession. This was a type of homogeneous grouping. Their quantitative data showed that heterogeneous grouping did not have a strong effect on the group's achievement with the cooperative task and what was important was the student's individual abilities. The research on the effectiveness of different cooperative grouping strategies is important but can be contradictory as exemplified in Johnson's and Onwuegbuzie's research studies. This makes it hard to decide on a strategy to use within an instructional approach, such as the problem-based method. Guidance is needed to identify which cooperative grouping strategies are effective within the model itself.

Another part of the problem-based instructional model that is missing concerns the assessment strategy. Nelson advocates for multiple assessments throughout any problem-based model. She suggests group and individual grades that evaluate the final product and process and that final grades be based upon "having a portion of the final grade reflect evaluations of individual products…part can also reflect an evaluation of an individual by fellow group members" (p. 254). On the other hand, Savery suggests assessment should be based on content knowledge, problem-solving skills, and higher-order thinking. He does not address how final grades should be calculated, but he does encourage formative assessment throughout the process and summative assessment, as needed. Clear suggestions for the assessment strategy in a problem-based model may be unclear and tend to vary among researchers, making it hard to distinguish best assessment practice.

Cooperative grouping strategies. The advantages to having students work together to complete group assignments are numerous. Jonassen, Peck, and Wilson (1999) supported this claim by emphasizing that learning is best when students share information and solve problems together. Research on group assignments has found that teamwork allows students to learn to work with others, create new perspectives, produce much better work than they would alone, and construct knowledge through dialogue and authentic experiences (Comeaux & McKenna-Byington, 2003; Ingram and Hathorn, 2004; Kozar, 2010). Often, cooperative groups are seen as being more appropriate in the problem-based instructional model, due to the focus on reaching a shared end result (Slavin, 1996). Two of the fundamental characteristics of a cooperative group structure are that the assignment is more structured by the instructor and students may divide the labor of the assignment or each may take responsibility for completing a particular part of the assignment as defined by the instructor (Paulus, 2005).

However, the methods behind cooperative grouping strategies vary greatly. Johnson, Johnson, and Stanne's (2000) conducted a meta-analysis investigating the many types of cooperative grouping strategies used in research and found that "cooperative learning is actually a generic term that refers to numerous methods for organizing and conducting classroom structure" (para. 6). In their review of 194 research articles, they could find no one best way to structure cooperative groups. This finding supports one of the issues mentioned previously in the problem-based instructional models: there are numerous ways to facilitate cooperative groups. Cooperative grouping strategies should be based on the general principles that empirical research has consistently found to be the most effective. These principles include:

- The task is instructor-created (Panitz, 1999)
- The task is not competitive; all group members are equally responsible (Johnson, Johnson, & Holubec, 1986)
- Students establish norms for behavior (Webb, Farivar, & Mastergeorge, 2001)
- Students participate through management roles with prescribed behaviors (Webb, Farivar, & Mastergeorge, 2001)

Using role assignment and social loafing. One of the characteristics most often attributed to cooperative groups is the practice of including individual role assignments as a component of teamwork. Some have argued that this is an essential element and can be used to prevent the well-known issue of "social loafing" in group work situations by encouraging equal participation among group members (Kelley & Sadowski, 2005). Social loafing, which is also called free riding, can best be described as behavior where a student fails to share group responsibilities or contribute fairly through the eyes of other group members (Aggarwal & O'Brien, 2008). Previous research has found that students' achievement may be effected and students may avoid group assignments or express dissatisfaction with group assignments because of dysfunctional group issues, such as social loafing (Bacon, 2005; Pauli, Mohiyeddini, Bray, Michie, & Street, 2008; Peterson & Miller, 2004). Student satisfaction within group assignments is an important construct because of previous research that has found low student satisfaction may lead to poor achievement and reduced degree completion (Guàrdia-Olmos, Peró-Cebollero, Freixa-Blanxart, Turbany-Oset, & Gordóvil-Merino, 2013; Suhre, Jansen, & Harskamp, 2007). Further, when group assignments are given, many faculty members may incorrectly feel that any type of group assignment, regardless of student preparation, will be more effective than direct instruction (Hansen, 2006). However, simply assigning group assignments does not always equate to students' achievement.

Despite the fact that social loafing and its effects of student achievement and group assignments is a well-known issue among educators, there has been little research that explains why this behavior happens and what instructional strategies should be used to confront and resolve this issue. Recent research that investigated the reasons behind social loafing suggested that student perception of social loafing may be due to perceived inequalities within the group, ranging from a perceived lack of skills or lack of fair contribution (Hall & Buzwell, 2013). Individual role assignments within group assignments might aid in reducing the perception of social loafing. By having clearly outlined role assignments, students could either choose or be assigned roles that match their skills and the perception of inequality might be lessened. Further, the use of clearly identified individual role assignments is a key component of successful teamwork and in preparing students for the collaborative and teamwork-focused workplace (Hansen, 2006).

Group formation strategies. Another cooperative grouping strategy to consider is the formation of the groups. In terms of group size and composition, there are many research studies that have tested different strategies. Some have advocated for student-selected groups (Bacon, Stewart & Silver, 1999; Chapman, Meuter, Toy, & Wright, 2006; Strong & Anderson, 1990), pointing towards research that showed students within the business disciplines who were in self-selected groups worked better together, showed a stronger commitment to each other, and valued each other higher than instructor-selected groups. Others have found less desirable effects of student-selected groups, including homogeneous group members who lacked diversity in skills (Hilton & Phillips, 2010). In their research on group-assignment in an accounting class, Hilton and Phillips conclude: "student-selected groups will yield more harmonious experiences, which some instructors might seek, whereas instructor-assigned groups are more likely to present social, communication, and organizational challenges that groups will need to overcome by exercising or developing team skills" (p. 31).

While much has been written on the value of roles in cooperative groups, questions remain about the best cooperative methods: what types of roles should students perform? Should students choose roles or should instructors choose them? What size should groups be? Should groups be structured based upon certain demographical characteristics? Do groups have to work together for a long period of time? Johnson, Johnson, and Smith (2007) point out that "considerable more research is needed on the basic elements that make cooperation work" (p. 27). With this in mind, the proposed study attempted to add to the body of cooperative research by providing answers to some of the questions above.

Assessment. The assessment strategy used throughout problem-based models tends to vary by subject matter; this is also the case in most cooperative group assignments. A multitude of questions arise over what should be assessed and how assessment should be conducted: should assessment occur through formative or summative measures?; should students assess themselves?; should the peers assess each other?; what type of assessment should the instructor perform?; and how much of a student's final grade should be based upon their self, peer, or instructor assessment? The answers to these questions all impact the instructional strategies used in the classroom.

The major question when determining the type of assessment to use in any instructional situation is which assessment strategy should be used: summative, formative, or both? Summative assessment is used "to describe learning achieved at a certain time for the purposes of reporting to parents, other instructors, [or] the pupils themselves" (Harlen & James, 1997, p. 370). This differs from formative assessment, which is an "iterative processes of establishing what, how much and how well students are learning in relation to the learning goals and expected outcomes in order to inform tailored formative feedback and support further learning" (Gikandi, Morrow, & Davis, 2011, p. 2337). Overall, summative assessment is used to assess what students have learned at the end of a lesson, unit, course, or program and formative assessment is used to assess what students have learned and still need to learn during the lesson, unit, course, or program. Both assessment strategies have been used in educational research to assess different types of student learning. According to Nicol and Macfarland-Dick (2006), formative assessment is a critical part of learning and "should be used to empower students as self-regulated learners" (p. 199). In their research, they sought to develop a model for self-regulation through formative assessment. They found that formative assessment can help student with self-regulation if the assessment helps students clarify what good performance is, facilitate self-assessment, delivers high quality feedback, encourages instructor-student dialogue, encourages motivation and self-esteem, provide opportunities to close the performance gap, and is used to improve teaching. In her review of the literature on using formative assessment in the classroom, Koh (2008) found that formative assessment practices have been noted to aid in the development of deep thinking, maintenance of motivation and self-esteem, encouragement of self-regulated learning, aid in employability, and provide students with quality feedback.

Both Nicol and Macfarland-Dick and Kohl's research has paralleled the research on summative assessment. In their review of the use of summative assessment, Gikandi, Morrow, and Davis (2011) conclude, "summative assessment has been the conventional form of assessment. It is commonly characterized by objective tests, pre-specified objectives and contents leading to uniformity of approaches, which mainly entail assessing general/broader content domains" (p. 2236). The main benefits of using summative assessment in education have been to help students learn how to be efficient learners and learn how to use grades to become more autonomous (Taras, 2010). Both types of assessment, therefore, may be parallel in helping students and instructors gain feedback from one another on how well learning objectives are being met. While the timing of the two types of assessment differ, many are beginning to suggest both types of assessment strategies should be used within an instructional model (Black & Wiliam, 2003; Taras, 2005; Wininger, 2005). By using both types of assessment, instructors may be able to assess to what degree and how students know information prior to the completion of some kind of representation of this knowledge. This could then allow instructors to help students with their weaker areas prior to students completing a final, summative deliverable (Black & Wiliam, 2012).

Summative and formative assessment strategies vary by the instructional method, learning environment, student age and grade level, and by discipline. In Black and Wiliam's (2009) analysis of the research on formative assessment methods in the classroom, they found that methods of formative assessment includes "sharing success criteria with learners, classroom questioning, comment-only marking, peer- and self-assessment and formative use of summative tests" (p. 3-4). There is research on the best formative assessment strategies in the problem-based instructional model, but each study suggests a different method. For example, Hung (2009) suggests that formative self-reflection through journals and weekly meetings focusing on the entire instructional process are essential parts to problem-based assessment. However, he and other researchers (Chin & Chia, 2004), who identify self-reflection as a crucial part of problem-based instruction, do not address peer or tutor assessment, summative assessment, or how much self-reflection should be involved in a student's overall grade. Those who do address the importance of peer assessment strategies (Papinczak, Young, & Groves, 2007; Sullivan, Hitchcock, & Dunnington, 1999) fail to give instructors a tool they can use, simply making often contradictory recommendations for what types of peer assessment strategy can be used: suggesting that the peer assessment be the same as the tutor and self-assessment; the assessment should be similar to a Likert-type response scale; the assessment should focus on problem-solving, independent learning, and group participation only; the assessment should be qualitative; that peer assessment and tutor assessment should be evaluated to reach an individual student's final grade; or that the assessment should only assess peer fulfillment of roles and responsibilities.

Assessment methods used in cooperative groups. Since the empirical data on problem-based assessment strategies may not offer clear or consistent suggestions for practical application, it may be important to evaluate what types of assessment have been effective within cooperative group activities. If an assessment strategy has been found helpful during cooperative group activities, then it may be useful in a problem-based model that uses cooperative group strategies. Using peer and self-evaluation in cooperative group work as both formative and summative measures is an expanding area of research. Research by Knowd and Daruwalla (2002) within the business discipline has suggested that one way to negotiate issues of group inequality is to have a peer and self-evaluation component in group learning environments. In their research, they found that a Likert- type response scale for peer and self-evaluation with 10 categories (quality of work, quantity of work, communication skills, initiative, efficiency, personal relations, group meeting attendance, attitude and enthusiasm, effort, and dependability) was most effective among small groups of students and helped students with self-monitoring. Students who were in the small groups using the evaluation tool rated themselves and peers higher on the evaluation categories and reflected closer relationships and reliance on each other within the groups.

Knowd and Daruwall's findings are similar to the findings of other researchers who have looked at ways to assess group work through peer and self-evaluation tools. Cheng and Warren's (2000) research within the engineering discipline offered a way to integrate a peer and self-evaluation tool into the individual grade earned by each student in a group. Their tool had five categories (ideas and suggestions for group project, literature search, literature analysis, preparing and planning of seminar presentation, preparation and planning of oral presentation, preparation and planning and writing of report) and students self- and peer-assessed the effort applied in these categories on a Likert-type scale. Their method for then computing students' individual grades was based upon Conway, Kember, Sivan, and Wu's (1993) suggestions where each student's average rating across all categories was computed and divided by the total average rating for all group members to calculate the Individual's Weighting Factor (IWF). The IWF was then multiplied by the instructor's assigned group project grade to calculate each student's final grade. Their findings suggest that Conway, et. al's method does help in accurately calculating each student's final grade and provides a more accurate method for grading individual contribution within groups.

Others methods for measuring achievement in group work have also been researched. Li's (2001) research with engineering students suggests an additional way to calculate peer and self-assessment scores into a student's individual grade within a group project. Li's students self- and peer-assessed on a Likert- type response scale with seven categories (initiative in generating ideas, contribution to the final design, manufacturing and prototype, analysis of the calibration data, computer programming, final report, and presentation). Li then added the sum of each peer's evaluation of group member and added this score with their self-evaluation score. The average group rating was computed and a student's final grade was determined by dividing each student's individual sum by the group average. However, Li found that some of the students' grades of each other were not consistent–some members of the group would rate a member very low or very high. To deal with this issue, Li proposed a normalization procedure in which a student's bias factor was calculated by dividing the student's average rating by the average rating given to other students in the same category. The bias factor was then divided by one to calculate each student's normalization factor. The final normalization factor was multiplied by the student's original rating. Li believed this gave students a more accurate grade and eliminated the bias associated with using peer evaluation scores.

In Esposto and Weaver (2011) research on assessing group work with economics students, students complete peer-evaluations. These peer evaluations were based on one rating. Students were given a score ranging from a negative one (perceived as being a liability to the group) to a positive four (perceived as being indispensible in completing the assignment). Each student's average was computed based upon an average rating. The instructor also assessed the group's final deliverable and assigned this deliverable a grade. Then individual students' final grades were calculated based upon adding what the researcher's called the Input Multiplication Factor (IMF) to each group average. The IMF for each student was determined by evaluating the average peer rating. If students had a high average peer rating, like 4.0, then the student's grade was given an additional 1.2 points. If the group's deliverable earned a 35/40 and the average peer rating for a student was 3.6, then the student earned a 42/40. Lastly, another assessment tool has been identified by Kelley and Sadowski (2005). In their study, students completed peer and self-evaluation first based upon their Likert-type-like assessment of work categories including quality, quantity, timeliness, and level of work and second based upon their evaluation of contribution percentage up to 100% for each group member. The average work category figure was then added to the average contribution figure and the instructor's overall grade of the group project.

Each of the assessment tools described above offers assessment strategies that might be applied in the problem-based model; however, the Kelley and Sadowski assessment measure may be easier, is ready-to-use, and one that instructors could use in any problem-based instructional environment. Their tool, unlike Knowd and Daruwalla's (2002), Cheng and Warren's (2000), Esposto and Weaver's (2011) or Li's (2001) allows students to self-evaluate on the same categories as the peer evaluation and includes clear descriptions of soft-skill based evaluation criteria. This tool could easily be taken and used in any classroom as is, without having to adjust for discipline.

Satisfaction

Student satisfaction has emerged as an important component of higher education. It is only in the twenty-first century that higher education institutions are increasingly recognizing that they have become part of the service industry with students as consumers (Elliott & Healy, 2001). It has been suggested that when students are satisfied, they tend to achieve better and retention is higher (Douglas & McClelland, 2008). However, satisfaction can be measured in many different ways, including satisfaction with achievement (Howard & Maxwell, 1980), satisfaction with grouping strategies (Baldwin, Bedell, & Johnson, 1997; Burdett & Hastie, 2003; Gatfield, 1999), and satisfaction with instructional quality (Ellis, Burke, Lomire, & McCormack, 2010).

Satisfaction in theoretical approaches. Perhaps to determine the best way to measure satisfaction with an instructional model or strategy is to first look at how student satisfaction has been evaluated with the theoretical approaches used in the model. When it comes to the problem-based model, the model includes social constructivism, andragogy, and community of inquiry theory. In their evaluation of student satisfaction within a cooperative (social constructivist) environment, So and Brush (2008) used a collaborative learning, social presence, and satisfaction (CLSS) questionnaire they created. Using this questionnaire, they found that student satisfaction was higher when the learning environment was perceived to be cooperative and had a strong social presence. This finding suggests that student satisfaction with a learning environment may be higher if the learning environment emphasized the foundations of social constructivism: human interaction, human knowledge construction, and social engagement. Richardson and Swan's (2003) research had similar results. They evaluated student satisfaction as an outcome of social presence using a revised survey tool originally created by Gunawardena and Zittle (1997) and found that higher social presence led to higher achievement. Both So and Brush's and Richardson and Swan's findings suggest that any model applying social constructivist principles should include measures of student satisfaction in social situations.

When looking at student satisfaction with the principles of andragogical and communities of practice, results are limited. Few studies on satisfaction with andragogical principles exist; this could be because of confusion over the terms pedagogy and andragogy. One study that sought to evaluate student satisfaction with andragogical learning processes in training programs found that satisfaction and grades were higher in andragogical groups (Holton, Wilson, Bates, 2009). Another study looked at andragogy principles by examining student satisfaction with rubrics, concluding that students were not satisfied with rubrics because of their limiting nature (Bolton, 2006). Likewise, few research studies have examined student satisfaction within a community of practice. Some of the ones that have emerged have focused on student satisfaction with a virtual community of practice. These studies have found that students expressed higher satisfaction with the learning environment and knowledge gained when there was a strong sense of community (Cadiz, Sawyer, & Griffith, 2009; Stacey, Smith, & Barty, 2004).

Satisfaction in instructional models. In terms of problem-based instructional model, previous research on student satisfaction with the theoretical principles that make up the model suggests that student satisfaction should be based upon perceptions of community, the learning process, and social presence. This matches the student satisfaction pillar with the Sloan Consortium's Five Pillars of Quality conceptual model. Concerning the student satisfaction pillar, the conceptual model suggests that student satisfaction be measured upon four values: community (engagement in the learning community), learning design (academic and administrative support services), assessment/research/evaluation (lifelong affiliation with community), and information technology (user-friendly interfaces) (Moore, 2005, p. 6). The similarities between the suggestions from research and the Sloan Consortium's conceptual model regarding what concepts make up student achievement provide a starting point in creating a tool for measuring student satisfaction. This study included the constructs when measuring student satisfaction with the proposed instructional model and strategies.

Achievement

Research suggests that student achievement is the most important part of evaluating instruction (Zhu, 2012). Problem-based instructional methods have a mixed history when it comes to student achievement. In their meta-analysis of problem-based achievement in the medical sciences, both Albanese and Mitchell (1993) and Dochy, Segers, Van den Bossche, and Gijbel (2003) found that medical students who received problem-based instruction did better on their clinical examinations. Other analyses of medical student's achievement in problem-based models have yielded varied results indicating everything from the model having no impact on achievement (Colliver, 2000) to a minimal impact (Smits, Verbeek, & DeBuisonje, 2002). There are similar findings within the other hard sciences: problem-based learning positively affecting student achievement in engineering (Reeves & Laffey, 1999) to having no significant effect (Mills & Treagus, 2003).

Achievement within problem-based instructional models. With varied results across student discipline-specific achievement within problem-based instructional models, it stands to question if perhaps student achievement should not be measured by discipline criterion. Perhaps it is best if student achievement within problem-based models focuses on the soft skills developed. In their meta-analyses of achievement in problem-based models, Gijbels, Dochy, Van den Bossche and Segers (2005) claim:

> PBL aims to educate students who are able to solve complex problems. To be congruent with its education goals and resulting instructional principles and practices, the assessment of the application of knowledge in solving problems is at the heart of the matter in PBL. Therefore, one could expect students in PBL to perform better at this level of the knowledge structure. (p. 46)

In other words, soft skills like problem solving should be used to measure student achievement in the model. The model is not designed to focus solely on the hard skills needed for employment within the disciplines.

Achievement of soft skills. How to the measure a student's achievement of soft skills is also a topic with varied answers. Lai and Viering's (2012) synthesis of the peer-reviewed research on soft skills achievement found that many types of assessments have been used, including self-reports, rating scales, standardized assessments, and observation. Based on the variance among assessment types, Lai and Viering (2012) suggest that there is currently no standard way to measure soft skills because each researcher uses a different assessment, uses different soft skill categories, and assesses different populations. They suggest multiple assessment methods be used to measure the same soft skills in a population and that achievement should be measured based on a combination of soft skills mastery. This notion is also supported by Greenstein (2012) whose book *Assessing 21st Century Skills* offered numerous four-level rubrics for assessing many types of soft skills such as work ethic, leadership and responsibility, global understanding, civics and citizenship, collaboration, debate, communication, metacognition, and creativity. Each rubric rates students on a level between four and one, with four being exemplary and one being novice. Each rubric should be used by an instructor wanting to assess a certain skill during an assignment; no tool or rubric is offered to rate students' overall achievement of soft skills. Realizing the need to have a way to measure soft skills achievement, in 2009 three industry leaders–Cisco, Intel, and Microsoft–started a project called Assessment and Teaching of 21st Century Skills (ATC21S). As of 2014, the project is still in its research and assessment phase, so information and tools for measuring the achievement of soft skills has not been made public, leaving many educators without clear answers and forcing them to try the multiple ways Lai and Viering (2012) summarized in their synthesis.

Nevertheless, while recognizing student achievement in the problem-based instructional model might be best measured by their mastery of soft skills, there are few studies that have attempted to measure soft skills in any instructional environment.

Summary

Students in the twenty-first century college classroom need to develop soft skills, so they can be successful in the workplace. This means colleges need to teach students more than technical or discipline-specific knowledge. Since most of the student's core courses focus on technical or discipline skills, the responsibility for soft skills education may falls to the general education courses. One way to improve soft skills education may be to utilize instructional models that emphasize soft skills as part of the model's values and methods. The problem-based instructional model's values and methods align well with soft skills education, emphasizing cooperative teamwork and minimizing competition. Therefore, the purpose of this study was to test the use of problem-based models within a soft sciences setting. The study also evaluated which cooperative grouping and assessment strategies worked best within models, based upon student achievement and satisfaction.

CHAPTER III

METHODOLOGY

Introduction

Problem-based instructional models have been used with the hard sciences since the problem-based instructional approach was first introduced in the 1960s. However, some of the research testing the successfulness of the method has focused on quantitative methods only: pre/posttest-only designs (Goelen, De Clercq, Huyghens, & Kerckhofs, 2006; McParland, Noble, & Livingston, 2004) or posttest-only designs (Antepohl & Herzig, 1999; Dahle, Brynhildsen, Fallsberg, Rundquist, & Hammar, 2002; Polanco, Calderón, & Delgado, 2004; Prince, Van Eijs, Boshuizen, Van Der Vleuten, & Scherpbier, 2005). Findings based upon these quantitative studies have been based upon achievement data on discipline-based assessments or satisfaction using a Likert-type response scale. Few studies have focused on qualitative or mixed methods; Gilkison (2003) used an exploratory case study method and Johnson (1999) used mixed methods to collect both qualitative questionnaire data and quantitative achievement data. These quantitative and mixed methods studies that have been performed have not looked at student achievement outside of the hard sciences or based on soft skills mastery; qualitative studies have not looked at the students' lived experiences within different problem-based models. Most of the research has not have focused on comparing different problem-based models.

Therefore, this mixed methods study investigated the use of different cooperative grouping strategies and an assessment strategy to enhance soft skills within one of two problem-based instructional models in the soft sciences classroom. The goal of this research was to compare student achievement and satisfaction within a traditional problem-based model from the hard sciences or a revised problem-based model to determine which model is the best for soft skills mastery. Within each model, cooperative grouping strategies and job role assignment strategies were assessed as well as the use of a three-level assessment method including peer, self, and tutor evaluation.

Research Design

This study used a mixed-methods approach to compare two problem-based instructional models within the soft sciences, two cooperative grouping strategies, and two job role assignment strategies (see Figure 6). The study used intact groups of participants from one of eight blended Arts and Sciences Capstone courses. Each soft sciences' course section was randomly assigned to either a traditional problem-based model (control group) or a revised problem-based model (the experimental group). The traditional problem-based model placed students in groups of five to seven, while the revised problem-based model placed students in groups of three to four. Course sections were then randomly assigned as using either heterogeneous or homogeneous group composition and as using either instructor or student-selected job roles within the groups. Based on each participant's demographic information collected at the beginning of the experiment, participants in both the control and experimental groups were then assigned to teams within their courses using criterion sampling.

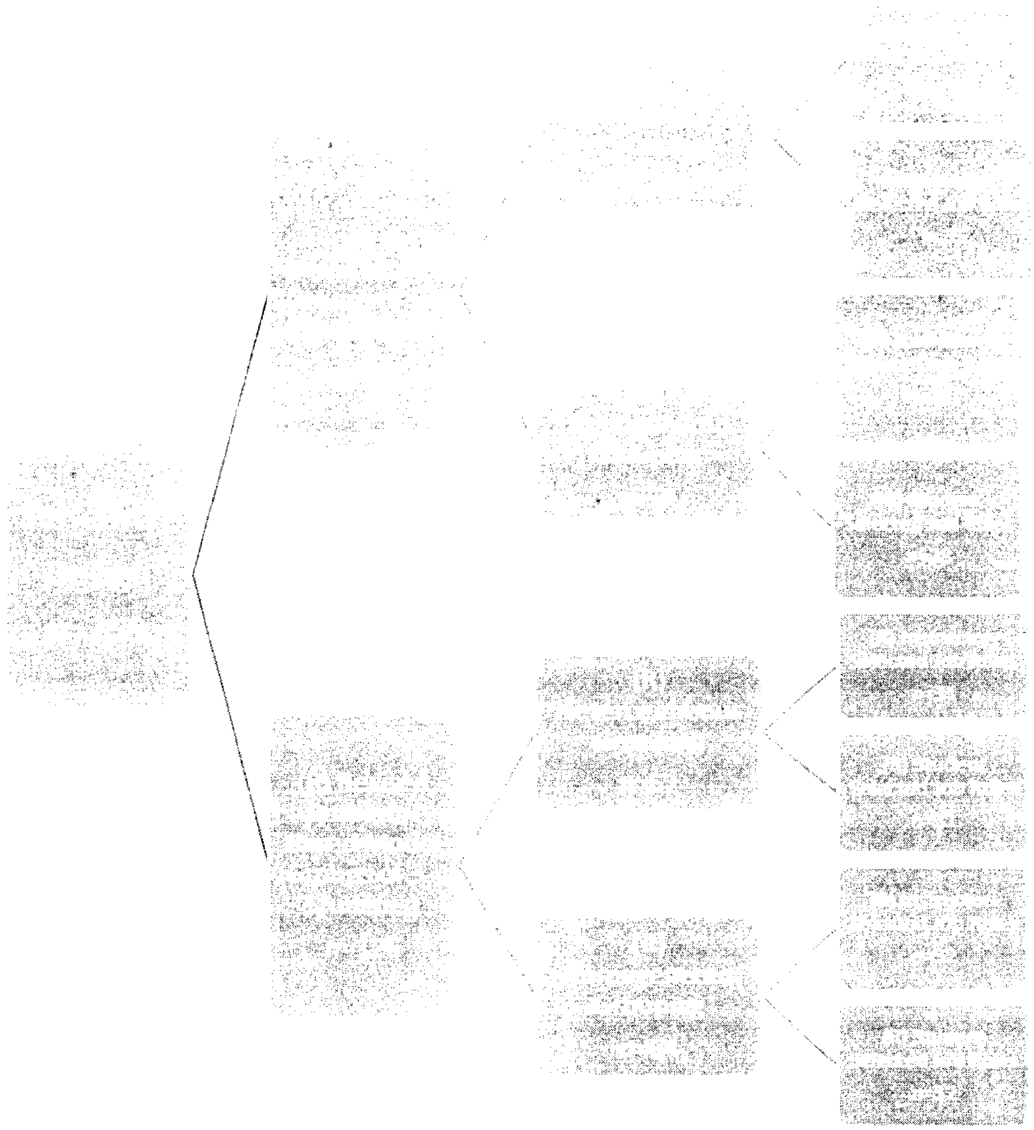

Figure 6. Research Design Figure. This figure shows the design of the research study, including the different models and groups. "R" means random assignment.

A correlation design was used to obtain examine quantitative data regarding differences in students' achievement and satisfaction between the different problem-based models in the soft sciences. Quantitative satisfaction data were collected at the beginning of the experiment through a pre-satisfaction questionnaire and at the end of the experiment through a post-satisfaction questionnaire. Quantitative achievement data were collected at the end of the experiment based upon student's final grades. Final grades were computed using a three-level soft skills evaluation tool, including peer, self, and tutor evaluation. A phenomenological approach was used to collect qualitative data on student satisfaction during the experiment. Qualitative data were collected through each participant's ten reflection wikis.

Research Questions

In order to investigate the possible effects of the problem-based instructional model, cooperative grouping strategies, and assessment strategies, the following research questions were proposed:

1. To what extent do traditional problem-based model participants as compared to revised problem-based model participants vary in student achievement and satisfaction?
2. To what extent do traditional problem-based model participants in heterogeneous and homogeneous groups as compared to revised problem-based model participants in heterogeneous and homogeneous groups vary in achievement and satisfaction?
3. To what extent do traditional problem-based model participants in heterogeneous and homogeneous groups with instructor or student selected job roles as compared to revised problem-based model participants in heterogeneous and homogeneous groups with instructor or student selected job roles vary in achievement and satisfaction?
4. What do students report about professionalism, cooperation, learning objectives, and group participation in problem-based instructional models?

Setting and Sample

Participants. The participants were chosen based upon criterion sampling; the participants involved in the study were undergraduate students enrolled in a postsecondary blended Arts and Sciences Capstone course at a private university. The students were enrolled in one of the university's six bachelor degree programs: Computer science, electronics engineering, business, criminal justice, health science, or culinary arts. The sample had 250 students, with 124 students in the control group and 126 in the experimental group (see Table 6). Prior to the study, instructors were informed by the university administration that a new approach to the course would be used and data would be collected by the researcher. The Arts and Sciences instructors participating in the research were chosen based upon their teaching schedule.

Table 6

Sample Size by Group

	Grouping Strategy		Job Role Assignment Strategy	
Model	Heterogeneous	Homogeneous	Instructor Selected	Student Selected
Traditional	67 participants	57 participants	61 participants	63 participants
Revised	62 participants	64 participants	63 participants	63 participants

Note. n = 250.

All students completed a demographic sheet at the beginning of the pre-satisfaction questionnaire (see Appendix A), which consisted of their name, age, gender, race, and program of study. Based upon these data, students were assigned, within their soft sciences class, into teams. The group using the traditional problem-based model placed students in teams of five to seven students. The group using the revised problem-based model placed students in teams of three to four students (see Table 7).

Table 7

Each Group's Team Information

Group Assignment	Teams *n*	Team Size	Participants *n*
TM-HE-IS	6	Teams 1-5 (5 peers) Team 6 (7 peers)	32
TM-HE-SS	5	All teams of 7	35
TM-HO-IS	5	Teams 1-3 (5 peers) Teams 2-5 (6 peers)	29
TM-HO-SS	4	All teams of 7	28
RM-HE-IS	10	Team 1 (4 peers) Teams 2-10 (3 peers)	31
RM-HE-SS	9	Teams 1-5 (3 peers) Teams 6-9 (4 peers)	31
RM-HO-IS	8	All teams of 4	32
RM-HO-SS	8	All teams of 4	32
Total	55		250

Note. TM= Traditional Model, RM= Revised Model, IS= Instructor-Selected, SS= Student-Selected.

Research groups were randomly assigned as using either a heterogeneous or homogeneous group composition strategy, but students were assigned to their teams within these groups based upon the demographic data collected. Demographic data were only used for balancing student teams within the groups and were not used as part of the study's analysis. The demographic data were not used as variables because the purpose of the research is to collect information on the strategies that can enhance soft skills knowledge, not on the learners themselves.

Independent Variables

The independent variables for this study included the problem-based instructional models, cooperative grouping strategy, and job role assignment strategy (see Figure 7).

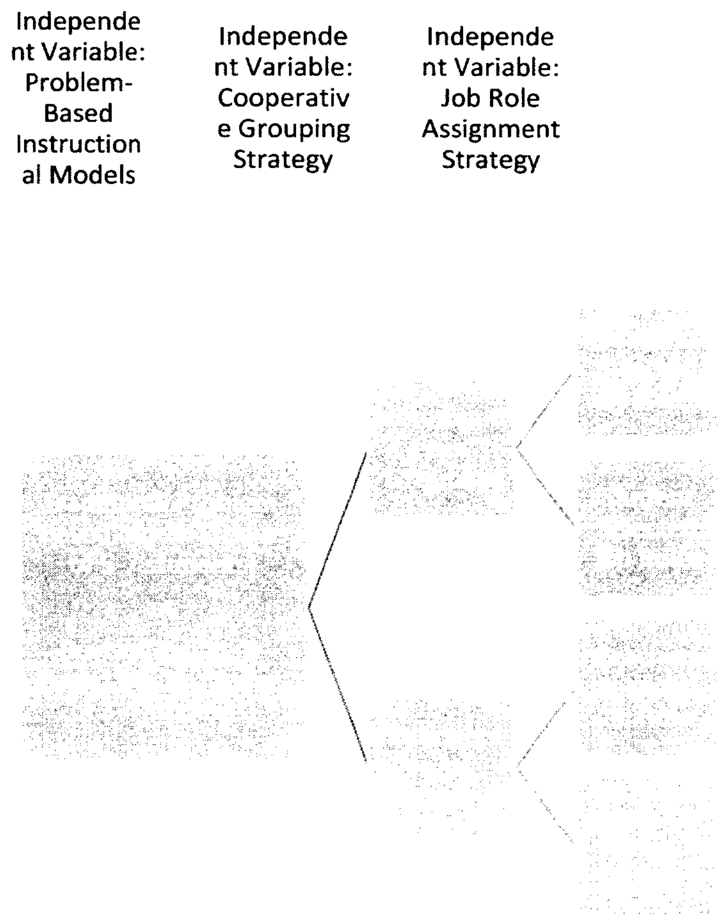

Figure 7. Independent Variables. This figure shows the independent variables of the study.

Dependent Variables

The dependent variables for this study included student achievement and satisfaction. Achievement was measured based upon students' individual grades determined using a three-leveled soft skills assessment tool, including peer, self, and instructor evaluation (see Appendix B). Satisfaction was measured using a pre- and post-satisfaction questionnaire (see Appendices C & D, respectively) and reflection wikis that asked students their satisfaction of soft-skills mastery and the team project (see Appendix E for the day 1 wiki and appendix F for the wiki for days 2-10).

Measures

Data were collected using four measures. At the beginning of the experiment, the pre-experimental satisfaction questionnaire was given. During the experiment, students completed ten reflection wikis. At the end of the experiment, students' grades were computed and the post-experimental satisfaction questionnaire was given (see Figure 8).

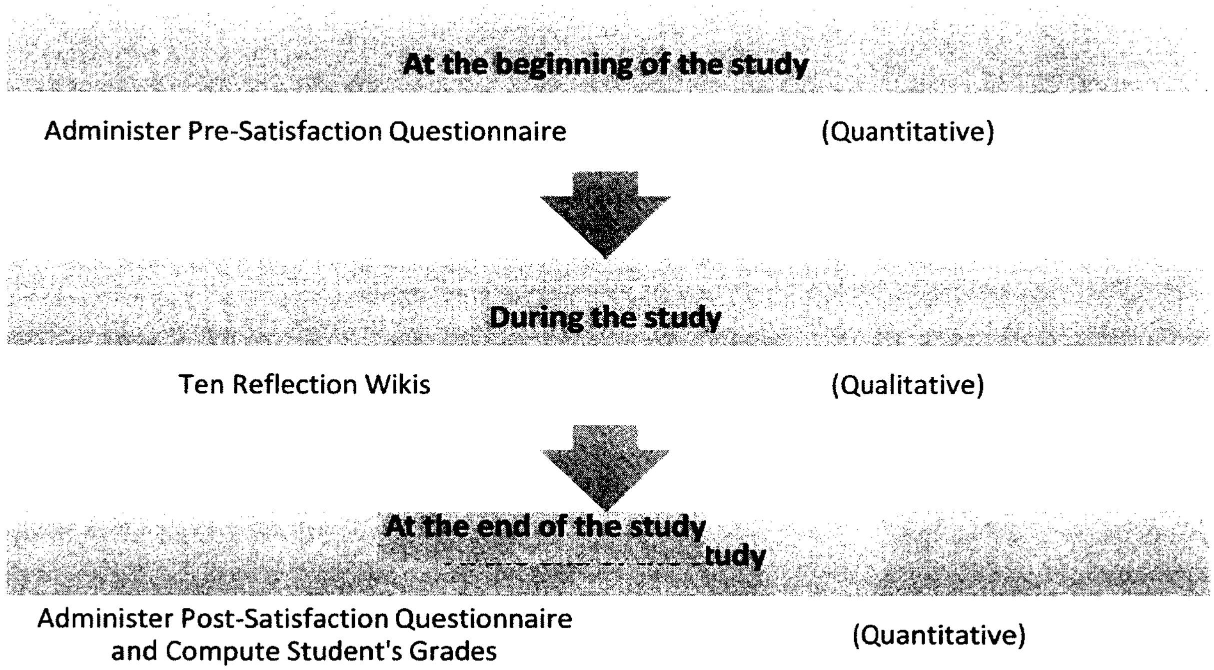

Figure 8. Measure Administration and Data Type. This figure shows when measures were given and what type of data the measure yielded.

Pre-experimental satisfaction questionnaire. Students' satisfaction was measured before teamwork began. A digital satisfaction and perception questionnaire was designed by the researcher and hosted on SurveyMonkey.com (see Appendix C). In order to create the questionnaire, previous instruments used to collect student satisfaction data were analyzed (Burdett, 2003; Burdett & Hastie, 2003; Driver, 2002; Gatfield, 1999).

Based upon this analysis, the original questionnaire developed before the pilot study had 15 items within two categories: group work and soft skills mastery (See Table 8). With this questionnaire, students would have rated their perceived level of soft skills mastery and level of typical satisfaction with teamwork on a 5-point Likert-type response scale (with 5 being strongly disagree and 1 being strongly agree). A pilot study of this questionnaire was conducted at the beginning of the experiment; the results of the pilot study are discussed in the procedures section below.

Table 8

Questionnaire Categories and Items

Category	Questionnaire Item
Soft skills mastery	I find it easy to communicate using technology
Soft skills mastery	I find it easy to communicate in face-to-face environments
Soft skills mastery	I find it easy to solve complex problems
Soft skills mastery	I am more successful when I solve problems by myself
Soft skills mastery	I am able to solve problems better when I work with a group
Group work	I like teamwork
Group work	Teamwork is fair
Group work	Teamwork grades are accurate
Group work	Group projects are better than independent projects
Group work	Group projects have to be instructor-controlled
Group work	Group projects are a valuable part of my education
Group work	I would recommend group projects to other instructors and students
Group work	I feel comfortable in group projects
Group work	Teamwork is a good use of classroom time
Group work	I do not find teamwork threatening

Students' grades. Student achievement was measured using students' final grades on the group project. Final grades were calculated using three measures suggested by Kelley and Sadowski (2005) on their peer evaluation tool: a work category ratio, digital contribution ratio, and project grade (see Appendix B). The grading evaluation tool was chosen because of its perceived effectiveness based upon previous pilot testing by the tool's creators; their results indicated that the three-leveled evaluation system including self-assessment, peer-assessment, and instructor-assessment helped make "group projects more enjoyable and valuable" and had an effect on team effectiveness (Kelley & Sadowski, 2005, p. 113).

Post-experimental satisfaction questionnaire. Students' satisfaction was also measured after students in both groups completed the group project. The pre-satisfaction experimental questionnaire was given again as a post-satisfaction experimental measure on SurveyMonkey.com (see Appendix D). The questionnaire had the same 15 items as the pre-satisfaction questionnaire within the same two categories: group work and soft skills mastery (See Table 8). Using this questionnaire, students would have rated their perceived level of soft skills mastery and level of typical satisfaction with teamwork on a 5-point scale (with 5 being strongly disagree and 1 being strongly agree). A pilot study of this questionnaire was conducted at the beginning of the experiment; the results of the pilot study are discussed in the procedures section below.

Self-reflection wikis. Data on students' satisfaction within the instructional model and cooperative group composition strategies and job role assignment strategies were collected through self-reflection wikis (see Appendices E & F). The wikis were completed by students through each course's learning management system, Moodle. The wikis were private and only the student, researcher, and instructor were able to see the responses. Students completed wikis at the end of each class period.

The first student wiki (see Appendix E) was used at the end of the first class only and was designed to meet the course's terminal learning objective five: Demonstrate cooperation and professionalism. This wiki asked students to reflect upon cooperation and professionalism by describing cooperation in their own words and providing examples, describing professionalism in their own words and providing examples, and explaining how they will apply cooperation and professionalism during their course.

The second student wiki (see Appendix F) was used at the end of the rest of the nine courses and was designed to have students complete formative evaluation throughout the course. This wiki asked students to reflect upon their progress towards mastering course objectives and their participation in their group based upon the summative grading rubric's work and soft skills contribution categories (digital age literacy, inventive thinking, effective communication, and high productivity).

Procedures

A request for permission to conduct exempt research was submitted to the Darden College of Education Human Subjects Review Committee in December of 2013. The application was approved on January 8, 2014 under approval number 201401056 (see Appendix G). The study took place from January until April 6, 2013.

Pilot study. In order to test the satisfaction questionnaire developed by the researcher, a pilot study was conducted before the research was scheduled to begin (see Appendix H). The two instructors involved in the pilot of the questionnaire were informed on January 9, 2014 that there would be data collected during their section of the Arts and Sciences Capstone course and that the links to a satisfaction questionnaire would be placed in their course shell on the learning management system, Moodle. The instructors were asked to have their students complete the questionnaire by January 21, 2014. The pilot study had 167 participants from seven sections of the Arts and Sciences Capstone courses digitally complete the questionnaire from the January 14-21, 2014. Since there were 15 items being tested, a minimum of 150 participants was needed to meet sampling adequacy guidelines. With 167 participants, sampling adequacy was met. First, Cronbach's alpha was reviewed to determine the reliability of the measure. Cronbach's alpha for the entire questionnaire was .848, indicating a good internal consistency. The Kaiser-Meyer-Olkin measure of sampling adequacy was also reviewed and had a score of .865, indicating a good sample size adequate for factor analysis. Lastly, Bartlett's test of sphericity was significant, $p < .000$, indicating a relationship between the variables.

Based on the Cronbach's alpha, Kaiser-Meyer-Olkin measure, and Bartlett's test, the next step was to perform an exploratory factor analysis (EFA) to identify which variables within the questionnaire should be grouped together into factors. The EFA was conducted using Maximum Likelihood with no rotation. Maximum Likelihood was chosen because of the researcher's desire to have the questionnaire be generalizable.

This initial EFA showed two clear factors within the data (see Figure 9). Items one through four and ten were too low to load, meaning there was no relation with these items to the others. The researcher felt items one through four could best be grouped together under "Communication" and "Problem Solving" categories, but item 10 was on team projects and not related to communication or problem solving. Since these items did not load, they were removed, and the EFA was restricted to two factors. On the second EFA, rotations were applied to give the researcher a better understanding of the data.

Assuming correlation of the two factors, the promax rotation was used. When the maximum likelihood with promax rotation was applied and restricted to two factors, five items loaded into each of the two factor (see Table 9).

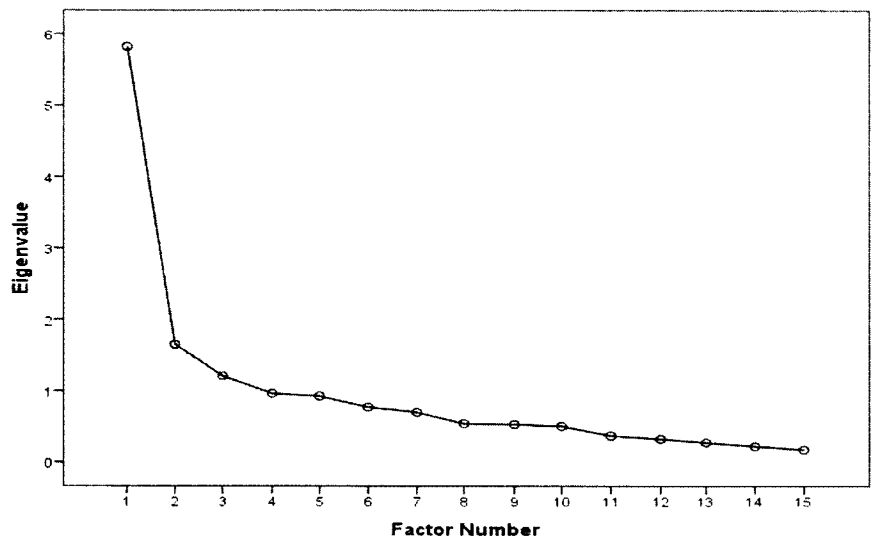

Figure 9. Scree Plot for Pilot Data. This figure shows how two factors were present in the data.

Table 9

Factor Loadings for Exploratory Factor Analysis with Promax Rotation (n= 167)

	Factor	
	1	2
question_1		
question_2		
question_3		
question_4		
question_5	.437	
question_6	1.005	
question_7	.730	
question_8		.469
question_9		.533
question_10		
question_11		.803
question_12		.951
question_13		.419
question_14	.808	
question_15	.783	

Next, each factor's reliability was checked: Factor 1 had an alpha level of .853 and factor 2 had an alpha level of .873, indicating both had good internal consistency. After reviewing the measure's questions, the researcher renamed the factors. Factor 1 became "Perception of Teamwork" while Factor 2 became "Perception of Team Projects." After careful review, the researcher felt like item 10 would fit well into the "Perception of Team Projects" factor, but the wording of the item needed to be revised. The use of the word "control" in the item may have misled the participants into thinking it was being suggested that instructors should be a part of the actual team projects. What the researcher had hoped to convey with this item was a degree of planning or arrangement on the part of the instructor, not actual step-by-step control. Therefore, the researcher included item 10 in the actual research study and reworded it to say, "Group projects have to be designed and structured by an instructor" (see Table 10).

Table 10

Revised Pre- and Post-Satisfaction Questionnaire Items

Factor	Questionnaire Item
Perception of Teamwork	I like teamwork
Perception of Teamwork	Teamwork is fair
Perception of Teamwork	Teamwork grades are accurate
Perception of Team Projects	Group projects are better than independent projects
Perception of Team Projects	**Group projects have to be designed and structured by an instructor**
Perception of Team Projects	Group projects are a valuable part of my education
Perception of Team Projects	I would recommend group projects to other instructors and students
Perception of Team Projects	I feel comfortable in group projects
Perception of Teamwork	Teamwork is a good use of classroom time
Perception of Teamwork	I do not find teamwork threatening

Note. The revised item appears in boldface.

Experiment. Instructors teaching the blended Arts and Sciences Capstone course from March 3 until April 6 were informed via email on February 10, 2014 of the new structure of the course and new "test items" such as the pre-and post-satisfaction questionnaires and self- and peer-evaluations. A total of three new instructors were teaching the course during this time, with a total of eight course sessions. None of these instructors participated in the pilot study.

The study took place throughout the entire blended Arts and Sciences Capstone course (see Appendix I for the course syllabus, appendix J for the course's learning objectives, and Appendix K for the course components mapped to the learning objectives), which was five weeks long and included five face-to-face class sessions and five hybrid class sessions. The five hybrid class sessions required students to meet virtually with teams groups during the scheduled class time through the open source web conferencing system Big Blue Button (see Appendix L). After being informed of the new course structure being used in his or her courses on February 10, 2014, each instructor then met with the researcher for an information session during the week of February 17, 2014. At this information session, instructors were given, via the Moodle shell of their course (see Appendices M-Q for images of each week of the course Moodle shell), a brief course overview (see Appendix R), a lecture on problem based learning (see Appendix S), a course task list by day (see Appendix T), the practice problem-based learning activity (see Appendix U), the course project (see Appendix V), a self and peer grading rubric (see Appendix B), and instructor grading rubric (see Appendix V). In order to make sure the instructors assigned and reminded students to complete the study's tasks at the correct time, each week the researcher logged into the course Moodle shells and exported activity reports. This allowed the researcher to see the activity in the Moodle shell and contact the instructor if the report showed a lack of activity on required items. This degree of control over the content and delivery of curriculum was not out of the norm for the private university where the research took place. Faculty were used to being given assessments and content to teach in their classes. Because of this, the researcher did not have any activity report issues with faculty.

Treatment

On the first day of class, each instructor began the session by going over the syllabus and course expectations (see Appendix I). Next, instructors used the lecture on problem-based learning to explain the instructional model being used in the class (see Appendix S). All students then completed the pre-satisfaction questionnaire, which also collected students' demographic data (see Appendix C). The researcher then used the demographic information to form heterogeneous or homogeneous teams. Heterogeneous teams were formed by trying to evenly spread out students by major first then by having at least one of each gender and race in each team. Homogeneous teams were formed by first putting groups of students with similar majors together then trying to group these students by gender and race. Once teams were formed, the team information was then emailed to the instructor to actually form the physical teams.

The rest of the first day of class involved the students, in their assigned homogeneous and heterogeneous teams, practicing within the instructional model. Instructors went over the practice activity (see Appendix U) before assigning students to groups based upon the researcher's teaming guidelines sent via email. Teams had one hour to complete the activity. After an hour, teams orally shared their solutions with the class. As a practice measure, instructors had students grade themselves and each other using the three-level grading rubric (see Appendix B). The students shared their evaluations with each other and the instructors visited with each team, going over his or her evaluation of the team's completion of the practice activity.

After the practice activity was complete, instructors went over the actual course-long assignment (see Appendix V) and the course schedule. Students were then instructed to begin the first part of the problem-based learning model: developing the team guidelines (the team guidelines should have included ground rules for interaction, the division of labor, and the procedures for reaching consensus) and developing their plan (the steps and tasks students thought they will need to do to complete the assignment). The instructors visited each team during this time to help where needed. During the last 30 minutes of class, instructors then explained either the job role assignment strategy: students would be in job roles either instructor or student-selected role assignments, as directed by the researcher. As a closure activity, the students then completed their first self-reflection wiki in their course Moodle shell (see Appendix E).

The next class session students met in a virtual format. Students met within their teams in a virtual Big Blue Button space set up in their course Moodle shell (see Appendix L). Students worked together to complete phase one of the project based upon the plan they developed. A deliverable of some kind, based upon the team's plan, was submitted for the instructor to review. The instructors visited each team's meeting to check for understanding and offer assistance when needed. Every class session ended with students completing their self-reflection wiki (see Appendix F). The second week of class was spent with students in their team meetings either virtually or face-to-face and working on phase one, following the schedule (see Appendix T). By the first class of week three, students presented their findings for phase one. The instructor then went over phases two and three and had students begin the problem-based learning process again; this included revising the plan, if needed. Students worked on phases two and three by meeting virtually or face-to-face each class, following the schedule (see Appendix T).

The last day of class required student team presentations and the submission of a written report. Students in both the experimental and control groups completed the modified team evaluation tool (see Appendix B). The instructors then delivered each student's responses to the researcher. The instructors completed the third part of the evaluation tool by grading the soft sciences projects using a rubric (see Appendix V). Lastly, on the final day of class students also completed the Post-experimental satisfaction questionnaire (see Appendix D). The instructors ended the courses by having students orally reflect on the pros or cons of the process and what they have learned as a result of the course.

Data Analysis

Quantitative. To test for differences between groups for student achievement an analysis of variance (ANOVA) was used. To test for differences between groups for post-satisfaction, a multivariate analysis of variance (MANOVA) was used. The MANOVA was appropriate since there were two dependent variables (achievement and post-satisfaction). The MANOVA also allowed for the researcher to compare groups and interactions between independent variables (Field, 2009). This means the researcher could compare post-satisfaction and achievement between many groups (see Figure 10 and Appendix W). To test for any effects of the pre-satisfaction questionnaire, a multivariate analysis of covariance (MANCOVA) was used. Still using the post-satisfaction questionnaire and achievement as independent variables and the models, grouping strategies, and job role assignment strategies as the dependent variables, the pre-satisfaction questionnaire was added as a covariate.

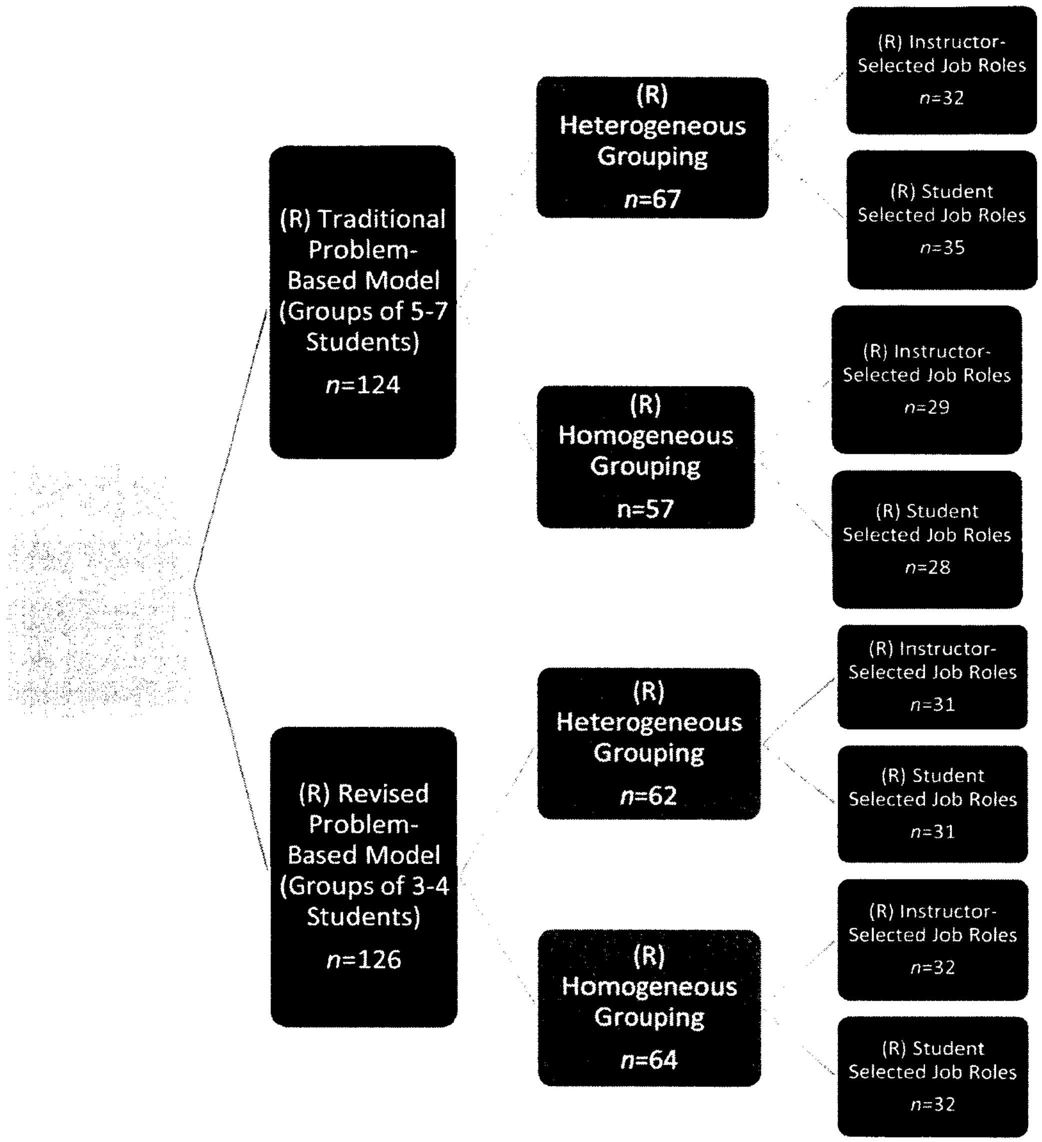

Figure 10. The Color-Coded Research Groups. This figure color codes research question 1 in blue, research question 2 in green, and research question 3 in red.

Qualitative. The qualitative data were analyzed using phenomenological analysis techniques as described by Hays and Singh (2012). First, the researcher bracketed her biases and assumptions about the study. Next, student's wikis were analyzed through horizontalization, which is looking for the large themes present in the data. After the horizontal codes were developed, the researcher engaged in textural description by combining the codes into similar themes based upon the "meaning and depth of the essence of the experience" (Hays & Singh, 2012, p. 355). Based on these themes, a codebook was formed with rich description of the textural themes. Lastly, a structural description was developed by looking for opposite or tensions within the textural themes. The final, structural themes provided a closer understanding of participant's individual experiences.

Trustworthiness strategies. As noted by Hays and Singh (2012), the trustworthiness or validity of qualitative research data has to do with the truthfulness of the findings. In order to increase the trustworthiness of the qualitative data derived from the proposed study, multiple strategies were used. First, an audit trail was used to increase the findings' credibility, coherence, and creativity. Second, the triangulation of investigators was used to increase credibility, transferability, confirmability, authenticity, sample adequacy, and substantive validation. At least two other evaluators, one from outside of the college of education and one from inside were used to evaluate the qualitative data for each of the qualitative themes. Third, thick description was used to increase credibility, transferability, confirmability, authenticity, coherence, and substantive validation.

Summary

The purpose of this mixed-methods study was to examine the effects of two different problem-based instructional models, cooperative grouping strategies, and job role assignment strategies on student satisfaction and achievement. A soft skills peer evaluation tool was also tested as part of the instructional model. The researcher's goal was to add to the research on problem-based instructional models by offering a model and specific strategies that can be used in the soft sciences to increase the development of soft skills. The researcher also hoped that the findings would lead to better cooperative grouping and assessment methods.

CHAPTER IV

RESULTS

Introduction

This study examined whether a traditional problem-based instructional model from the hard sciences featuring large groups of students or a revised problem-based instructional model featuring small groups of students had effects on students' soft skills achievement and satisfaction in the soft science's classroom. The purpose of this study was to see if the same problem-based instructional model from the hard sciences was effective in a soft science's classroom or if a revised model was needed. The effects of different cooperative grouping strategies and job role assignment strategies within each of the models were also tested. A mixed methods inquiry was conducted, featuring a quantitative correlative design and a qualitative phenomenological approach. Quantitative investigation was conducted through analysis of variance (ANOVA), multivariate analyses of variance (MANOVA), and multivariate analysis of covariance (MANCOVA) while qualitative investigation was conducted following techniques explained by Hays and Singh (2012).

Characteristics of Participants

At the beginning of the study, there were a total of 250 participants. However, 14 participants were lost due to schedule changes or being dropped from the course. This meant a reduction in team size within four groups: the traditional model's heterogeneous student-selected group and homogeneous student-selected group; and both of the revised model's homogeneous instructor and student-selected groups (see Tables 11 and 12).

Table 11

Sample Sizes after Loss of Participants

	Number of Participants					
	Traditional Model		Revised Model			
Grouping Strategy	Beginning *n*	End Analysis *n*	Beginning *n*	End Analysis *n*	Beginning Total *n*	Total Analysis *n*
Heterogeneous Group	67	61	62	59	129	120
Homogeneous Group	57	52	64	64	121	116
Total					250	236

Note. At the beginning of the study, n= 250; at the end of the study, n= 236.

Table 12

Team Information by Group after Loss of Participants (n=236)

Group Assignment	Team *n*	Team Size	Participant *n*
TM-HE-IS	6	Teams 1-5 (5 peers) Team 6 (7 peers)	32
TM-HE-SS	5	Team 1 (5 peers) Teams 2-5 (6 peers)	29 (lost 6 participants)
TM-HO-IS	5	Team 1 (5 peers) Teams 2-5 (6 peers)	29
TM-HO-SS	4	Team 1 (5 peers) Teams 2-4 (6 peers)	23 (lost 5 participants)
RM-HE-IS	10	All teams of 3	30 (lost 1 participant)
RM-HE-SS	9	Teams 1-7 (3 peers) Teams 8-9 (4 peers)	29 (lost 2 participants)
RM-HO-IS	8	All teams of 4	32
RM-HO-SS	8	All teams of 4	32

Note. TM = Traditional Model, HE- Heterogeneous Grouping, HO= Homogeneous Grouping, IS= Instructor-Selected Job Roles, and SS = Student-Selected Job Roles.

This left a total of 236 participants. Each participant came from one of eight sections of the same soft sciences course: the blended Arts and Science Capstone known as CAP480. Of the eight course sections, four sections (n=113) were randomly assigned a traditional problem-based instructional model and the other four sections (n=123) were randomly assigned a revised problem-based instructional model. Within the four traditional model sections, there were two sections (n=61) that were randomly assigned to use a heterogeneous grouping strategy and two sections (n=52) that were randomly assigned to use a homogeneous grouping strategy. Also, in each of the two sections, one section was randomly assigned to apply either student (n=52) or instructor (n=61) selected roles for students within teams. Within the four revised model sections, there were two sections (n=59) randomly assigned to use a heterogeneous grouping strategy and two sections (n=64) randomly assigned to use a homogeneous grouping strategy. Lastly, in each of these two sections, one section was randomly assigned to apply either student (n=61) or instructor (n=62) selected roles for students within teams (see Table 13).

Table 13

Descriptive Statistics for Students Enrolled in CAP480 (n=236)

		End Frequency	Percent (%)
Model			
	Revised	123	52.1%
	Traditional	113	47.9%
Grouping Strategy within Traditional Model			
	Homogeneous	52	46.0%
	Heterogeneous	61	54.0%
Grouping Strategy within Revised Model			
	Homogeneous	64	52.0%
	Heterogeneous	59	48.0%
Role Assignments within Traditional Model			
	Instructor-Selected	61	54.0%
	Student-Selected	52	46.0%
Role Assignments within Revised Model			
	Instructor-Selected	62	50.4%
	Student-Selected	61	49.6%

Reliability of the Instruments

The reliability coefficients for the pre- and post-satisfaction questionnaire are given in Table 14 below. Cronbach's alpha was computed using the data collected from the 236 participants. The pre-satisfaction questionnaire had an overall reliability of .868 and the post-satisfaction questionnaire has an overall reliability of .898, indicating both had good internal consistency. The Kaiser Meyer-Olkin measure was also reviewed and the pre-satisfaction questionnaire had a score of .899, indicating a great range; Bartlett's test was $p < .000$, indicating a relationship between variables. The post-satisfaction questionnaire had a Kaiser Meyer-Olkin score of .893, also indicating a great range; Bartlett's test was $p < .000$, indicating a relationship between variables. Because there were 236 participants for 11 items, sampling adequacy was met.

However, both the pre- and post-satisfaction questionnaire contained two factors. For the pre-satisfaction questionnaire, the first factor called "satisfaction of teamwork" had a reliability score of .829. For the second factor, satisfaction of team projects, the reliability was .818. For the post-satisfaction questionnaire, the first factor, satisfaction of teamwork, the reliability was .863. The second factor, satisfaction of team projects, the reliability was .824.

Table 14

Internal Consistencies of the Pre- and Post-Satisfaction Questionnaires

Instrument	Reliability Coefficient	*N*
Overall Pre-Questionnaire	.868	11
Overall Post-Questionnaire	.898	11
Pre-Questionnaire Perception of Teamwork (Satisfaction with Teamwork)	.829	5
Pre-Questionnaire Perception of Team Project (Satisfaction with Team Projects)	.818	6
Post-Questionnaire Perception of teamwork (Satisfaction with Teamwork)	.863	5
Post-Questionnaire Perception of team project (Satisfaction with Team Projects)	.824	6

Data Analysis

The first step in quantitative data analysis was to compute each participant's final grade. Using Kelley and Sadowski's (2005) teamwork grading formula, participant's final grades were computed using three scores: the work ratio, the digital participation score, and instructor's final grade. First, each participant's work ratio was computed by adding up the total points each participant earned in each of the four soft skills work categories (digital age literacy, inventive thinking, effective communication, and high productivity). Table 15 shows an example of how one participant's work ratios was computed. As displayed in the table, each total was then added together to get the participant's total points earned, which was then divided by the total possible points available to get the work ratio (in this case, the total points possible was 100). Second, each participant's digital contribution percentage was computed by adding up the total digital contribution ratings. Table 16 shows an example of how one participant's digital contributions was computed. Third, the instructor used the soft sciences' project's soft skills grading rubric to compute his or her grade for the project deliverable. These three values were then multiplied by each other to compute each participant's final project grade. Table 17 shows an example of how one participant's final project grade was computed.

Table 15

Sample Calculations for the Work Ratio Figure

	Soft Skills					
Participant #	Digital Age Literacy	Inventive Thinking	Effective Communication	High Productivity	Total Points Earned	Ratio
1	5+4+5+5+5	4+4+5+5+5	2+4+5+5+2	4+4+5+5+4	87	.87
	=24	=23	=18	=22		

Note. In sample table, a + b + c + d + e = team member 1's rating + team member 2's rating + team member 3's rating + team member 4's rating + the participant's self-rating.

Table 16

Sample Calculations for the Digital Contribution Figure

	Digital Contribution Rating					
Participant #	Self	Team Member 1	Team Member 2	Team Member 3	Team Member 4	Total
1	.20	.20	.20	.20	.20	1.00

Note. In sample table, Total= Self Contribution rating + All Peer ratings.

Table 17

Sample Calculations for the Final Grade Figure

Participant #	Instructor's Grade	Work Category Ratio	Digital Contribution Total	Final Soft Sciences' Project Grade
1	91	.87	1.00	79.17

Note. In sample table, Final soft sciences' project grade = Instructor's Grade x Work Category Ratio x Digital Contribution Total.

The next step in the quantitative data analysis was to compute each participant's pre- and post-satisfaction questionnaire averages by factor. This was done by averaging each participant's pre- and post- satisfaction rating for items 1, 2, 3, 10, and 11 (factor 1: perception of teamwork) and pre- and post-satisfaction scores for items 4-9 (factor 2: perception of team project) (see Table 18).

Table 18

Sample Pre-Satisfaction Questionnaire Ratings and Averages

	Item Number												
Participant	1	2	3	4	5	6	7	8	9	10	11	FA1	FA2
1	4	4	3	3	3	3	4	4	4	4	3	3.6	3.5

Note. In sample, FA1= Perception of teamwork; FA2= Perception of team project. Example Perception of teamwork Pre-Average = (item 1+ item 2+ item 3+ item 10 + item 11)/5. Example Perception of team project Pre-Average = (item 4+ item 5+ item 6+ item 7+ item 8+ item 9)/6.

After final grades were computed (the achievement dependent variable), the post-satisfaction questionnaire averages were computed (the satisfaction dependent variable), and the pre-satisfaction questionnaire averages were computed (the covariate), the differences and interactions between groups could be computed.

Checking normality. Before quantitative analysis, the quantitative data were examined for normality. Initial assumption checking revealed that the data for the perception of teamwork factor during the pre-questionnaire (TW-Pre), perception of team project factor during the pre-questionnaire (TP-Pre), and perception of teamwork factor during the post-questionnaire (TW-Post) were in an acceptably normal range. However, the perception of team project factor during the post-questionnaire (TP-Post) had a high kurtosis and grades had a high kurtosis of 3.973 (see Table 19). Since TP-Post's kurtosis was high, the z-score of kurtosis was calculated. The z-score of kurtosis had a value of 2.93, which fell within upper threshold of 3.29 and no further action was needed. To address the grades' kurtosis issue, the grades data were analyzed. Twenty extreme scores higher than 100% were found. These scores were Winsorized to the high possible grade of 100%. After Windsorization, the kurtosis for the grades variable went down to .764. However, skewness then went up to -.977, which seemed somewhat high. Fourteen scores lower than 50 were considered extreme and Winsorized to the lowest possible grade of 50%. After Windsorization, the skewness and kurtosis for grades improved to acceptable values (see Table 20).

Table 19

Summary of Skewness and Kurtosis (n = 236)

	Skewness	Std. Error of Skewness	Kurtosis	Std. Error of Kurtosis
Grades	.544	.158	3.973	.316
TW-Pre	-.526	.158	.125	.316
TW-Post	-.370	.158	.202	.316
TP-Pre	-.038	.158	.033	.316
TP-Post	-.502	.158	.926	.316

Note. TW= Perception of Teamwork; Pre= Pre-Questionnaire; Post= Post-Questionnaire; TP= Perception of Team Projects.

Table 20

Summary of Skewness and Kurtosis after Winsorizing Grades (n = 236)

Winsorizing	Skewness	Std. Error of Skewness	Kurtosis	Std. Error of Kurtosis
Grades Higher than 100	-.977	.158	.764	.316
Grades Lower than 50	-.454	.158	-.331	.316

Checking correlations. After the data were checked for normality, the next step was to check for correlations between the dependent variables (see Table 21). Analysis revealed that final grades were not correlated to any of the other variables. The Perception of teamwork factor from the pre-questionnaire was correlated to the Perception of teamwork factor form the post-questionnaire and the Perception of team project factor from the pre-questionnaire. Perception of teamwork factor from the post-questionnaire was also correlated to the Perception of team project factor from the pre-questionnaire and the Perception of team project factor from the post-questionnaire. Lastly, the Perception of team project factor from the pre-questionnaire was correlated to Perception of team project factor from the post-questionnaire. Using this information, an ANOVA was conducted for grades and a MANOVA and a MANCOVA was conducted for the remaining factors.

Table 21

Correlations between Dependent Variables and Covariates (n=236)

		Pearson Correlation	Significance
Grades			
	TW-Pre	-.01	.93
	TW-Post	-.08	.21
	TP-Pre	-.06	.40
	TP-Post	-.04	.55
TW-Pre			
	TW-Post	.14	.03
	TP-Pre	.79	.00
	TP-Post	.10	.12
TW-Post			
	TP-Pre	.28	.00
	TP-Post	.81	.00
TP-Pre			
	TP-Post	.28	.00

Note. n= 236. TW= Perception of Teamwork; Pre= Pre-Questionnaire; Post= Post-Questionnaire; TP= Perception of Team Projects.

Checking homogeneity of variance-covariance. The checking homogeneity of variance began for the ANOVA with Levene's test, which indicated equal variances for the problem-based instructional model group (F= .875, p= .35), for the grouping strategy (F= 1.059, p= .31), and for the job role assignment strategy (F= .013, p= .91), meaning the assumption of homogeneity was met. The checking homogeneity of variance-covariance began for the MANOVA and MANCOVA with Box's test of equality. These were non-significant as Box's M= F(21, 166036.58)= .967, p= .502. This meant that the covariance matrices are roughly equal and the assumption of homogeneity was met.

Based on the assumption of homogeneity being met, Wilks' Lambda was used to interpret the multivariate tests.

Research Question 1: To What Extent do Traditional Problem-Based Model Participants as Compared to Revised Problem-Based Model Participants Vary in Student Achievement and Satisfaction?

This question sought to evaluate what differences, if any, existed between the traditional and revised models when it came to achievement and satisfaction (see Figure 11). The analysis and results will be explained via sub-questions.

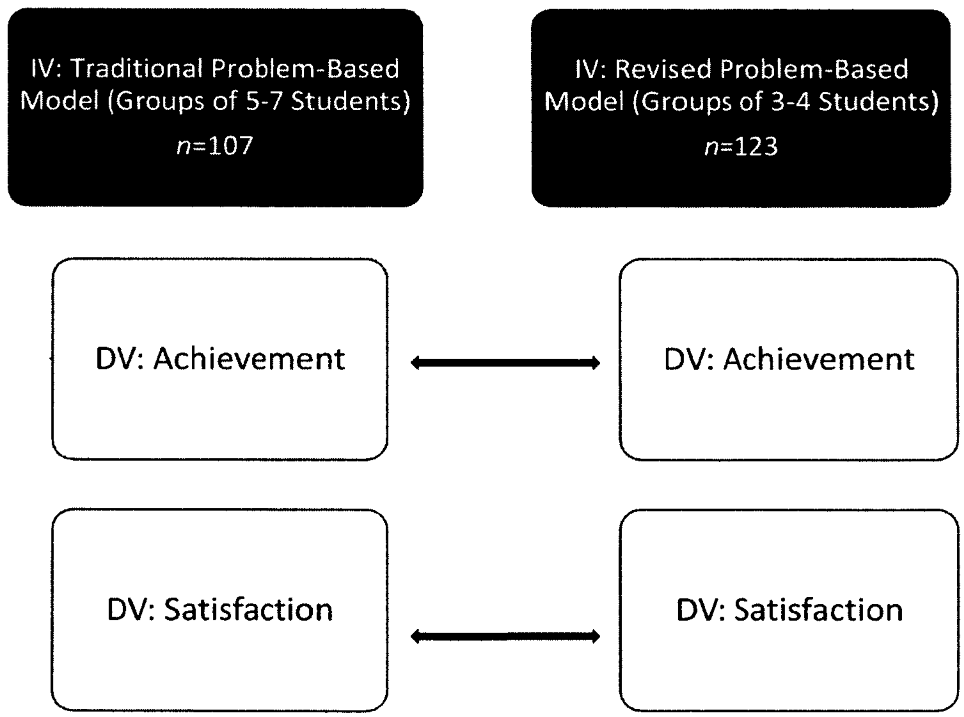

Figure 11. Research Design for Question 1. This figure shows the experimental and control group and the independent variables.

Research question 1A: What are the differences in achievement between traditional problem-based model participants and revised problem-based model participants? Question 1A addressed to what extent traditional or revised problem-based models varied in terms of student achievement. The means indicated that participants in the traditional model earned higher grades than the participants in the revised model (see Table 22). An ANOVA was performed to determine if there were significant differences between the two models. There was not a significant effect of model on grades, $F\,(1, 234) = 1.79, p > .05$ (see Table 23).

Table 22

Means of Achievement in Instructional Models

		M	*SD*
Traditional (*n*=113)			
	Grades	81.61	13.57
Revised (*n*=123)			
	Grades	79.42	16.78

Table 23

Summary of ANOVA on the Achievement Score by Instructional Model (n =236)

	df	*F*	*p*
Model	1	1.79	.183

Research questions 1B: What are the differences in satisfaction between traditional problem-based model participants and revised problem-based model participants? Question 1B addressed to what extent traditional or revised problem-based models varied in terms of student satisfaction. Because of the correlation between the post-questionnaire factors (perception of teamwork and perception of team projects) within the satisfaction variable, a MANOVA was performed to determine if there were significant differences between the two models. Estimated marginal means indicated that participants in the traditional model had lower perception of teamwork and perception of team projects ratings than participants in the revised model (see Table 24). However, there was not a significant effect of model on satisfaction, Wilks' Λ = .998, $F(2, 227)$= 2.443, p>.05 (see Table 25). Separate univariate ANOVAs on the outcome variables supported the analysis (see Table 26).

Table 24

Estimated Marginal Means of Post-Satisfaction by Instructional Model

	M	*SD*
Traditional (n=113)		
Perception of teamwork	3.79	.64
Perception of team project	3.43	.66
Revised (n=123)		
Perception of teamwork	3.95	.59
Perception of team project	3.61	.66

Table 25

Summary of MANOVA on the Satisfaction Ratings by Instructional Model (n = 236)

	Wilks' Λ	*F*	Hypothesis *df*	Error *df*	*p*	Partial η^2
Model	.998	2.443	2	227	.075	.40

Table 26

Summary of ANOVA on the Satisfaction Ratings by Instructional Model (n =236)

	Df	*F*	*p*	Partial η^2
Perception of teamwork	1	1.73	.147	.14
Perception of team project	1	2.01	.060	.70

Next, a MANCOVA was performed to test the effects, if any, of the covariates on the variables. Estimated marginal means (see Table 27) indicated that participants in the revised model had increases in their satisfaction from the pre- to post-questionnaire in both perception of teamwork and team project, while the traditional model had an increase in satisfaction for perception of teamwork, but a decrease in satisfaction for perception of team project. Further analysis showed that the Pre-Perception of teamwork did significantly influence the combined dependent variables, $\Lambda = .96$, $F(2, 225)= 5.103$, $p<.05$ and the Pre-Perception of the team project also significantly influenced the combined dependent variables, $\Lambda = .90$, $F(2, 225)= 13.164$, $p<.05$. Still, as was found in the MANOVA, there was not a significant effect of model on satisfaction, even when the pre- and post-factors were controlled, $\Lambda = 1.00$, $F(2, 225)= 2.42$, $p>.05$ (see Table 28).

Table 27

Estimated Marginal Means of Pre- and Post-Satisfaction by Instructional Model

		M	*SD*
Traditional (*n*=113)			
	TW-Pre	3.78	.78
	TW-Post	3.79	.64
	TP-Pre	3.51	.60
	TP-Post	3.43	.66
Revised (*n*=123)			
	TW-Pre	3.86	.58
	TW-Post	3.95	.59
	TP-Pre	3.58	.63
	TP-Post	3.61	.66

Note. TW= Perception of Teamwork; Pre= Pre-Questionnaire; Post= Post-Questionnaire; TP= Perception of Team Projects.

Table 28

Summary of MANCOVA on the Satisfaction Score by Instructional Model (n = 236)

	Wilks' Λ	*F*	Hypothesis *df*	Error *df*	*p*	Partial η^2
TW-Pre	.96	5.103	2	225	.01	.04
TP-Pre	.90	13.164	2	225	.00	.11
Model	1.00	2.42	2	225	.797	.002

Note. TW= Perception of Teamwork; Pre= Pre-Questionnaire; TP= Perception of Team Projects.

Research Question 2: To What Extent do Traditional Problem-Based Model Participants in Heterogeneous and Homogeneous Groups as Compared to Revised Problem-Based Model Participants in Heterogeneous and Homogeneous Groups Vary in Achievement and Satisfaction?

This question sought to evaluate what differences, if any, existed between the traditional and revised models different grouping strategies (heterogeneous and homogeneous) when it came to achievement and satisfaction (see Figure 12). The analysis and results will be explained via sub-questions. Within each achievement sub-question, means and ANOVA results will be explained. Within each satisfaction sub-question, the estimated marginal means will be explained. The section will then end with MANOVA results followed by the MANCOVA results.

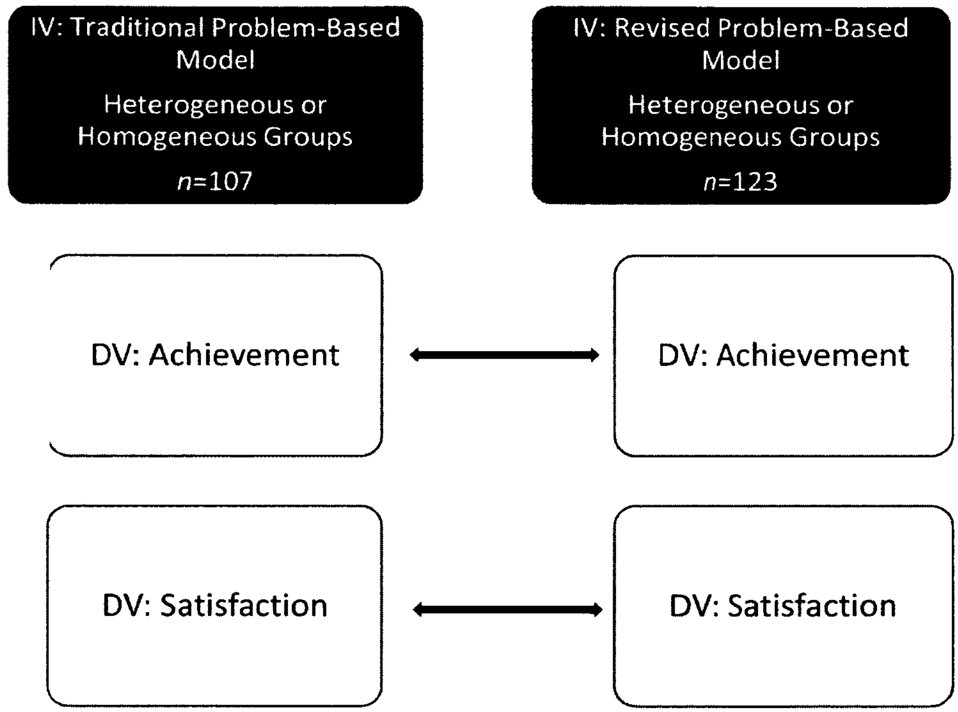

Figure 12. Research Design for Question 2. This figure shows the experimental and control group and the independent variables.

Research question 2A: What are the differences in achievement between traditional problem-based model participants in heterogeneous and homogeneous groups?

Question 2A addressed to what extent traditional models using homogeneous and heterogeneous grouping strategies varied in terms of student achievement. The means (see Table 29) indicated that participants in the heterogeneous group earned slightly higher grades than the participants in the homogenous group. An ANOVA was performed to determine if there were significant differences between the two groups within the traditional model. There was not a significant effect of grouping strategy on grades, F (1, 111) = .007, $p > .05$ (see Table 30).

Table 29

Estimated Marginal Means of Achievement for Traditional Model by Grouping Strategy

	M	*SD*
Traditional (*n*=113)		
Heterogeneous	81.42	15.06
Homogeneous	81.27	11.82

Table 30

Summary of ANOVA on the Achievement Score by Grouping Strategy in Traditional Model (n=113)

	Df	*F*	*p*
Grouping Strategy	1	.007	.932

Research question 2B: What are the differences in achievement between revised problem-based model participants in heterogeneous and homogeneous groups? Question 2B addressed to what extent revised models using homogeneous and heterogeneous grouping strategies varied in terms of student achievement. The means (see Table 31) indicated that participants in the homogeneous group earned higher grades than the participants in the heterogeneous group. An ANOVA was performed to determine if there were significant differences between the two groups within the model. There was not a significant effect of group on grades, $F\,(1, 121) = 2.836, p > .095$ (see Table 32).

Table 31

Estimated Marginal Means of Achievement for Revised Model by Grouping Strategy

		M	*SD*
Revised (*n*=123)			
	Heterogeneous	77.33	16.01
	Homogeneous	81.51	12.39

Table 32

Summary of ANOVA on the Achievement Score by Grouping Strategy in the Revised Model (n=123)

	df	*F*	*P*
Grouping Strategy	1	2.836	.095

Research question 2C: What are the differences in achievement between traditional problem-based model participants and revised problem-based model participants in heterogeneous groups? Question 2C addressed to what extent both the traditional and revised models using heterogeneous grouping strategies varied in terms of student achievement. Means (see Table 33) indicated that participants in the traditional model's heterogeneous group had higher grades than the revised model's heterogeneous group. An ANOVA was performed to determine if there were significant differences between the two model's heterogeneous groups. There was not a significant effect of grouping strategy on grades, F (1, 118) = 2.854, p > .094 (see Table 34).

Table 33

Estimated Marginal Means of Achievement for Traditional and Revised Models by Heterogeneous Grouping Strategy

		M	*SD*
Traditional (*n*=113)			
	Heterogeneous	81.94	15.06
Revised (*n*=123)			
	Heterogeneous	77.33	16.01

Table 34

Summary of ANOVA on the Achievement Score by Heterogeneous Grouping Strategy in Traditional and Revised Models (n=136)

	Df	*F*	*p*
Grouping Strategy	1	2.854	.094

Research question 2D: What are the differences in achievement between traditional problem-based model participants and revised problem-based model participants in homogeneous groups? Question 2D addressed to what extent both the traditional and revised models using homogeneous grouping strategies varied in terms of student achievement. Means (see Table 35) indicated that participants in the traditional model in homogeneous groups had higher grades than participants in the revised model's homogeneous groups. An ANOVA was performed to determine if there were significant differences between the two models. There was not a significant effect of group composition on grades, $F\,(1, 114) = .011, p > .05$ (see Table 36).

Table 35

Estimated Marginal Means of Achievement for the Traditional and Revised Model by Homogeneous Grouping Strategy

	M	*SD*
Traditional (n=113)		
Homogeneous	81.27	11.82
Revised (n=123)		
Homogeneous	80.51	12.39

Table 36

Summary of ANOVA on the Achievement Score by Homogeneous Grouping Strategy in Traditional and Revised Models (n=136)

	df	*F*	*p*
Grouping Strategy	1	.011	.915

Research question 2E: What are the differences in satisfaction between traditional problem-based model participants in heterogeneous and homogeneous groups? Question 2E addressed to what extent traditional models using homogeneous and heterogeneous grouping strategies varied in terms of student satisfaction. Estimated marginal means (see Table 37) indicated that participants in the heterogeneous group had higher perception of teamwork and team projects than participants in the homogeneous group.

Table 37

Estimated Marginal Means of Satisfaction for Traditional Model by Grouping Strategy

	M	*SD*
Traditional (*n*=113)		
Heterogeneous		
TW-Post	3.91	.61
TP-Post	3.45	.70
Homogeneous		
TW-Post	3.64	.66
TP-Post	3.41	.62

Note. TW= Perception of Teamwork; Post= Post-Questionnaire; TP= Perception of Team Projects.

Research question 2F: What are the differences in satisfaction between revised problem-based model participants in heterogeneous and homogeneous groups? Question 2F addressed to what extent revised models using homogeneous and heterogeneous grouping strategies varied in terms of student satisfaction. Estimated marginal means (see Table 38) indicated that participants in the heterogeneous group had higher Perception of teamwork and perception of the team project ratings than participants in the homogeneous group.

Table 38

Estimated Marginal Means of Satisfaction for Revised Model by Grouping Strategy

	M	*SD*
Revised (*n*=123)		
Heterogeneous		
TW-Post	4.03	.61
TP-Post	3.68	.66
Homogeneous		
TW-Post	3.88	.56
TP-Post	3.54	.60

Note. TW= Perception of Teamwork; Post= Post-Questionnaire; TP= Perception of Team Projects.

Research question 2G: What are the differences in satisfaction between traditional problem-based model participants and revised problem-based model participants in heterogeneous groups? Question 2G addressed to what extent both the traditional and revised models using heterogeneous grouping strategies varied in terms of student satisfaction. Estimated marginal means (see Table 39) indicate that participants in the revised model in heterogeneous groups had higher Perception of teamwork and perception of team project participants in the traditional model in heterogeneous groups.

Table 39

Estimated Marginal Means of Satisfaction for the Traditional and Revised Models by Heterogeneous Grouping Strategy

	M	*SD*
Traditional (*n*=113)		
Heterogeneous		
TW-Post	3.91	.61
TP-Post	3.45	.70
Revised (*n*=123)		
Heterogeneous		
TW-Post	4.03	.61
TP-Post	3.68	.66

Note. TW= Perception of Teamwork; Post= Post-Questionnaire; TP= Perception of Team Projects.

Research question 2H: What are the differences in satisfaction between traditional problem-based model participants and revised problem-based model participants in homogeneous groups? Question 2H addressed to what extent both the traditional and revised models using homogeneous grouping strategies varied in terms of student satisfaction. Estimated marginal means (see Table 40) indicated that participants in the revised model's homogeneous groups had higher perception of teamwork and perception of team project's satisfaction ratings than participants in the traditional model's homogeneous groups.

Table 40

Estimated Marginal Means of Satisfaction for the Traditional and Revised Models by Homogeneous Grouping Strategy

	M	*SD*
Traditional (*n*=113)		
Homogeneous		
TW-Post	3.64	.66
TP-Post	3.41	.62
Revised (*n*=123)		
Homogeneous		
TW-Post	3.88	.56
TP-Post	3.54	.60

Note. TW= Perception of Teamwork; Post= Post-Questionnaire; TP= Perception of Team Projects.

MANOVA analysis. Based on the correlation between the post-questionnaire factors (perception of teamwork and perception of team projects) within the satisfaction variable, a MANOVA was performed to determine if there were significant differences between the grouping strategies. There was not a significant effect of grouping strategy on satisfaction, Wilks Λ =1.00, $F(2, 227)$= 1.341, p>.05 (see Table 41). Separate univariate ANOVAs on the outcome variables supported the analysis (see Table 42).

Table 41

Summary of MANOVA on the Satisfaction Ratings by Grouping Strategy (n = 236)

	Wilks' Λ	*F*	Hypothesis *df*	Error *df*	*P*	Partial η^2
Grouping Strategy	1.00	1.341	2	227	.320	.18

Table 42

Summary of ANOVA on the Satisfaction Ratings by Grouping Strategy (n =236)

	df	*F*	*p*	Partial η^2
Perception of teamwork	1	2.532	.223	.16
Perception of team project	1	.80	.789	.05

MANCOVA analysis. Next, a MANCOVA was performed to test the effects, if any, of the covariates on the variables. Estimated marginal means (see Table 43) indicated:

- Participants in the traditional model in heterogeneous groups had increases in perception of teamwork from the pre- to post-questionnaire, but decreased in perception of team projects from the pre-to post-questionnaire.
- Participants in the traditional model in homogeneous groups had decreases in both perception of teamwork and perception of team projects from the pre- to post-questionnaire.
- Participants in the revised model in heterogeneous groups had decreases in both perception of teamwork and perception of team projects from the pre- to post-questionnaire.
- Participants in the revised model in homogeneous groups had increases in both perception of teamwork and perception of team projects from the pre- to post-questionnaire.

However, further analysis showed that Pre-Perception of teamwork did significantly influence the combined dependent variables, $\Lambda = .96$, $F(2, 225)= 5.103$, $p<.05$ and the Pre-Perception of the team project also significantly influenced the combined dependent variables, $\Lambda = .90$, $F(2, 225)= 13.164$, $p<.05$. Still, as was found in the MANOVA, there was not a significant effect of grouping strategy on satisfaction, even when the pre- and post-factors were controlled, $\Lambda = .99$, $F(2, 225)= .84$, $p>.05$ (see Table 44).

Table 43

Estimated Marginal Means of Pre- and Post-Satisfaction by Grouping Strategy

	M	*SD*
Traditional (*n*=61)		
Heterogeneous		
TW-Pre	3.71	.40
TW-Post	3.88	.70
TP-Pre	3.46	.66
TP-Post	3.44	.72
Traditional (*n*=52)		
Homogeneous		
TW-Pre	3.85	.60
TW-Post	3.53	.81
TP-Pre	3.57	.78
TP-Post	3.30	.79
Revised (*n*=59)		
Heterogeneous		
TW-Pre	4.00	.57
TW-Post	3.98	.61
TP-Pre	3.69	.64
TP-Post	3.63	.66
Revised (*n*=64)		
Homogenous		.58
TW-Pre	3.73	.56
TW-Post	3.88	.66
TP-Pre	3.46	.60
TP-Post	3.56	

Note. TW= Perception of Teamwork; Pre= Pre-Questionnaire; Post= Post-Questionnaire; TP= Perception of Team Projects.

Table 44

Summary of MANCOVA on the Satisfaction Score by Grouping Strategy (n = 260)

	Wilks' Λ	F	Hypothesis df	Error df	p	Partial η^2
TW-Pre	.96	5.103	2	225	.01	.04
TP-Pre	.90	13.164	2	225	.00	.11
Grouping Strategy	.99	.84	2	225	.533	.004

Note. TW= Perception of Teamwork; Pre= Pre-Questionnaire; TP= Perception of Team Projects.

Research Questions 3: To What Extent do Traditional Problem-Based Model Participants in Heterogeneous and Homogeneous Groups with Instructor or Student Selected Job Roles as Compared to Revised Problem-Based Model Participants in Heterogeneous and Homogeneous Groups with Instructor or Student Selected Job Roles Vary in Achievement and Satisfaction?

This question sought to evaluate what differences, if any, existed between the traditional and revised models different grouping strategies (heterogeneous and homogeneous) using different role assignments (instructor or student selected) when it came to achievement and satisfaction (see Figure 13). Within each achievement sub-question, means and ANOVA results will be explained. Within each satisfaction sub-question, the estimated marginal means will be explained. The section will then end with MANOVA results followed by post hoc analyses and MANCOVA results.

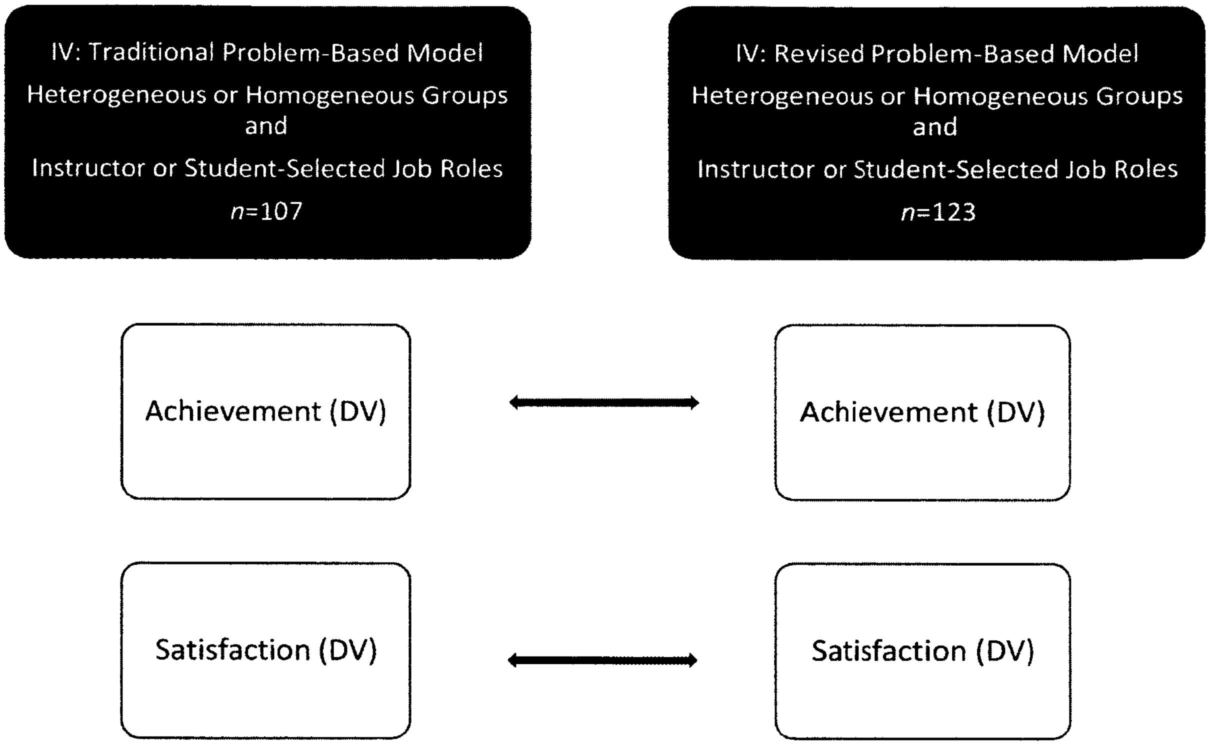

Figure 13. Research Design for Question 3. This figure shows the experimental and control group and the independent variables.

Research question 3A: What are the differences in achievement between traditional problem-based model participants in heterogeneous groups with instructor or student selected job roles? Question 3A addressed to what extent the traditional model using a heterogeneous grouping strategies and both instructor and student-selected job roles varied in terms of student achievement. Means (see Table 45) indicated that participants in the traditional model, with heterogeneous grouping, and instructor-selected job roles had higher grades than students in the student-selected job roles. An ANOVA was performed to determine if there were significant differences between the job role assignment strategies. There was not a significant effect of job role assignment on grades, $F(1, 59) = .097, p > .05$ (see Table 46).

Table 45

Means of Achievement for the Traditional Model using Heterogeneous Groups and Instructor and Student-Selected Job Roles

	M	*SD*
Traditional (n=61)		
Heterogeneous		
Instructor-Selected	82.55	13.57
Student-Selected	81.34	16.78

Table 46

Summary of ANOVA on the Achievement Score by Job Role Assignment in Traditional Model, Heterogeneous Group (n=61)

	df	*F*	*p*
Job Role Assignment	1	.097	.756

Research question 3B: What are the differences in achievement between traditional problem-based model participants in homogeneous groups with instructor or student selected job roles? Question 3B addressed to what extent the traditional model using homogeneous grouping strategies and both instructor and student-selected job roles varied in terms of student achievement. Means (see Table 47) indicated that participants in the traditional model in homogeneous groups and with instructor-selected job roles had higher grades than those in the student-selected job roles. An ANOVA was performed to determine if there were significant differences between the two job role assignment strategies. There was not a significant effect of job role assignment on grades, F (1, 49) = 7.587, $p > .05$ (see Table 48).

Table 47

Means of Achievement for the Traditional Model using Homogeneous Groups and Instructor and Student-Selected Job Role Assignments

	M	*SD*
Traditional (*n*=52)		
Homogeneous		
Instructor-Selected	85.43	9.52
Student-Selected	77.11	12.96

Table 48

Summary of ANOVA on the Achievement Score by Job Role Assignment in Traditional Model, Homogeneous Group (n=52)

	df	*F*	*p*
Job Role Assignment	1	7.587	.18

Research question 3C: What are the differences in achievement between revised problem-based model participants in heterogeneous groups with instructor or student selected job roles? Question 3C addressed to what extent the revised model using heterogeneous grouping strategies and both instructor and student-selected job roles varied in terms of student achievement. Means (see Table 49) indicated that participants in the revised model, with heterogeneous grouping, and student-selected job roles had higher final grades than the instructor-selected job roles. An ANOVA was performed to determine if there were significant differences between the two job role assignment strategies. There was a significant effect of job role assignment on grades, F (1, 57) = 27.223, $p < .05$ (see Table 50).

Table 49

Means of Achievement for the Revised Model using Heterogeneous Groups and Instructor or Student-Selected Job Roles

	M	*SD*
Revised (n=59)		
Heterogeneous		
Instructor-	68.31	16.34
Selected	86.36	9.10
Student-Selected		

Table 50

Summary of ANOVA on the Achievement Score by Job Role Assignment in Revised Model, Heterogeneous Group (n=59)

	df	*F*	*p*
Job Role Assignment	1	27.223	.000

Research question 3D: What are the differences in achievement between revised problem-based model participants in homogeneous groups with instructor or student selected job roles? Question 3D addressed to what extent the revised model using homogeneous grouping strategies and both instructor and student-selected job roles varied in terms of student achievement. Means (see Table 51) indicated that participants in the revised model, with homogeneous grouping, and instructor-selected job roles had higher final grades. An ANOVA was performed to determine if there were significant differences between the two job role assignment strategies. There was not a significant effect of job role assignment on grades, F (1, 62) = 1.094, p > .05 (see Table 52).

Table 51

Means of Achievement for the Revised Model using Homogenous Groups and Instructor or Student-Selected Job Roles

	M	SD
Revised (n=64)		
Homogeneous		
Instructor-	83.13	13.23
Selected	79.89	11.47
Student-Selected		

Table 52

Summary of ANOVA on the Achievement Score by Job Role Assignment in Revised Model, Homogenous Group (n=64)

	df	*F*	*P*
Job Role Assignment	1	1.094	.300

Research question 3E: What are the differences in achievement between traditional problem-based model participants and revised problem-based model participants in homogeneous groups with instructor selected job roles? Question 3E addressed to what extent the models using homogeneous grouping strategies and instructor-selected job roles varied in terms of student achievement. Means (see Table 53) indicated that participants in the traditional model, with homogeneous grouping, and instructor-selected job roles had higher final grades. An ANOVA was performed to determine if there were significant differences between the two job role assignment strategies. There was not a significant effect of job role assignment on grades, F (1, 59) = .599, p > .05 (see Table 54).

Table 53

Means of Achievement for the Traditional and Revised Models using Homogeneous Groups and Instructor-Selected Job Role Assignments

	M	*SD*
Traditional (n=29)		
Homogeneous		
Instructor-Selected	85.43	9.52
Revised (n=32)		
Homogeneous		
Instructor-Selected	83.13	13.23

Table 54

Summary of ANOVA on the Achievement Score by Instructor-Selected Jobs in Traditional and Revised Model, Homogeneous Groups (n=61)

	df	*F*	*p*
Job Role Assignment	1	.599	.442

Research question 3F: What are the differences in achievement between traditional problem-based model participants and revised problem-based model participants in homogeneous groups with student selected job roles? Question 3F addressed to what extent the models using homogeneous grouping strategies and student-selected job roles varied in terms of student achievement. Means (see Table 55) indicated that participants in the revised model, with homogeneous grouping, and student-selected job roles had the highest final grades. An ANOVA was performed to determine if there were significant differences between the two job role assignment strategies. There was not a significant effect of job role assignment on grades, $F\ (1, 53) = .707, p > .05$ (see Table 56).

Table 55

Means of Achievement for the Traditional and Revised Models using Homogeneous Groups and Student-Selected Job Role Assignments

	M	*SD*
Traditional (*n*=23)		
Homogeneous		
Student-Selected	77.11	12.96
Revised (*n*=32)		
Homogeneous		
Student-Selected	79.89	11.47

Table 56

Summary of ANOVA on the Achievement Score by Student-Selected Jobs in Traditional and Revised Model, Homogeneous Groups (n=55)

	df	*F*	*p*
Job Role Assignment	1	.707	.404

Research question 3G: What are the differences in achievement between traditional problem-based model participants and revised problem-based model participants in heterogeneous groups with instructor selected job roles? Question 3G addressed to what extent the models using heterogeneous grouping strategies and instructor-selected job roles varied in terms of student achievement. Means (see Table 57) indicated that participants in the traditional model, with heterogeneous grouping, and instructor-selected job roles had higher final grades. An ANOVA was performed to determine if there were significant differences between the two job role assignment strategies. There was a significant effect of job role on grades, $F\,(1, 60) = 14.013, p < .05$ (see Table 58).

Table 57

Means of Achievement for the Traditional and Revised Models using Heterogeneous Groups and Instructor-Selected Job Role Assignments

	M	*SD*
Traditional (*n*=32)		
Heterogeneous		
Instructor-Selected	82.55	13.57
Revised (*n*=30)		
Heterogeneous		
Instructor-Selected	68.31	16.34

Table 58

Summary of ANOVA on the Achievement Score by Instructor-Selected Jobs in Traditional and Revised Model, Heterogeneous Groups (n=62)

	df	*F*	*p*
Job Role Assignment	1	14.013	.000

Research question 3H: What are the differences in achievement between traditional problem-based model participants and revised problem-based model participants in heterogeneous groups with student selected job roles? Question 3H addressed to what extent the models using heterogeneous grouping strategies and student-selected job roles varied in terms of student achievement. Means (see Table 59) indicated that participants in the revised model, with heterogeneous grouping, and student-selected job roles had higher final grades. An ANOVA was performed to determine if there were significant differences between the two job role assignment strategies. There was not a significant effect of job role assignment on grades, $F\ (1, 56) = 2.009, p > .05$ (see Table 60).

Table 59

Means of Achievement for the Traditional and Revised Models using Heterogeneous Groups and Student-Selected Job Role Assignments

	M	*SD*
Traditional (*n*=29)		
Heterogeneous		
Student-Selected	81.34	16.78
Revised (*n*=29)		
Heterogeneous		
Student-Selected	86.36	9.10

Table 60

Summary of ANOVA on the Achievement Score by Student-Selected Jobs in Traditional and Revised Model, Heterogeneous Groups (n=58)

	df	*F*	*p*
Job Role Assignment	1	2.009	.162

ANOVA post hoc analyses. In order to fully understand the significant results of the ANOVA analysis on grades, Gabriel post hoc analyses were performed. The Gabriel Post hoc analysis revealed five significant areas (see Table 61). First, the final grades of participants in the traditional model, in heterogeneous groups, with instructor-selected job roles differed from the final grades of participants in the revised model, in heterogeneous groups, and instructor-selected job roles. Second, the final grades of participants in the traditional model, in homogeneous groups, with instructor-selected job roles differed from the final grades of participants in the revised model, in heterogeneous groups, and instructor-selected job roles. Third, the final grades of participants in the revised model, in heterogeneous groups, and instructor-selected job roles differed from the final grades of participants in the revised model, in the heterogeneous groups, and student-selected job roles. Fourth, the final grades of participants in the revised model, in heterogeneous groups, and instructor-selected job roles differed from the final grades of participants in the revised model in the homogeneous groups, and instructor-selected job roles. Fifth, the final grades of participants in the revised model, in heterogeneous groups, and instructor-selected job roles differed from the final grades of participants in the revised model, in homogeneous groups, and student-selected job roles.

Table 61

ANOVA Post Hoc Analysis (n=236)

Group 1	Group 2	Mean Difference	Standard Error	Significance
TR-HE-IS	RM-HE-IS	15.07	3.65	.00
TR-HE-SS	RM-HE-IS	13.36	3.74	.01
TR-HO-IS	RM-HE-IS	17.94	3.75	.00
RM-HE-SS	RM-HE-IS	-18.87	3.74	.00
RM-HO-IS	RM-HE-IS	--12.06	3.65	.03

Research question 3I: What are the differences in satisfaction between traditional problem-based model participants in heterogeneous groups with instructor or student selected job roles? Question 3I addressed to what extent the traditional model using a heterogeneous grouping strategies and both instructor and student-selected job roles varied in terms of student satisfaction. Estimated marginal means (see Table 62) indicate that participants in the traditional model in heterogeneous groups in student-selected job roles have higher perception of teamwork satisfaction than their instructor-selected job roles. However, participants in the traditional model in heterogeneous groups in instructor-selected job roles have higher perception of team project satisfaction than their student-selected job roles.

Table 62

Estimated Marginal Means of Satisfaction for the Traditional Model using Heterogeneous Groups and Instructor and Student-Selected Job Roles

	M	*SD*
Traditional (*n*=61)		
Heterogeneous		
Instructor-Selected		
TW-Post	3.91	.58
TP-Post	3.60	.71
Student-Selected		
TW-Post	3.91	.65
TP-Post	3.28	.66

TW= Perception of Teamwork; Post= Post-Questionnaire; TP= Perception of Team Projects.

Research question 3J: What are the differences in satisfaction between traditional problem-based model participants in homogeneous groups with instructor or student selected job roles? Question 3J addressed to what extent the traditional model using homogeneous grouping strategies and both instructor and student-selected job roles varied in terms of student satisfaction. Estimated marginal means (see Table 63) indicate that participants in the traditional model in homogeneous groups in student-selected job roles had higher perception of teamwork and 2 satisfaction than the instructor-selected job roles.

Table 63

Estimated Marginal Means of Satisfaction for the Traditional Model using Homogeneous Groups and Instructor and Student-Selected Job Role Assignments

	M	*SD*
Traditional (*n*=52)		
Homogeneous		
Instructor-Selected		
TW-Post	3.61	.66
TP-Post	3.34	.60
Student-Selected		
TW-Post	3.67	.67
TP-Post	3.49	.65

Note. TW= Perception of Teamwork; Post= Post-Questionnaire; TP= Perception of Team Projects.

Research question 3K: What are the differences in satisfaction between revised problem-based model participants in heterogeneous groups with instructor or student selected job roles? Question 3K addressed to what extent the revised model using heterogeneous grouping strategies and both instructor and student-selected job roles varied in terms of student achievement. Estimated marginal means (see Table 64) indicate that participants in the revised model, with heterogeneous grouping, and student-selected job roles had higher Perception of teamwork satisfaction than the instructor-selected job roles. However, participants in the revised model, with heterogeneous grouping, and instructor-selected job roles had higher Perception of team project satisfaction than the student-selected job roles.

Table 64

Estimated Marginal Means of Satisfaction for the Revised Model using Heterogeneous Groups and Instructor or Student-Selected Job Roles

	M	*SD*
Revised (*n*=59)		
Heterogeneous		
Instructor-Selected		
TW-Post	4.00	.64
TP-Post	3.68	.65
Student-Selected		
TW-Post	4.06	.58
TP-Post	3.67	.69

Note. TW= Perception of Teamwork; Post= Post-Questionnaire; TP= Perception of Team Projects.

Research question 3L: What are the differences in satisfaction between revised problem-based model participants in homogeneous groups with instructor or student selected job roles? Question 3L addressed to what extent the revised model using homogeneous grouping strategies and both instructor and student-selected job roles varied in terms of student satisfaction. Estimated marginal means (see Table 65) indicate that participants in the revised model, with homogeneous grouping, and instructor-selected job roles had the higher perception of teamwork and perception of team project satisfaction ratings.

Table 65

Estimated Marginal Means of Satisfaction for the Revised Model using Homogenous Groups and Instructor or Student-Selected Job Roles

	M	*SD*
Revised (*n*=64)		
Homogeneous		
Instructor-Selected		
TW-Post	3.82	.55
TP-Post	3.69	.59
Student-Selected		
TW-Post	3.81	.55
TP-Post	3.40	.60

Note. TW= Perception of Teamwork; Post= Post-Questionnaire; TP= Perception of Team Projects.

Research question 3M: What are the differences in satisfaction between traditional problem-based model participants and revised problem-based model participants in homogeneous groups with instructor selected job roles? Question 3M addressed to what extent the models using homogeneous grouping strategies and instructor-selected job roles varied in terms of student satisfaction. Estimated marginal means (see Table 66) indicate that participants in the revised model, with homogeneous grouping, and instructor-selected job roles had higher perception of teamwork and 2 satisfaction ratings.

Table 66

Estimated Marginal Means of Satisfaction for the Traditional and Revised Models using Homogeneous Groups and Instructor-Selected Job Role Assignments

	M	*SD*
Traditional (*n*=29)		
Homogeneous		
Instructor-Selected		
TW-Post	3.61	.66
TP-Post	3.34	.60
Revised (*n*=32)		
Homogeneous		
Instructor-Selected		
TW-Post	3.82	.55
TP-Post	3.69	.59

Note. TW= Perception of Teamwork; Post= Post-Questionnaire; TP= Perception of Team Projects.

Research question 3N: What are the differences in satisfaction between traditional problem-based model participants and revised problem-based model participants in homogeneous groups with student selected job roles? Question 3N addressed to what extent the models using homogeneous grouping strategies and student-selected job roles varied in terms of student satisfaction. Estimated marginal means (see Table 67) indicate that participants in the revised model, with homogeneous grouping, and student-selected job roles had the higher perception of teamwork and perception of team project satisfaction ratings.

Table 67

Estimated Marginal Means of Satisfaction for the Traditional and Revised Models using Homogeneous Groups and Student-Selected Job Role Assignments

	M	*SD*
Traditional (*n*=23)		
Homogeneous		
Student-Selected		
TW-Post	3.67	.67
TP-Post	3.49	.65
Revised (*n*=32)		
Homogeneous		
Student-Selected		
TW-Post	3.81	.55
TP-Post	3.40	.60

Note. TW= Perception of Teamwork; Post= Post-Questionnaire; TP= Perception of Team Projects.

Research question 3O: What are the differences in satisfaction between traditional problem-based model participants and revised problem-based model participants in heterogeneous groups with instructor selected job roles? Question 3O addressed to what extent the models using heterogeneous grouping strategies and instructor-selected job roles varied in terms of student satisfaction. Estimated marginal means (see Table 68) indicate that participants in the revised model, with heterogeneous grouping, and instructor-selected job roles had the highest perception of teamwork and 2 satisfaction ratings.

Table 68

Estimated Marginal Means of Satisfaction for the Traditional and Revised Models using Heterogeneous Groups and Instructor-Selected Job Role Assignments

	M	*SD*
Traditional (*n*=32)		
Heterogeneous		
Instructor-Selected		
TW-Post	3.91	.58
TP-Post	3.60	.71
Revised (*n*=30)		
Heterogeneous		
Instructor-Selected		
TW-Post	4.00	.64
TP-Post	3.68	.65

Note. TW= Perception of Teamwork; Post= Post-Questionnaire; TP= Perception of Team Projects.

Research question 3P: Models, heterogeneous grouping strategy, student-assignment, and satisfaction. Question 3P addressed to what extent the models using heterogeneous grouping strategies and student-selected job roles varied in terms of student satisfaction. Estimated marginal means (see Table 69) indicate that participants in the revised model, with heterogeneous grouping, and student-selected job roles had the higher perception of teamwork and 2 ratings than traditional model.

Table 69

Estimated Marginal Means of Satisfaction for the Traditional and Revised Models using Heterogeneous Groups and Student-Selected Job Role Assignments

	M	*SD*
Traditional (*n*=29)		
Heterogeneous		
Student-Selected		
TW-Post	3.91	.65
TP-Post	3.28	.66
Revised (*n*=29)		
Heterogeneous		
Student-Selected		
TW-Post	4.06	.58
TP-Post	3.67	.69

Note. TW= Perception of Teamwork; Post= Post-Questionnaire; TP= Perception of Team Projects.

MANOVA analysis. A MANOVA was performed to determine if there were significant differences between the job role assignments. Using Wilks' Lambda there was not a significant effect of job role on satisfaction, Wilks Λ =.943, $F(8, 454)=1.684$, $p>.05$ (see Table 70). This was supported by the separate univariate ANOVAs on the outcome variables (see Table 71).

Table 70

Summary of MANOVA on the Satisfaction Ratings by Job Role Assignment (n = 236)

	Wilks' Λ	*F*	Hypothesis *df*	Error *df*	*p*	Partial η^2
Role	.943	1.684	8	454	.100	.029

Table 71

Summary of ANOVA on the Satisfaction Ratings by Job Role Assignment (n =236)

	df	*F*	*p*	Partial η^2
Perception of teamwork	4	.087	.943	.003
Perception of team project	4	.824	.144	.029

MANCOVA analysis. Next, a MANCOVA was performed to test the effects, if any, of the covariates on the outcome variables. Estimated marginal means (see Table 72) indicated:

- Participants in the traditional model in heterogeneous groups and using instructor- or student-selected groups had increases in perception of teamwork from the pre- to post-questionnaire.
- Participants in the traditional model in heterogeneous groups and using instructor-selected groups had increases in perception of team projects from the pre- to post-questionnaire.
- Participants in the traditional model in heterogeneous groups and using student-selected groups had decreases in perception of team projects from the pre- to post-questionnaire.
- Participants in the traditional model in homogeneous groups and using instructor- or student-selected groups had decreases in perception of teamwork and perception of team projects from the pre- to post-questionnaire.
- Participants in the revised model in heterogeneous groups and using student-selected groups had decreases in perception of team work and perception of team projects from the pre- to post-questionnaire.

- Participants in the revised model in heterogeneous groups and using instructor-selected groups had increases in decreases in perception of team work, but decreases in perception of team projects from the pre- to post-questionnaire.
- Participants in the revised model in homogeneous groups and using instructor- or student-selected groups had increases in perception of teamwork and perception of team projects from the pre- to post-questionnaire.

However, further analysis showed that Pre-Perception of teamwork did significantly influence the combined dependent variables, $\Lambda = .96$, $F(2, 225)= 5.103$, $p<.05$ and the Pre-Perception of the team project also significantly influenced the combined dependent variables, $\Lambda = .90$, $F(2, 225)= 13.164$, $p<.05$. Still there was not a significant effect of role assignment strategy on satisfaction, even when the pre- and post-factors were controlled, $\Lambda = .95$, $F(2, 225)= 1.53$, $p>.05$ (see Table 73).

Table 72

Estimated Marginal Means of Satisfaction for the Traditional and Revised Models using Heterogeneous or Homogeneous Groups and Instructor or Student-Selected Job Role Assignments

	M	*SD*
Traditional (*n*=113)		
Heterogeneous		
Instructor-Selected		
TW-Pre	3.74	.78
TW-Post	3.91	.58
TP-Pre	3.47	.48
TP-Post	3.60	.71
Student-Selected		
TW-Pre	3.67	.86
TW-Post	3.91	.65
TP-Pre	3.41	.68
TP-Post	3.28	.66
Homogeneous		
Instructor-Selected		
TW-Pre	3.90	.62
TW-Post	3.61	.66
TP-Pre	3.51	.58
TP-Post	3.34	.60
Student-Selected		
TW-Pre	3.78	.77
TW-Post	3.67	.67
TP-Pre	3.56	.60
TP-Post	3.49	.65
Revised (*n*=123)		
Heterogeneous		
Instructor-Selected		
TW-Pre	3.89	.87
TW-Post	4.00	.64
TP-Pre	3.70	.59
TP-Post	3.68	.65
Student-Selected		
TW-Pre	4.10	.49
TW-Post	4.06	.58
TP-Pre	3.68	.48
TP-Post	3.67	.69

	M	*SD*
Homogeneous	3.75	.72
Instructor-Selected	3.82	.55
TW-Pre	3.52	.53
TW-Post	3.69	.59
TP-Pre		
TP-Post	3.71	.92
Student-Selected	3.81	.55
TW-Pre	3.40	.71
TW-Post	3.40	.60
TP-Pre		
TP-Post		

Note. TW= Perception of Teamwork; Pre= Pre-Questionnaire; Post= Post-Questionnaire; TP= Perception of Team Projects.

Table 73

Summary of MANCOVA on the Satisfaction Score by Role Assignment Strategy (n = 236)

	Wilks' Λ	*F*	Hypothesis *df*	Error *df*	*p*	Partial η^2
TW-Pre	.96	5.103	2	225	.01	.04
TP-Pre	.90	13.164	2	225	.00	.11
Role Assignment Strategy	.95	1.53	2	225	.14	.026

Note. TW= Perception of Teamwork; Pre= Pre-Questionnaire; TP= Perception of Team Projects.

Research Question 4: What do Students Report About Professionalism, Cooperation, Learning Objectives, and Group Participation in Problem-Based Instructional Models?

This question sought to examine each student's experience while they were part of the various groups within the problem-based instructional models. A phenomenological approach was taken to analyzing each student's experience, beginning with bracketing of the researcher's biases and assumptions (see Appendix X). Next, the codes from horizontalization were developed and separated by Wiki (see Appendix Y and Appendix Z). These codes were then reviewed and refined into textural codes (see Appendix AA and Appendix BB). The last step was to take the textural codes and refine them into structural codes (see Appendix CC and Appendix DD). The structural codes composed the final codebook (see Appendix EE). The following sections provide a thick description of the codes found in the research. The thick description is organized into seven section by main codes: Cooperation, Professionalism, Project Application, Digital Age Literacy, Effective Communication, High Productivity, and Inventive Thinking. Within each of the seven main codes, there are multiple sub-codes that reflect participants' deep experiences. Pseudonyms are used instead of participant numbers. The structural codes making up the final "main codes" were reflected across the different models and groups.

Thick Description

Cooperation. The cooperation codes came from the first wiki, which asked students to share their definition or understanding of cooperation. There were three themes that discussed behavior, two that discussed equality, and three that discussed work ethic (see Figure 14). Cooperation codes differed from the Professionalism codes later explained in that participants explained cooperation in terms of action, whereas professionalism was explained in terms of general behavior.

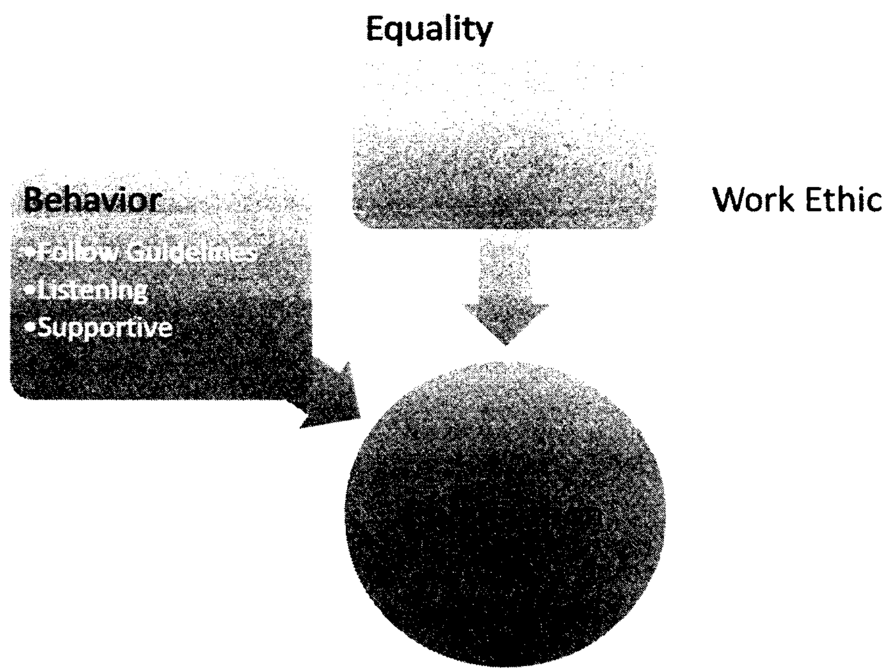

Figure 14. Cooperation Codes. This graphic shows the codes and sub-codes that made up students' perceptions of cooperation.

Behavior- follow guidelines. The first theme that emerged was the idea of doing what is asked or expected of one in a group. Sally explained, "cooperation is typically when two or more people come together for a common purpose, they all work together in an organized fashion and get the work done." This idea of getting the "work done" was further explained by John, who explained rules and goals were important: "cooperation is the willingness to follow set rules, support team goals or yield to the team members when needed for the success of a project." Becky pointed out the importance of sharing the same topic: "cooperation is having everyone on the same page. All teammates should have the same idea and understand the idea." Tim felt like sharing the topic also meant agreement: "cooperation mean to me the ability to agree and stand in agreement on a topic, situation and or job."

Behavior-listening. Another theme that emerged was the importance of listening to others. Linda felt like "Humility is needed so that every idea and opinion is not shot down, but taken into consideration." Jason added "cooperation is an individual's willingness to give feedback and interact with an activity or event." Adding to this idea, Andrea explained the importance of non-agreement: "I think cooperation is not necessarily agreeing with the same idea but instead it is coming to an understanding between people to get a task done." Peter felt like listening involved other characteristics: "When I think about cooperation there are many words that come to mind. But the first to two that come to mind are open-minded, and respect."

Behavior-supportive. Participants also explained team members could be cooperative by giving the other group members what they need when they need it. George said, "Having a positive attitude and willingness to learn are all actions that should be a part of cooperation." David added, "It is one's ability to contribute to, and be part of team." Bryan refined this idea better by saying, "Actions that should be a part of cooperation should include listening to the opinions of other members of your group, helping others in the group that need assistance in order to collectively arrive at the same goal." Mark, a revised model participant summed it up best, stating:

> Cooperation is the backbone of teamwork. Without it, you have individuals doing the same job twice or overlapping each other's work when it is not necessary. It only takes one person to open the door. Yet if your hands are full and I see you approaching the door, by holding it open for you I am in essence cooperating with

> you to help you pass through the threshold of the doorway. Cooperating is making things easier for others by kind of going along with the plan and or even going as far as to predict what the goals are and filling in the needs area.

Equality-workload. Participants' also felt that everyone should have a separate part and responsibility within the group. Garret stated, "Cooperation is where individuals or groups collectively interact together to complete a task or achieve a goal." Kate refined this a bit by adding, "Cooperation is the ability of individuals to work together and take their strengths and weaknesses and use them toward a common goal." Becky brought up the issue of time by stating, "it's one or more people unitizing together to reach one common goal in a reasonable amount of time if not in a scheduled amount of time." Lauren had deeper insight, focusing on the relationship between peers, stating, "I think cooperation is all about building a relationship to a point where there needs to be a little give and take from all sides. That there has to be a certain outcome but the way to get there has to be agreed upon by everyone." Gary felt that there were more factors, including knowledge: "The way I would describe cooperation is when a group of people who are like-minded or completely indifferent come together for a common goal to be accomplished as a team with equal effort from every member of the group or team."

Equality-ideas. Participants felt that allowing others to share their experiences and thoughts and validating their opinions was a valuable part of cooperation in equality. Kate said she "believe[s] that cooperation means putting aside your own personal views and opinions, being open minded, and willing to listen to other ideas and suggestions and respond accordingly." Becky added that, "Cooperation would best be described as the ability to function as a team player, understanding that ones own ideas are not the only valid ideas." Gary explained how an individual best supports the equality of ideas: "When one cooperates, he/she listens with an open mind, reflects and analyzes his ideas, and offers relative feedback." There was also a feeling of putting judgments aside. Bryan explained, "To foster a cooperative environment people should be able to share their views and opinions without feeling like they will be judged. A consensus is also important so every team member will feel valued." Tyrone felt like cooperation could not exist with judgment. He said, "The word cooperation means working well with people especially in a team. It also means respecting the ideas and not judging your peers."

Work ethic-project focus. Work ethic in regards to the project was also an important concept participants wrote about. They described that despite anything, there should be a focus on getting the project and its goal done, putting aside any differences of opinion. Denise said, "I would describe cooperation as working together well and being willing to set aside your own needs and desires for the betterment of the group and its needs." Arnold added the importance of loss, "Cooperation is every one putting aside differences to attain a goal. Listen to all ideas without being judgmental, Giving up something for the team." Gavin pointed out the importance of behavior, commenting "Cooperation is the ability to create and adapt to ideas around you and put emphasis on the way you behave when a conflict arises."

Work ethic-working with others. Participants also described sharing the project and doing everything together. To Tonya, this meant "listening to members of your group and volunteering for tasks that are needed by the group are actions that show cooperation." Bill explained using scenarios and brainstorming how peers could work together:

> Cooperation is working together towards the same goal in a cohesive and positive manner. This could mean if the leader of the group allocates tasks and duties that all participants take on these tasks without argument. Also if two people are working together as a team they willing to complete tasks with the help of the other.

To Logan, this meant, "When given an assignment you do your equal share." But Rebecca noted that sometimes one has to do more than his or her share: "Everyone completing their share of the goal/task. Sometimes when cooperating with other people, someone ends up with a larger share to complete the goal/task at hand and helping them out is part of that."

Work ethic-compromise. Another theme in that data were the idea of going along with ideas one may not agree with. Lisa said, "Cooperation is when two or more people working towards a goal reach consensus, through compromise." Kevin pointed out that compromise does not mean defeat, "Cooperation is working together to get the job done. No matter if you don't like where the team is going you still give input and work together." Martha supported this idea stating, "Cooperation needs give and take from both sides, it involves compromise from everyone." In order to effectively compromise, Mohammed said, "Cooperation requires each person involved step back and put aside differences that may get in the way of cooperation." Rose pointed out the personal traits needed to compromise: "solid cooperation requires a high level of adaptability to ever-changing situations." Nick felt like compromise also meant providing continued support: "once a direction is chosen, regardless of your feelings on the direction, being capable of supporting the goal of the team."

Professionalism. The professionalism codes came from the first wiki, which asked students to share their definition or understanding of professionalism. There were two themes that discussed work ethic, four that discussed professional traits (equality, expertise, attitude, and ethics) and three that discussed behavior (see Figure 15). Professionalism codes differed from the previous cooperation codes in that the professionalism codes explained behavior and mannerisms, not necessarily actions.

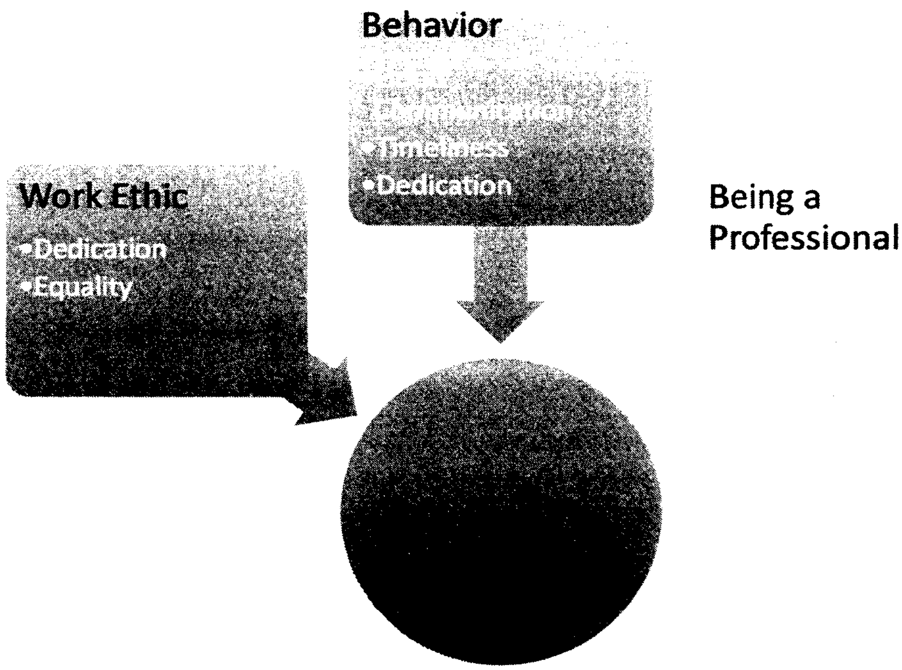

Figure 15. Professionalism Codes. This graphic shows the codes and sub-codes that made up students' perceptions of professionalism.

Work ethic-dedication. To be a professional, participants thought that one should be focused on getting jobs done and completing goals. Glenn said:

> To me professionalism means having style, experience, good judgment, and good behavioral skills when dealing with people or situations. Having good judgment means knowing when and how to use the knowledge and experience one has to get the job done.

Susan felt like competence was also important:

> When you are trying to show your professionalism the best qualities to display are competence and dedication. I say competence, because to properly assess a situation you must know what you are speaking about. Dedication is important, because it can shows how well rehearsed you are in your activities and also the consistency you have in working towards a goal.

Chris felt like being dedicated was also related to standards or ethics in the field. He stated, "Professionalism is working with a standard or having a high regard of work ethics. It is completing assigned task, within the allocated timeframe without procrastination."

Work ethic-equality. Participants also thought that being a professional meant being fair to others in the field and their knowledge. Kate said, "To me actions include, doing what you say you will do, doing the best job you can do, and treating others with fairness and respect." Tammy added the need to remove one's personal thoughts: "Part of this is being able to separate yourself from your personal bias and treat everyone fairly." Matt felt like equality was important when it came to work. He stated, "willing to compromise of the work load making sure every member has a fair input and one individual is not left doing all the work themselves."

Professional expertise. Going hand in hand with the equality theme, participants also felt that professionals must be knowledgeable in one's field and specialty. Chad said, "Professionalism to me is about respect and accuracy." Linda added, "Professionalism includes high level of skill." Jim felt like mastery was important. He said, "My personal definition of professionalism is any one person that has successfully mastered or on the way to mastering his/her trade or job industry."

Professional attitude. Having knowledge was not the only characteristic that participants felt made a professional. They felt like one had to be mature, positive, and dedicated. According to Sally, "Professionalism is how you act when dealing with others." Fallin added, "Professionalism means being respectful, having class and taking responsibility for how you act and how you present yourself and you treat the people around you." Garrett emphasized the importance of respect by stating, "One must possess a positive attitude and carry themselves with respect to self and others regardless of the situation." Martin pointed out that being positive in what may be perceived as negative situations was also an important quality: "maintain a positive attitude even if it's something I might not personally choose."

Professional ethics. Besides being knowledgeable, participants also felt like professionalism meant doing what was right within the field by following rules and guidelines established by that field. June and Edward (respectively) brought up the point that one might be the only professional in the field present: "Professionalism is doing what is right even when others are not around" and "Professionalism is doing what is right whenever nobody is looking." Mickey pointed out that professional ethics extends past the actual job field and into the company. He stated, "Professionalism is the act of performing duties and exhibiting oneself in a manner that reflects strong leadership and also adheres to the policies of the company."

Behavior- good communication. While participants felt communication was important as part of cooperation, they also found it to be important in professionalism.

June said, "Professionalism is a manner of treating others with respect and dignity." Adam pointed out that "it includes polite behavior and good judgment." Chad listed many characteristics of good communication, being "courteous, listening, and giving honest feedback to fellow group members. Such things as let people complete ideas or sentences." Casey realized how hard good communication can be by stating, "I think one of the main things in handling situations with professionalism is by remaining calm, even if inside you are screaming and wanting to pull your hair out."

Behavior-timeliness. In terms on time, participants felt that being prompt for meetings and staying for the duration of meetings was important for professionals. Heather explained that "Professionalism, for me is when a person works hard, comes to class/work on time and works hard to maintain good communication." Greg said, "Professionalism is being able to responsibly and efficiently complete assigned tasks." Cynthia added that "Professionalism is work place etiquette. Some examples are being on time for meetings." Richard pointed out that timeliness also meant readiness: "Examples of this action is completing assignments on time with your best effort; also, showing up to meetings on time and ready to work."

Behavior-dedication. While a project focus was important to participants during cooperation, they also felt like doing what one should do within a professional setting was part of being a professional. Tim said, "I think some examples of professionalism are when a person consistently does what it right by their coworkers and customers even when it is not the easiest thing to do." Kim emphasized the importance of the task at hand: "A professional will put the achievement of the task before their personal feelings." Toya pointed out that finishing the job was not always easy, but that a professional would do it anyhow: "Professionalism is maintaining your composure and finishing the job no matter if you agree with the team."

Project application. The project application codes came from the first wiki, which asked students to share how they would be cooperative and professional in team projects. There were two themes that discussed attitude and ones that discussed criticism, working in the group, honesty, sharing, and quality (see Figure 16).

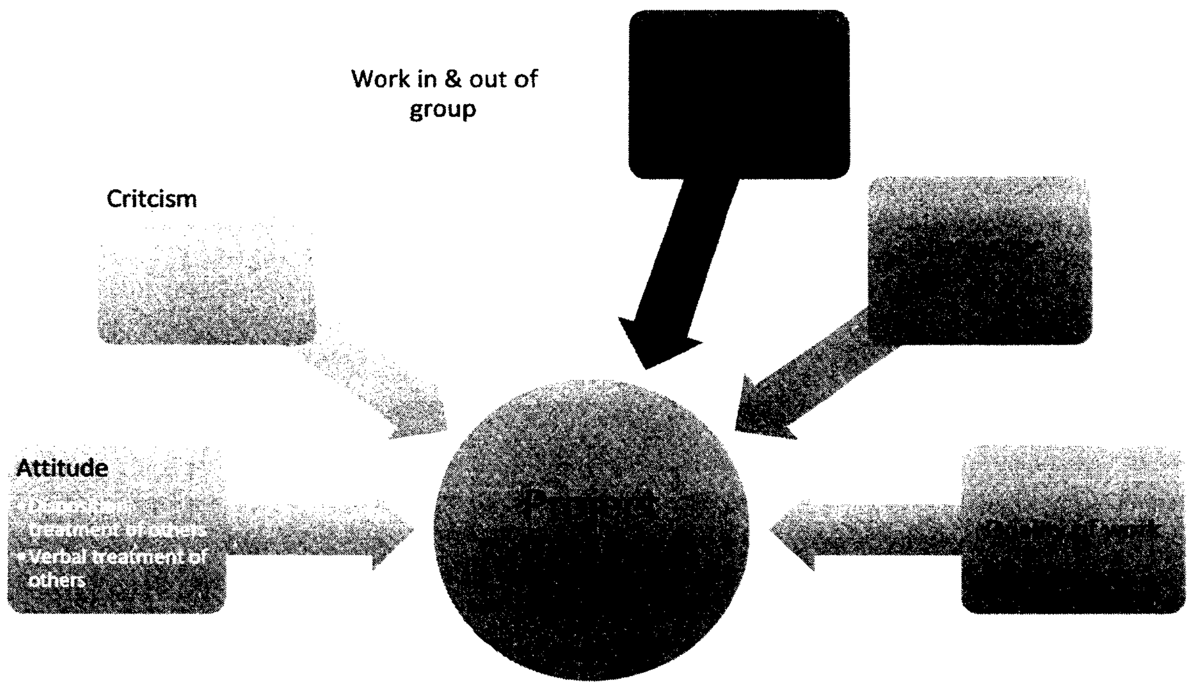

Figure 16. Project Application Codes. This graphic shows the codes and sub-codes that made up students' perceptions of how they would apply cooperation and professionalism during the team project.

Attitude-disposition treatment of others. Participants had many ideas about how they would be cooperative or professional, but one of the main themes reflected was having a positive disposition towards the project and others. Randy said, "During any group projects cooperation and professionalism are very important because we need both to be able to work together and even when we don't agree on something we can come to a place of common ground and continue towards our goal." Amy explained that she would be "open to ideas from others and willing to compromise of the work load making sure every member has a fair input." Kayleigh said she would "listen to my fellow group members and discuss their suggestions and thoughts. I would also treat them with respect."

Attitude-verbal treatment of others. Another action that was important to participants was not cutting down the ideas and actions of others, not speaking over others, and using appropriate language. Casey said, "During a group project I would apply professionalism by listening to everything that the people had to say and give positive and professional feedback." Karen said she would "listen to other group member ideas and respect them." Alicia felt like "Listening to my teammates ideas and opinions is an excellent way to do this [be cooperative and professional]." Janet felt like it was more than just what she would do, but also by helping others: "I [would] encourage others to express their ideas, while playing devil's advocate to build upon ideas to find the best solutions."

Criticism-negative. Different from the verbal treatment of others, participants also felt like there was a need to be accepting of and give negative criticism with an open mind. Joanne said, "The challenge comes when one has to criticize someone else's ideas without being condescending or obnoxious. I have worked in groups before with a positive outcome and will do my best to be a positive member of any team to which I am assigned." Russell felt like he would "give out positive and negative criticism on individual work to show accomplishments and room for work." Becky pointed out the line between helping and hurting by stating that "constructive criticism is accepted, not belittlement." Gail felt like criticism was a two way street: "To accomplish this, you need to be open and willing to listen to advice and at the same time be able to offer your own constructive criticisms."

Work in & out of the group. Besides communicating with the group, participants also explained how they would help their peers. Carolyn said

> With our project we are trying to keep everyone equal so the professionalism of what each person knows will help with any issues that arise and with all of us ensuring completion of the project no one will be left behind.

Bryan pointed out the need to balance his work and help other at the same time: "I would also help them in anyway that I can and get my work done in a timely manner." Nicole said, "While we are doing projects cooperation means turns your work on time and be part of the team and do everything professionally so it will help out to other team members to complete project successfully."

Honesty. Being truthful with the group was also an emergent theme. This was not lying to team members and stating if one is having problems. Crystal said, "Ask for help, being a professional is not being perfect it is being accountable to your imperfections." Sean felt that equality was important, but that everyone must be honest about what they can do: "Professionalism helps to ensure there are equal shares amongst the group members while also ensuring that people are being honest in their individual work." James felt like honesty was also needed in helping others in the group, stating "giving honest feedback to fellow group members" was important.

Sharing the workload. Besides being honest, participants also felt like it was important they do a fair share of what it assigned to them. Randy said, "During group projects, people need to contribute equal parts and treat each other with respect."

Michelle liked the idea of division: "Groups must act in a professional manner where they can divide up the work and make sure everyone can behave ethically by not slacking." Kayleigh focused on her personal responsibility with the workload by stating "Also, being able to complete my portion of my task instead of passing it off to others." Shannon was prepared to do what was asked of her. She stated, "During group projects I would apply cooperation and professionalism by ensuring that I do my part with every group project."

Quality of work. Lastly, participants also felt like they needed to take their time to do the best job they could do. Kate said, "help others by answering questions to the best of my knowledge and respecting the other members of my group." Tim realized that he could need to be "professional by competing all that is required of me on a timely manner with only my best." Glenn and Brandon (respectively) felt like effort was tied to time, too: "I will apply my best effort to ensure that I deliver accurately and on time. I will try my best to give feedback when needed and follow up and updates on my progress" and "Being given a task to do as a group and you do it the best of your ability and in a timely manner."

Digital age literacy. The digital age literacy codes came from the rest of the nine wikis, which asked students to share their progress on the project and soft skills. There were five themes that divided digital age literacy into basic, scientific, economic, technological, and global categories. Then there was a sixth theme that discussed a lack of digital age literacy.

Basic literacy. Participants throughout the research shared how they knew how to use basic tools such as email and Microsoft Suite. Early on in the course, Tara said (day

4) "I learned that I have a great deal of digital age literacy. I can navigate easily through computer programs and can use PowerPoint and excel." Don (day 5) was also learning this: "Which meant that I was the person in charge of the PowerPoint based on the fact I know more about technology than some of my other teammates but that's ok cause what I lack in other areas get made up by my teammates." Marty (day 7) recognized the importance of teammates basic literacy skills, stating "I appreciated the anticipation of members who were engaged into creating PowerPoint and its layout with ease and knowledge of doing so." By the end of the course, both Kate and Gavin felt basic literacy was very important: "This assignment was an excellent exercise in our team's ability to utilize various Microsoft software in new ways in order to accomplish a successful project" and "Today as a group we finalized a few things for the course project. Working in PowerPoint we put together some of our ideas in the proper categories."

Scientific literacy. Participants also showed how they could evaluate scientific research at the beginning of the project. Denise said, (day 2) "we took the time to gather information about competitors, the technologies required to create the device, and other aspects of that required research." Tim reported (day 2) "we as a group, had the idea to do our project around Washington RIET. We looked at the company and I found an article from the CIO that talked about the system" Matt said (day 2) "The hardware research is going at a smooth pace. Plans for the Linux portion of the project is already taking shape." Later in the course, scientific literacy grew for some. Glenn said (day 5) "We presented scientific information, statics, and cultural beliefs." Martha added (day 6) "I was also doing research on a company to find if their system is in fact a MIS."

Economic literacy. Another important literacy was understanding how to compute money and financial reports. Randy realized the importance of economic literacy early on: (day 2) "With devices and applications in my charge I have a lot of research ahead of me and need to firm up my numbers to get to finances." Amy said (day 3) "The primary contribution I have made to the group has been financial research and budget development. Utilizing a simple, pre-made, template, I constructed a detailed budget sheet that detailed the cost of individual jobs, any items purchased, accounted for investor donations, rent and licenses, and more." By the second week of the course, Denise realized that economic literacy was a critical component: (day 4) "I have decided to take the lead on this portion researching the different cost of materials and manufacturing cost and will be doing the financial analysis and emailing it out to the group." Sean realized that his economic literacy was also important to the whole group. He stated, (day 5) "By researching similar companies within the industry, and by using industry standards, I am able to supply everyone in the group with a template and guide that could be used to help us in developing the vision of our company." Towards the end of the course, Michael realized the need for accuracy (day 7) "I put together the entire financial analysis while getting all the correct information via research and my other teammates." Richard began to feel overwhelmed by the large economic literacy demand: (day 7) "Getting the pricing for all the equipment needed and software will be the lengthiest part of my task. Once everything is accounted for the price will then reflect the total for all equipment. Working as the Cost specialist is a very tedious job that takes more than math skills."

Technological literacy. The other literacy that was important was how to use advanced technological tools. Jim felt like technology literacy made the project easier right from the first week: (day 2) "Using the internet to research the advantages and disadvantages of our project topic made it easy to cover a lot of information in a short time." Lori shared Jim's feelings by stating (day 2):

> During this class session, we didn't focus on completing any particular portion of the project. Instead, we took the time to gather information about competitors, the technologies required to create the device, and other aspects of that required research. The intent was to have as much information as possible so that creating the project documents would progress as smoothly as possible.

By week 2, Gavin realized he had to use advanced technology to stay active in the group: (day 3) "I also helped with the research project by mobile phone while not able to access a computer" Halfway through the course, some participants demonstrated technological literacy by coming up with ways to share work. Mohammed said, (day 4) "We also established a share drive folder so that we can all up load things to the same place and easily get everyone the information need for the project."

Lack of technical literacy. However, there were other participants who recognized the literacies were important, but did not find them easy. Joanne said (day 2) "I don't do well researching topics on the internet." Others, realizing the difficulty, felt more optimistic. Martha explained (day 3) "As I practice more with the subject, I will become more familiar with the information and the tools associated with. In other words I'm getting da skills!!"

Global awareness. Even though they did not have to, participants took their projects and made connections to the global world. During the first week of the project, Jim said (day 2)

> Then continued to talk about how our NPO can benefit women all over the world. I personally feel that it is one of the best ideas for women because I have experienced some situations in my past that had I known some of the techniques that we would teach then I would not have been so scared and able to keep a calm head.

Ned explained (day 2)

> The group that I am apart of has chosen to deal with the problem that occur during the times of heavy snow. Our idea will take some experimentation and we must also be able to identify materials that will hold up to the pressures that our product would undergo. Our idea would help motorists that would be stuck in the snow, this would be mostly for safety purposes.

Michael felt excited by the third week by the new idea. He stated (day 3)

> We are working on developing a new idea that will change the way police and other people in authority will act towards people who have our system deployed in their vehicle. We developing a system that will monitor how traffic stops and other incidents around a vehicle with this system is deployed. It will change the way police and other people in authority decide to act knowing that this system is deployed.

Trent said (day 3) "We as a group started to research what and how fraud is effecting consumers globally using the WWW. We are trying to come up with an idea that will provide with a solution to fraud in order to strengthen the problem at hand." By the end of the course, participants began to feel hopeful about the global impact of their ideas. Sally explained (day 8)

> I think we will make our mark in the green movement and people will talk about how our company changed the hybrid car industry. I really hope we have great success with this because it would be cool to tell my kids about how this company really started and everything like that.

Effective communication. The effective communication codes came from the rest of the nine wikis, which asked students to share their progress on the project and soft skills. There were four themes: interactivity, personal responsibility, cooperation, and lack of cooperation.

Interactivity. Participants used multiple ways to communicate with their groups through the course. During the first week of class, Randy said (day 2) "I even took down emails so even when we are at home we are able to get in contact with one another, just in case we have important questions or anything of the sort." Much of the interactivity began during the second week of the class. Gavin found ways to communicate in the course's LMS: (day 4) "Today I learned to work with the discussion board on Moodle. I started a forum discussion on the phase two project. The rest of the team had not logged on yet but I'm well aware that they are great partners whom all are dedicated." On the other hand, Tommy found ways to communicate via shared documents: (day 4) "After the change of our project we started to gather new information off the internet about our new topic then again went back to Google docs and started to collect the information into a central repository for easy reference and discussion thanks to the chat option that the document provides." Glenn felt like storage was important and said (day 4) "We already have a cloud storage setup so we can easily communicate and share ideas while working on the group assignments." By the end of the course, participants had begun to use collaborative, synchronous technologies. George said, (day 7) "I find the Google Hangout is very interesting during class." Matt also shared how his group (day 9) "utilized actual digital technology, Skyping on an iPad, to present a portion of our presentation."

Personal responsibility. Participants admitted to using communication to share issues and problems. Half way through the course, Steve said (day 6) "We discussed that if we are having any trouble with our part of the project to speak up so that we call all pitch in and help." Toward the end of the project, Jaxson explained his attendance issue: (day 8) "This reflection I find myself at home not feeling well at all, but I did not want to slow my team down. So I made sure I was able to do a good hand off with my teammate, who position I was sitting in for."

Cooperation. Communication was not used only to plan the project or share troubles. For some participants, communication was necessary for cooperation. Barry said (day 3) "My group is coming together very nicely and we don't fight or argue, we just discuss everything and listen to see who has the better point. Then the better point is taken after everyone has an input on it." At the end of the course, Mark found that (day 9)

> this class has really shown me skills to work in a team, and this has been the only class where I can say that the whole team has worked together to complete a task. Normally in other classes either one person or the whole team slacks off at their assignment, making it harder for the work to be completed.

Lack of cooperation. Some participants expressed frustrating with communication in regards to cooperation. One participant felt there were communication issues at the beginning of the project. She used a metaphor to explain how she felt the issues would affect the project and the roles of teammates. Lora (day 3):

> I am the Beast Keeper. This group is akin to a wildlife preserve. I have a peacock, llama, wild boar, and a hyena. Most of the animals do as they are asked. When it is time to eat, they eat. When it is time to enter their assigned habitat for the evening, they do. It seems as though they interact well without a desire for superiority. The hyena is a different story. When it is time to eat, he chases the other animals and try's to eat them. When asked why he behaved this way, considering that he has food specifically for him, he blames the other animals and attempts to point out how he is a victim of the other animals. When it is time to go to his habitat for the evening, he decides that he wants to run amok and states that he only did it because the other animals were doing it. His interaction with the other animals is not appropriate for the environment. He often disappears into the surrounding brush with little regard to the safety needs of the preserve. I have already determined that interaction with the hyena will be terminated. He is not an asset to this collection of animals.

Jim thought more about himself in terms of communication, stating (day 4) "I thought I was an effective communicator. But now I think other wise. I have a member on my team that did not understand the task at hand." Toward the middle of the course, Danny reported communication issues tied to attendance: (day 6) "There have been some issues with the group over the progress of the project. Some of the other group members come in on their own accord." During the final course sessions, participants realized the communication issues that had affected the project. June said (day 8),

> Team members may be late to meetings, slow to produce results, and fail to meet deadlines. Many of the meetings may be and usually are unproductive because members won't trust one another opinions and ideas. Bogging things down in arguments, and revisiting of topics later because they could not be resolved in a timely manner.

Gavin took personal responsibility for communication issues by stating (day 8) "I wish I could of communicated better with the group. If I didn't have to work so much, I would have communicated better. I'm highly disappointed with myself."

High productivity. The high productivity codes came from the rest of the nine wikis, which asked students to share their progress on the project and soft skills. There were four themes: high quality products, managing, planning, and prioritizing.

High quality products. Towards the end of the course, participants explained that they spent time making sure their products were edited, revised, and formatted in an almost final way. Gail said, (day 7) "We finished up our ruff draft and made sure that we had all of our information together. We reviewed our power point and verified its completion and added any suggestions." Jake added (day 8) "Today we finalized our group effort by our separate sections of the audit rubric. We worked together by giving each other ideas and recommendations to our individual portions."

Managing. At times throughout the course, some participants felt the need to manage during the project. Early on, Tim said, (day 4)

> Starting to get a little frustrated with a certain member of our team. In earlier team meetings/discussions, we had divided up our assignment into segments and gave each member specific responsibilities. Now after partner #1 and myself have done our part, it seems that partner #3 is still confused as to what his tasks are. This is really frustrating because I know that I have put in a lot of effort with my piece, and it scares me that my grade is in the hands of a classmate that doesn't seem to be on board.

Candace felt the need to organize the project halfway through the course: (day 5)

> With there being six people in this group I have tried to make sure that everyone is communicating effectively. I have also helped keep our team on direction by suggesting that we break down each part of our assignment into group tasks. This keeps the work load small on everyone and also brings us together as a team when we come back and turn our individual work into a group made final draft.

Chris felt like the project could be fun. She stated, (day 6) "I keep things simple and fun. I try to break down the tasks into uncomplicated packages then bring the packages together to form the more intricate project." Nearing the end of the project, Kim accepted the need to manage and said (day 8) "I feel like my main job in the group is to be the glue. And I do not mind."

Planning. Other groups did not have troubles with managing because of their planning in the beginning and re-planning during the project. Hesitant to be in a planning role, Gail said (day 2) "We have established a project manager, which, unfortunately is going to be me as no one else wanted to do it. I have been surfing the internet for ideas on how to set some ground rules and have come up with about a dozen so far." Harvey's team tried to be organized right from the beginning: (day 2) "We have discussed and determined who will be responsible for which part of our proposal. After we have each done our individual parts we will get together and go over what we have done and iron out any remaining details." By the second week, some groups were still organizing and planning. Harold shared (day 3)

> Today, our group working with one another to assign and distribute responsibilities for our research proposal. From there we split up, working on our individual portions of the proposal, while using one another as sounding boards for our ideas. We laid out a plan in which we can work together today, utilizing our group members for planning, and then go more in-depth and expand on our personal responsibilities over the weekend.

Some groups even started to consider what to do in emergency situations. Donald said (day 4) "When it comes to our group formation and the first set of our group I think we are doing very well. We have all talked about what we need to do in case we are not able to show up and make it to class."

Prioritizing. Throughout the course, participants also showed how they could move parts of the projects around to complete items when needed. Kat said (day 2) "We split the work between the three of us which was a lot easier." Marybeth's group did this, too: (day 2) "When the instructor hand out and assignment we split the parts within the group a everyone has a fair share and do they part for the most part." Lin's group began not with roles, but with the grading requirements. He said (day 2) "We got together and went over the grading rubic for projects together. Then for the reset we all took sections that we wanted to do so that we could break up the work." Even after organizing the project during the first week of the course, during the second week, Hank said (day 4) "We as a group came up with the outline for our proposal. Breaking it down individually so that we can collectively put our research into the project." Towards the middle of the course, absences began to make an impact on the project plan. Gary shared (day 5)

> I had forgotten to reflect on the fact that several key people were absent. Causing a few people to shift positions to cover the missing positions, now they are back and wanting an update. I am not annoyed with the people who had spoken up and said that they were going to be absent, but the ones that did not communicate with the group are the ones that need to step up this week.

This middle part of the course seemed to be a turning point for some groups. Martin said (day 5)

> This class was a turning point for out team. It made us truly come together and solve a huge problem. The group leader left the group; therefore all of roles needed to be considered to determine who needed to do what task to make sure everything was able to get completed by the deadline.

Nearing the end of the course, Marty began to look at what still needed to be done: (day 6) "I have written out all the objects that need to be completed before the final week. We had a clear understanding of what each of us is responsible for." Other participants had to step into different roles days before the deadline: Megan shared (day 8) "When our Project Mgr had removed himself, I stepped up to keep the ball rolling."

Inventive thinking. The inventive thinking codes came from the rest of the nine wikis, which asked students to share their progress on the project and soft skills. There were four themes: adaptability, self-direction, creativity, and curiosity.

Adaptability. When it came to the actual project topic, participants from the middle to the end of the course found ways to move past problems. Tammy's group had to adapt quickly to perform the tasks required of them. She stated, (day 4) "Because the video did not work, we gave the class a real-time demonstration of two basic self-defense techniques that we were focusing on." Brittany was adaptable in her role and in the roles of others: (day 6) "I went through and I fine-tuned with the help of other team members on my responsibilities. I also went through and helped my team members out on what they were looking to fix in their responsibilities." Russell reflected stress in terms of having to be adptable: (day 6) "So, today was stressful, as two members of my group decided to no longer be apart of the group and left the rest of us hanging." Michael found that age began to require adaptability towards the end of the project. He said (day 7)

> I do feel that age has played a role in some of the problems faced by the group yet has also been a positive force in dealing with many aspects. Due to the differences in age there are varying perspectives on subject matter which can sometimes lead to disorder but can sometimes lead to coming up with solutions that one group or the other could not, or would not have thought of previously. We were able to overcome some of the obstacles.

Charlotte tried to adapt in regards to helping others. She shared (day 8)

> I noticed he did not use any in-text citations, and also had poor formatting on the works cited for an APA paper. Of course once I saw this, I tried to help him fix it and explain anything that he did not understand because we are a team, but he said he did not need my help although he never truly fixed the problem. Of course, it could also be related to the heavy workload he was enduring, but

> without wanting to stir up the controversy I fixed the mistakes myself and left it at that.

During the last class sessions, participants also reflected upon their adaptability throughout. Don explained that he learned that he is (day 9) "able to adapt when needed. I have had a few times where I was moving code around only to have something not work as I expected then I needed to adapt or utilize a higher-level of thinking to determine just how or why it didn't work as expected."

Self-direction. Participants also recognized the important of keeping themselves on task and focused. Jessica said (day 4) "I personally made some mistakes because each presentation something I have never work with I have had to use. With practice we will be able to become a stronger group and brings us closer together. None of us put anyone down or said anything negative to each other." Roberta said (day 5) "I feel that my team and I have communicated well. They keep me up with what they've worked on, and what it is I need to work on. Denise realized she needed to be more cooperative: (day 6) "I need to work more closely hand in hand with the individual doing expenses so we are on the same path." Ronnie felt the need to stay on task towards the end of the course. She shared how she was (day 7) "sticking with the plans and ways I do things within the group because it's working and everything is going smoothly."

Creativity. Participants also felt like the process helped them come up with new and improved ideas. Janice shared happiness about her group's creativity: (day 2) "Everyone thinks that we have a great idea. A refrigerator that can do online ordering, suggest recipes, and keep inventory of items is very unique." Pat said (day 5) "I have been able to show myself that I am creative in a sense that allows for me to build websites to fulfill needs." Lauren felt inspired at the end of the course: (day 10) "Definitely learned alot from my team mates. They brought out the better side of my critical thinking as well as my creative side."

Curiosity. Besides being creative, some participants felt like the process encouraged teaching themselves to learn or read about something that is not part of their current knowledge. Latoya said (day 2)

> For some time now, I have been thinking about something, this doesn't really happen very often, but the curiosity of the topic is making me want to research and write about it. So I guess that curiosity does make you think, and for me, make me write about it because that it intrigues me.

Michael applied his curiosity to start planning for the project (day 2):

> I did give thought to which companies would be ideal as a subject. Adobe was the first one that came to mind. They are a software company that makes products for print and digit graphics, website design and development, multimedia, gaming and marketing industries. Last year they embraced the cloud, making their software available online through a subscription service. It would be interesting to see how they use MIS in there company to support design, development, retail, online and business to business service

Summary

The purpose of this study and its research questions was to investigate different strategies used within two problem-based instructional models. Specifically, the effects of a traditional and revised problem-based instructional model (research question 1), heterogeneous and homogeneous grouping strategy (research question 2), and instructor and student-selected job role strategy (research question 3) on students' satisfaction and achievement were investigated. In summary, the quantitative data did not show statistically significant effects of models or group composition strategies on achievement and satisfaction. There was a statistically significant effect of job role assignment strategy on achievement. Specifically, there were statistically significant differences in five areas. First, between the two models using a heterogeneous group composition and instructor-selected job role assignment. Second, between the two models using the different group composition strategies, and instructor-selected job role assignment. Third, among the instructor and student-selected job roles in the revised model in the heterogeneous group. Fourth, among the different group composition strategies in the revised model using instructor-selected job roles. Lastly, among the revised model using different group composition strategies and different job role assignment strategies.

Qualitative data showed participants had feeling in seven different areas. Before engaging in the project, they felt that cooperation included different behaviors, types of equality, and types of work ethic while professionalism meant other types of work ethic, professional actions and knowledge, and behaviors. Participants also thought about the application of cooperation and professionalism in regards to attitude, criticism, working with the group, honest, sharing the workload, and quality of work. During the course of the project, participants reflected variations of soft skills strengths and weaknesses across four major categories: digital age literacy, effective communication, high productivity, and inventive thinking.

CHAPTER V:

DISCUSSION

The purpose of this mixed-methods study was to examine the effects of two different problem-based instructional models, cooperative grouping strategies, and job role assignment strategies on student satisfaction and achievement. A soft skills peer evaluation tool was also tested as part of the instructional model. The researcher's goal was to add to the research on problem-based instructional models by offering a model and specific strategies that can be used in the soft sciences to increase the development of soft skills. The researcher also hoped that the findings would lead to better cooperative grouping and assessment methods.

Findings

Factors influencing achievement. All of the research questions addressed achievement as a dependent variable. The first question asked to what extent achievement varied between the two problem-based models. The second question asked to what extent achievement varied between the two problem-based models when two different cooperative grouping strategies were used: homogeneous or heterogeneous. Lastly, the final question asked to what extent achievement varied between the two problem-based models using the two different cooperative grouping strategies when two different job role assignment strategies were used: instructor or student-chosen.

Models. Just as problem-based instructional models vary in terms of their structure, how achievement is measured within problem-based instructional methods has varied (Dochy, Segers, Van den Bossche, & Gijbels', 2003). This study calculated achievement by using a combination of scores from a peer and self-grading rubric (see

Appendix B) and the instructor's soft skills rubric (see Appendix V). The study attempted to see if there were differences between the achievement of students in a traditional model from the hard sciences or a revised model using the achievement measures. Descriptive statistics showed only slightly higher grades for students in the traditional model versus the revised one. These findings were not statistically significant. This suggests that students can achieve similarly within either model, and one may not be better than the other. Instructors who want to use either model may find the grading method proposed by the researcher as effective.

Cooperative grouping strategy. In his research, Slavin (1996) found that cooperative grouping results in higher achievement among students. However, not providing specific information about group composition, other researchers (see Li & Lam, 2013) found that more research was needed regarding why, how, and under what conditions achievement occurs. This study attempted to offer some answers to these questions. Using homogeneous and heterogeneous grouping strategies within two cooperative problem-based learning models, achievement data were collected via participants' assignment grades. Descriptive statistics showed slightly higher grade averages for students in the homogeneous groups in both the traditional and revised problem-based models, between the heterogeneous groups in the traditional model over the revised model, and between the homogeneous groups in the revised model over the traditional model. However, these differences were not statistically significant at $p>.05$.

While statistically insignificant, the implications are significant. First, these findings suggest that instructors wanting to use a cooperative problem-based instructional model could form homogeneous or heterogeneous groups. One grouping strategy may not influence achievement. Second, researchers of the problem-based method have found that some studies of the method cite the assessment method as having an effect on student achievement, but that there are multiple ways of measuring achievement within groups (Dochy, Segers, & Buehl, 1999; Dochy, Segers, Van den Bossche, & Gijbels', 2003). Another issue found in the literature review was the rarity of a clear assessment method for soft skills (Silva, 2009). In the present study, achievement data were collected using a tool and method influenced by Kelley and Sadowski's (2005) peer grading rubric (see Appendix B) and a soft skills rubric created by the researcher (see Appendix V). Since there were not statistically significant differences between the groups, this grading tool and method may be usable within either group type. Lastly, many of the problem-based models suggest the use of both summative and formative assessment. The present study used both types of assessment within the different groups; summative assessment was done using the tool described above (Appendix B) and formative assessment was done at each class meeting using wikis (Appendices E & F). Since there were no statistically significant findings between the groups, the summative and formative methods used in the study might be successful in other settings using the same models.

Job role assignment strategy. While there were no statistically significant achievement differences between the problem-based models and between the different cooperative grouping strategies, there were differences between the job assignment strategies. Johnson, Johnson, and Smith (2007) suggested that more research was needed on the various ways to facilitate cooperative group work, including job role assignment. Some research in the disciplines has found that student selected groups do best (Bacon, Stewart & Silver, 1999; Chapman, Meuter, Toy, & Wright, 2006; Strong & Anderson,

1990) while others suggest that is not the case (Hilton & Phillips, 2010). This study found that achievement did differ when instructor or student-selected job roles were used. Achievement was different and statistically significant between five groups:

- Between students in both models in heterogeneous groups using instructor-assigned job roles, with students in the traditional model having a higher grade (84%) than students in the revised model (68%).
- Between students in both models in the different groups and using different job role assignment strategies, with students in the traditional model, in heterogeneous groups and using student-selected job roles having a higher grade (83%) than students in the revised model, in heterogeneous groups, using instructor-selected job roles (68%).
- Between students in the revised model using heterogeneous groups using different job role assignment strategies, with students using student-selected job roles having a higher grade (87%) than students using instructor-selected job roles (68%).
- Between students in the revised model using different grouping strategies with instructor-selected job roles, with students in the heterogeneous group having a higher grade (81%) than students in the homogenous group (68%).
- Between students in the revised model using both different grouping strategies and different job role assignment strategies, with students in the homogeneous group having a higher grade (80%) than students in the heterogeneous group (68%).

Specifically, one group was significantly less academically successful than the others: the revised model using a heterogeneous grouping strategy and instructor-chosen groups. Participants in this group greatly differed from participants in numerous traditional and revised model groupings. These participants earned lower grades than participants in a traditional model using both homogeneous and heterogeneous grouping strategies and instructor-chosen groups, and participants in all of the different revised model groups (homogeneous, heterogeneous, instructor-selected, and student-selected.

These findings may provide answers to previous research: What types of strategies make a difference on student achievement in cooperative problem-based instructional models? The results suggest the revised model with heterogeneous grouping and instructor-chosen job roles is ineffective. A more effective choice for instructors may be to use either homogeneous or heterogeneous groups within a traditional model and instructor-selected job roles. Another choice might be to use any of the other combinations within the revised model: Heterogeneous groups with student-selected job roles or homogeneous groups with either instructor or student-selected job roles.

Factors influencing satisfaction. The first three research questions addressed satisfaction as a dependent variable. The first question asked to what extent satisfaction varied between the two problem-based models. The second question asked to what extent satisfaction varied between the two problem-based models when two different cooperative grouping strategies were used: Homogeneous or heterogeneous. Lastly, the final question asked to what extent satisfaction varied between the two problem-based models using the two different cooperative grouping strategies when two different job role assignment strategies were used: instructor or student-chosen.

Models. Previous research has suggested that when students are satisfied, retention is higher and achievement is better (Douglas & McClelland, 2008). The descriptive statistics from this study showed slightly higher ratings for students in the traditional model in terms of satisfaction with teamwork and satisfaction with team projects. However, this was not a statistically significant finding. This means students were similarly satisfied in both areas with the traditional and revised model.

Cooperative grouping strategy. Some of the research on problem-based models has focused more on satisfaction with learning, not the actual process or strategies used in the classroom (Antepohl & Herzig, 1999; Ochoa, Gottschall, & Stuart, 2004; Woltering, Herrler, Spitzer, Spreckelsen, 2009). To shed light on the strategies that may or may not influence student satisfaction, this study compared student satisfaction with teamwork and team projects between different cooperative grouping strategies: homogeneous or heterogeneous groups. While descriptive statistics showed variations in teamwork and team project satisfaction across groups, no variations were statistically significant. This means that students were similarly satisfied in homogeneous and heterogeneous groups within both the traditional and revised models.

Job role assignment strategy. Similarly the need to shed light on strategies used within models that influence satisfaction as described above, job role assignment strategies were also evaluated. While descriptive statistics showed variations in teamwork and team project satisfaction across the different job roles, no variations were statistically significant. This means that students were similarly satisfied in instructor and student-selected job roles within both the traditional and revised models.

What students report about professionalism, cooperation, learning objectives, and group participation in problem-based instructional models. The final research question sought to understand what students reported on soft skills topics.

Cooperation. At the beginning of the study, participants expressed that they felt cooperation was an action that occurs during the process of a project and included not only a person's behavior, but also demonstrating equality and work ethic through actions (see Figure 17). Participants described cooperation as a "willingness to follow set rules" (P138) and "willingness to give feedback" (P87). Cooperation was not "necessarily agreeing with the same idea, but instead it is coming to an understanding" (P233) including one's "ability to function as a team player" (P45) and "putting aside differences to attain a goal" (P68). Participants felt that "working together to get the job done" (P7), "listening to members of your group and volunteering" (P36), "completing their share of the goal/task" (P21), and "contributing their ideas, solutions, and the work" (P4), and "understanding that one's own ideas are not the only valid ideas" (P207).

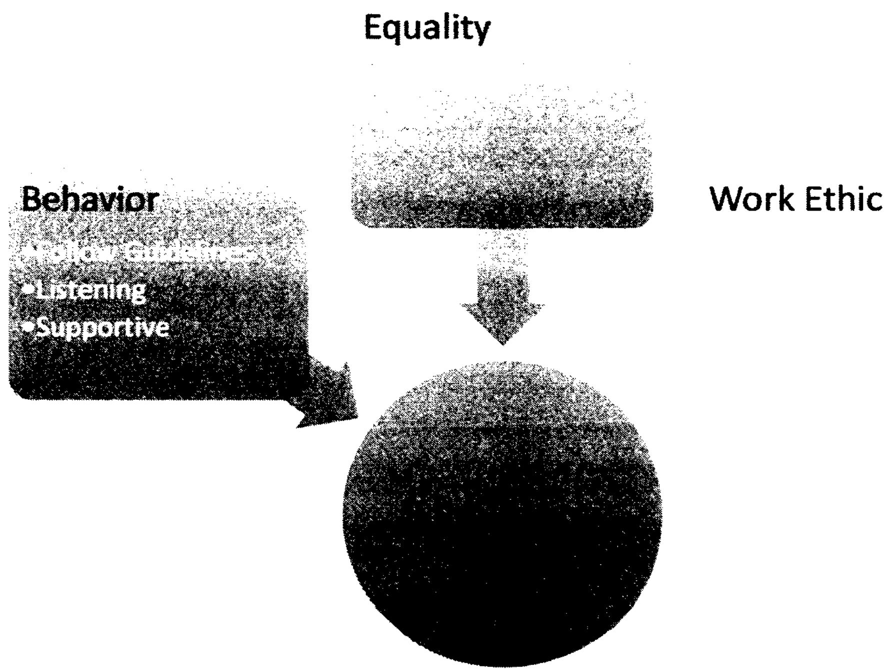

Figure 17. Cooperation Codes. This graphic shows the codes and sub-codes that made up students' perceptions of cooperation.

Professionalism. At the beginning of the study, participants expressed that professionalism was less of an action like cooperation but more a behavior and included one's perception of work ethic and personality traits (see Figure 18). They described professionalism as having "style, experience, good judgment, and good behavioral skills" (P160) and "competence and dedication" (P56) as well as being able to "separate yourself from your personal bias and treat everyone fairly" (P204), and "be calm and composed no matter the situation" (P16). Some examples of professionalism include "being on time for meetings" (P190), doing "what is right" (P90), and having a "positive attitude" (P24).

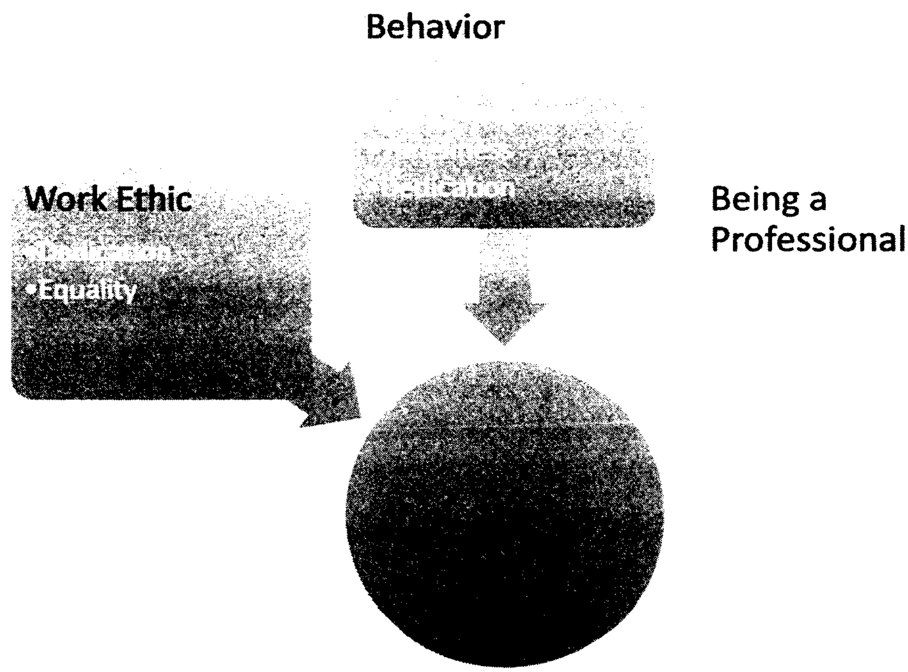

Figure 18. Professionalism Codes. This graphic shows the codes and sub-codes that made up students' perceptions of professionalism.

Project application. At the beginning of the study, participants explained that they would apply both cooperation and professionalism by controlling their attitude, behaviors with the group, sharing, being honest, accepting criticism, and doing quality work (see Figure 19). However, in their application of cooperation and professionalism, there seemed to be little difference between the actions of cooperation and behavior of professionalism; the two seemed to go together. Participants shared that they would be both cooperative and professional by being "open to ideas from others and willing to compromise of the work load" (P67), encouraging "others to express their ideas, while playing devils' advocate to build upon ideas" (P205), and helping "them [peers] in anyway that I can and get my work done in timely manner" (P65). Part of the union of cooperative action with the behavior or professionalism also included themes of honesty ("being accountable to your imperfections [P4]), sharing ("contribute equal parts and treat each other with respect"), and doing quality work ("apply my best effort to ensure I deliver accurately and on time").

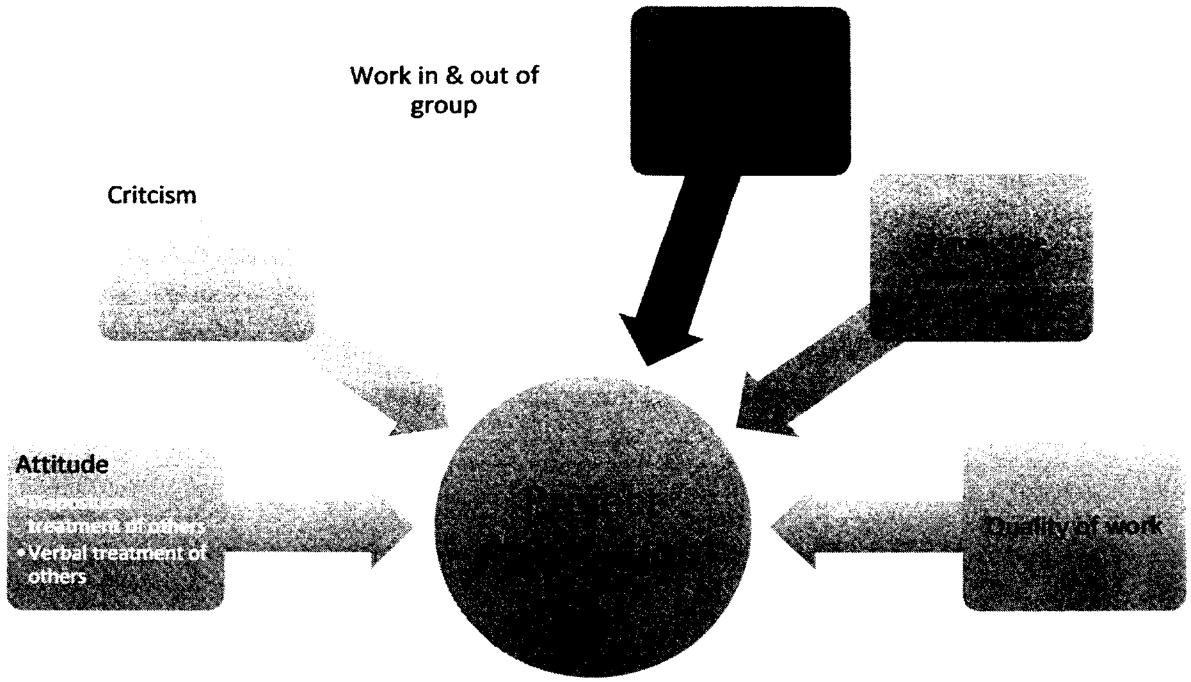

Figure 19. Project Application Codes. This graphic shows the codes and sub-codes that made up students' perceptions of how they would apply cooperation and professionalism during the team project.

Digital age literacy. During the study, participants reported knowledge of basic and technological literacies, using scientific literacy, and applying economic literacies (see Figure 20). Participants also expressed being globally aware and some frustration with a lack of digital age literacy. Besides having basic literacy such as using Microsoft PowerPoint, participants were also reflective and surprised by their abilities: "I learned that I have a great deal of digital age literacy" (P35) and "I was the person in charge of the powerpoints based on the fact I know more about technology than some of my other teammates" (P200). When it came to scientific literacy, participants seemed to find it easy to find articles and reports on topics of interest, but those who were applying their economic literacies felt like this was the bigger contribution to the team. Participants said "the primary contribution I have made to the group has been the financial research" (P67), "I have a lot of research ahead of me and need to firm up my numbers" (P9), and "getting the pricing for all the equipment needed and software will be the lengthiest part of my task" (P217).

Even though they were not required parts of the project, participants demonstrated technological literacy by using many different and advanced tools. This included using their mobile phone for research, creating diagrams, and establishing a shared drive. While there were participants who showed growth in many literacies, there were also participants who realized they did not have the literacies needed: "I don't do well researching topics on the internet" (P66) and "As I practice more with the subject, I will become more familiar with the information and the tools associated with. In other words I'm getting da skills!!" (P3). The most surprising finding from the qualitative data were participants who took the project topic, which was supposed to be more locally focused, and thought about how the project could make a global impact. Participants expressed a desire to make a "mark in the green movement and people will talk about our company changed the car industry" (P2), to "benefit women all over the world" (P44), and to understand "how fraud is effecting consumers globally using the WWW. We are trying to come up with an idea that will provide a solution to fraud" (P70).

Effective communication. During the study, participants reported using effective communication in an interactive way, to express personal responsibility, and to cooperate (see Figure 20). Some participants also shared frustration with a lack of effective communication. Participants shared that they used email, discussion boards, Google docs, Skyping on the iPad, Google Hangouts, and cloud storage to communicate in an interactive way. When sick or when busy with work, participants used communication to stay on top of the work. Cooperation was also improved for some via communication: "This class has really shown me skills to work in a team, and this has been the only class where I can say that the whole team has worked together to complete a task" (P188). However, as one would expect with teamwork, there were also issues with communication within groups. Participants shared "I thought I was an effective communicator. But now I think otherwise" (P44), "I wish I could of communicated better with the group" (P9), and "email has been an option to keep the communication flowing, but I feel that it has been ineffective" (P14).

High productivity. During the study, participants reported elements of high productivity, including creating quality products, managing, planning, and prioritizing. Participants demonstrated high productivity by auditing each other's parts of the project using a rubric to make sure their project would meet all of its requirements (see Figure 20). Managing, planning, and prioritizing was often a part of the first days of the project, but sometimes these actions were consequences of group issues: "we had divided up our assignment into segments and gave each member specific responsibilities. Now after partner #1 and myself have done our part, it seems that partner #3 is still confused" (P90), "I feel like my main job in the group is to be the glue" (P154), "when our project Mgr [manager] had removed himself, I stepped up to keep the ball rolling" (P50), and "several key people were absent. Causing a few people to shift positions to cover the missing positions" (P207).

Inventive thinking. During the study, participants applied inventive thinking by being adaptive, self-directed, creative, and curious (see Figure 20). Participants described being adaptive ("because the video did not work, we gave the class a real-time demonstration" [P204]) and self-directed when they needed to be ("I am sticking with the plans and ways I do things" [P167]). However, some participants expressed being surprised by how creative and curious they were during the project. One participant felt inspired to research something he had thought about for a while and write about it, while another felt like she was showing herself in a creative way to her peers.

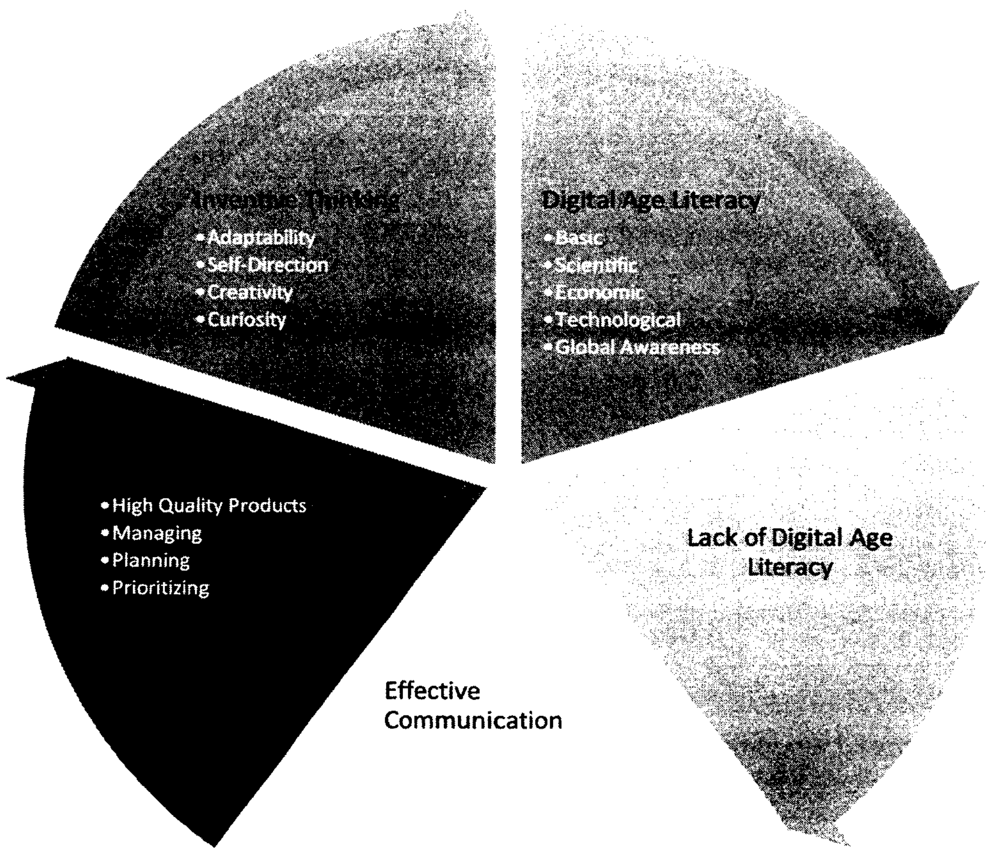

Figure 20. Soft Skills Codes. This graphic shows the codes and sub-codes that made up students' perceptions of the soft skills they did or did not develop.

Summary

Overall, the quantitative findings from this study suggest that students in the soft sciences can be as academically successful and satisfied in a traditional model and may not need a revised model. The findings also suggest that within these models, the group composition may not impact achievement satisfaction and that job role assignment may not impact satisfaction. What does impact student achievement is when the models using the different group compositions do or do not allow students to choose their job roles within the team. Students who were in a revised model in heterogeneous groups using instructor-assigned job roles had the lowest grades and this seems to suggest this model and grouping may be ineffective in the soft sciences' classroom. The qualitative findings suggest that students see cooperation as an action and professionalism as a part of who a person is. They applied both cooperation and professionalism through their behaviors, attitude, and ethics. During the study, participants reported growth in digital age literacy, the use of different communication tools, being highly productive when they needed to be, and being surprised about inventiveness.

Limitations and Delimitations

Possible threats to internal validity. One threat to internal validity is selection. Since the research took place in classes that the students' advisors schedule them in, there was little control in regards to which research group each student was assigned. However, in order to deal with this issue, the courses were randomly assigned as using either the experimental or control groups, homogeneous and heterogeneous groups, or instructor or student-selected job role assignments. There is the risk, however, that students even in instructor-selected job roles still took on jobs they wanted and did not do the jobs specified by the instructor.

Another issue is that the instructors were aware that the researcher is a doctoral candidate and was conducting research through the classes. During the training meeting with each instructor, the researcher asked each instructor not to tell students that data were being collected for doctorial research, which could modify behavior. The researcher asked instructors to tell students that this is a new curriculum for the course and that all course sections were using the curriculum.

A last issue is that of maturation (Creswell, 2012). The threat of maturation should have been quite small since the entire course was only five weeks long, reducing the standard time spent in a college course. This course was also the last one for many participants before graduation. During the training meeting with each instructor, the researcher asked each instructor to be consistent in contacting students who miss class sessions so that students do not become inactive or drop the course. The researcher also checked attendance records for class sessions, emailing instructors when students were absent from more than one class session and asking the instructor to contact the student to encourage participation.

Possible threats to external validity. One possible threat to external validity exists in the variety of blended learning environments at the postsecondary level. Many postsecondary institutions use different models for what they define as a blended learning environment. This may make the findings harder to generalize and harder to replicate in other blended learning environments. Details regarding the blended structure of the courses used in this study are explained. Results should be generalized to blended learning models that are similar in structure.

Another possible threat is that of institution type. The postsecondary institution in which the research took place is a private university, meaning its structure and population may be different from other public and private postsecondary institutions.

Recommendations for Future Research

There are many different areas that future research could expand. First, this study found that there were not significant achievement and satisfaction with teamwork or team projects differences between students in the soft sciences in the traditional and revised problem-based models. Given the research was done at a private university using a blended course model in one soft science's course, future research could test the models at other private and public institutions using different or similar blended course models. The models could also be tested in other soft science's courses such as philosophy and English.

Second, this study found that neither heterogeneous nor homogeneous group composition made a difference on students' soft skills achievement and satisfaction with teamwork or team projects. Future research could try different grouping strategies such as grouping students in one heterogeneous or homogeneous way (such as all females of different majors or all males of the same major). It may also be interesting to look at how the demographics may or may not affect achievement and satisfaction and if there are differences between demographic groups. Third, this study found that role assignment strategy did affect achievement. Future research could test the significant findings in different environments with different assignments. This study could also be built upon by testing its measures. The pre- and post-satisfaction questionnaire developed by the researcher could be tested within different hard and soft science classes and among different populations of students. The soft skills grading rubric (see Appendix V) could also be tested in different environments.

Lastly, participants' qualitative data showed many of the expected issues that occur during team projects: frustration with communication, technology, and timeliness. While the problem-based model and the strategies tested were chosen to try and reduce these common problems, future research could test specific communication strategies, technology tutorials and project schedules within the traditional and revised models to see if these aspects make an impact on students' achievement and satisfaction.

Overall Conclusions

Often different subject matters need different instructional models because the variations in what students are expected to learn and are expected to do. For example, a student in a Chemistry lab may learn in a different model than a student in a Medical Ethics class because the students may be learning concrete versus abstract topics that they are expected to apply to adapt. It was the belief of the researcher, however, that the instructional theory behind how students in hard and soft subjects learn is not that different. The research study sought to take one instructional method, the problem-based one, and research two different versions using two different cooperative grouping strategies and evaluate the models for effectiveness in a soft science's class.

The study found that the model and group composition may not make an impact on students' soft skills achievement and satisfaction with teamwork and team projects. However, when either instructor or student-selected job roles are added to the models and groups, there is an impact on some students' achievement. This means that instructors may be able to use a model from the hard sciences and it may not matter if students are in homogeneous or heterogeneous groups, but it does make a difference if students are allowed to choose their job roles or if they are assigned.

Another interesting finding is that students reported environmental distinctions between cooperation and professionalism. Yet when they explained how they would apply these concepts in team project, they seemed to group them together. Perhaps there is not as much of a difference between the two terms as students thought when they were asked to separately define the two terms. Lastly, during the study, while participants reflected growth in many soft skills, they did express frustration with themselves and their peers when it came to time and communication.

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APPENDIX A

DEMOGRAPHIC DATA COLLECTION QUESTIONS

*** 1. Please provide the requested information below.**

First and Last Name	
Age	
Gender	
Race	
Degree Program	

APPENDIX B

GROUP PROJECT SELF AND PEER GRADING RUBRIC

Purpose: This form is used to give you the opportunity to rate the contributions of yourself and your fellow team members. This page will not be shared with anyone else on the team, so think carefully and be open and honest with your evaluation.

Evaluate yourself and each person in your team and rate him/her on a scale of 1 to 5 in each of the categories.

Use the following scale to base your rating:

5. Above Average Work
4. Average Work
3. Slightly Below Average Work
2. Significantly Below Average Work
1. Poor or no work in this Category

The digital participation percentage column is a measure of your perception of how well you and each team member digitally contributed to the project. The total of the column must equal 100%. As an example, assuming a four-student team, if you feel that everyone on the team digitally participated equally, then assign 25 percent to each student (25% x 4 = 100%).

- A. **Digital Age Literacy** – Basic, Scientific, Economic, and Technological literacies, including visual and information literacies as well as multicultural literacy and global awareness.
- B. **Inventive Thinking** – adaptability, managing complexity, self-direction, curiosity, creativity, risk-taking, higher-order thinking and sound reasoning.
- C. **Effective Communication** – teaming, collaboration, interpersonal skills; personal, social, and civic responsibility; interactive communication.
- D. **High Productivity** – Prioritizing, planning, managing for results, effective use of real-world tools, ability to produce relevant, high-quality products.
- E. **Digital Participation** to the group (in percent). ***The total for this must add up to 100%.***

	A	B	C	D	E
Team Member	Digital Age	Inventive Thinking	Effective Communication	High Productivity	Digital Participation %
1. (self)__________	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5	*______%

2. ____________	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5	*_______%
3. ____________	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5	*_______%
4. ____________	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5	*_______%
5. ____________	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5	*_______%
6. ____________	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5	*_______%
7. ____________	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5	*_______%

* total for all must = 100%

APPENDIX C

PRE- SATISFACTION QUESTIONNAIRE

Teamwork & Group Projects Pre-Questionnaire

Welcome to the teamwork and group projects pre-questionnaire!

The purpose of this questionnaire is to determine your satisfaction with teamwork experiences and group projects.

This questionnaire is anonymous and the results will be kept confidential.

Next

Teamwork & Group Projects Pre-Questionnaire

*** 1. Please provide the requested information below.**

First and Last Name

Age

Gender

Race

Degree Program

Directions. Choose one response for each of the following eleven items.

*** 2. I am able to solve problems better when I work with a group.**

Strongly Agree | Agree | Neither Agree nor Disagree | Disagree | Strongly Disagree

*** 3. I like teamwork.**

Strongly Agree | Agree | Neither Agree nor Disagree | Disagree | Strongly Disagree

*** 4. Teamwork is fair.**

Strongly Agree | Agree | Neither Agree nor Disagree | Disagree | Strongly Disagree

*** 5. Teamwork grades are accurate.**

Strongly Agree | Agree | Neither Agree nor Disagree | Disagree | Strongly Disagree

*** 6. Group projects are better than independent projects.**

Strongly Agree | Agree | Neither Agree nor Disagree | Disagree | Strongly Disagree

*** 7. Group projects have to be designed and structured by an instructor.**

Strongly Agree | Agree | Neither Agree nor Disagree | Disagree | Strongly Disagree

*** 8. Group projects are a valuable part of my education.**

Strongly Agree | Agree | Neither Agree nor Disagree | Disagree | Strongly Disagree

*** 9. I would recommend group projects to other instructors and students.**

Strongly Agree | Agree | Neither Agree nor Disagree | Disagree | Strongly Disagree

*** 10. I feel comfortable during group projects.**

Strongly Agree | Agree | Neither Agree nor Disagree | Disagree | Strongly Disagree

*** 11. Teamwork is a good use of classroom time.**

Strongly Agree | Agree | Neither Agree nor Disagree | Disagree | Strongly Disagree

*** 12. I find teamwork nonthreatening.**

Strongly Agree | Agree | Neither Agree nor Disagree | Disagree | Strongly Disagree

Prev Done

APPENDIX D

POST-SATISFACTION QUESTIONNAIRE

Teamwork & Group Projects Post-Questionnaire

Welcome to the teamwork and group projects post-questionnaire!

The purpose of this questionnaire is to determine your satisfaction with teamwork experiences and group projects.

This questionnaire is anonymous and the results will be kept confidential.

Next

Teamwork & Group Projects Post-Questionnaire

*** 1. Please provide the requested information below.**

First and Last Name

Directions: Choose one response for each of the following eleven items.

*** 2. I am able to solve problems better when I work with a group.**

Strongly Agree	Agree	Neither Agree nor Disagree	Disagree	Strongly Disagree

*** 3. I like teamwork.**

Strongly Agree	Agree	Neither Agree nor Disagree	Disagree	Strongly Disagree

*** 4. Teamwork is fair.**

Strongly Agree	Agree	Neither Agree nor Disagree	Disagree	Strongly Disagree

*** 5. Teamwork grades are accurate.**

Strongly Agree	Agree	Neither Agree nor Disagree	Disagree	Strongly Disagree

*** 6. Group projects are better than independent projects.**

Strongly Agree	Agree	Neither Agree nor Disagree	Disagree	Strongly Disagree

*** 7. Group projects have to be designed and structured by an instructor.**

Strongly Agree	Agree	Neither Agree nor Disagree	Disagree	Strongly Disagree

*** 8. Group projects are a valuable part of my education.**

Strongly Agree	Agree	Neither Agree nor Disagree	Disagree	Strongly Disagree

*** 9. I would recommend group projects to other instructors and students.**

Strongly Agree	Agree	Neither Agree nor Disagree	Disagree	Strongly Disagree

*** 10. I feel comfortable during group projects.**

Strongly Agree	Agree	Neither Agree nor Disagree	Disagree	Strongly Disagree

*** 11. Teamwork is a good use of classroom time.**

Strongly Agree	Agree	Neither Agree nor Disagree	Disagree	Strongly Disagree

Prev Done

APPENDIX E

SELF-REFLECTION WIKI 1

Directions: Use this space to reflect upon professionalism and collaboration. Your response should be no less than one paragraph (approx. 7-8 sentences).

1. In your own words how would you describe cooperation? Please give examples of the actions you feel should be a part of cooperation

2. In your own words, how would you describe professionalism? Please give examples of the actions you feel should be a part of professionalism

3. In your group assignment this term, how will you apply cooperation and professionalism?

New page

New page title* Day 1 Wiki

Format

- HTML format
- Creole format
- NWiki format

Create page

There are required fields in this form marked *.

APPENDIX F

SELF-REFLECTION WIKI 2-10

Directions: Use this space to reflect upon the two items below. Your response should be no less than one paragraph (approx. 7-8 sentences).

1. Reflect upon your progression towards mastering the course learning outcomes or soft skills development.

Learning Outcomes:

- •LO1. Assess current problems in society or a specific field of study utilizing a combination of quantitative and qualitative research.
- •LO2. Formulate solutions to a current problem in society or in a specific field of study.
- •LO3. Judge validity of sources by critically analyzing the author, purpose, content, intended audience, and design of sources.
- •LO4. Integrate research and knowledge from previous course work to produce communication that incorporates written and visual elements.
- •LO5. Demonstrate cooperation and professionalism.

2. Reflect upon your participation in the group. This may include review of the your digital age literacy, inventive thinking, effective communication, and high productivity.

New page

New page title* Day #

Format

- HTML format
- Creole format
- NWiki format

Create page

There are required fields in this form marked *.

APPENDIX G

IRB APPROVAL LETTER

January 8, 2014 Approved Application Number
201401056

Dr. Richard C. Overbaugh
Department of Teaching and Learning

Dear Dr. Overbaugh:

Your Application for Exempt Research with Kelly S. Rippard entitled "The Effects of Cooperative Grouping Strategies and a Three-Level Evaluation Tool on Student Soft Skills Achievement and Satisfaction within a Problem-Based Instructional Model in the Soft Sciences," has been found to be EXEMPT under Category 6.1 from IRB review by the Human Subjects Review Committee of the Darden College of Education. You may begin this research project when you are ready. Committee members suggested that you may want to consider, but this is not necessary, informing the students of the voluntary nature of their participation in the study and providing students with your name and contact information in the event they have any concerns about the study.

The determination that this study is EXEMPT from IRB review is for an indefinite period of time provided no significant changes are made to your study. If any significant changes occur, notify me or the chair of this committee at that time and provide complete information regarding such changes.

In the future, if this research project is funded externally, you must submit an application to the University IRB for approval to continue the study.

Best wishes in completing your study.

Sincerely,

Theodore P. Remley, Jr., J.D., Ph.D.
Professor and Batten Endowed Chair in Counseling
Department of Counseling and Human Services
ED 110
Norfolk, VA 23529

Chair
Darden College of Education Human Subjects Review Committee
Old Dominion University

tremley@odu.edu

APPENDIX H

PILOT PRE- AND POST-SATISFACTION QUESTIONNAIRE

Teamwork and Soft Skills Questionnaire

Welcome to the teamwork and soft skills questionnaire!

The purpose of this questionnaire is to determine your satisfaction with teamwork experiences and your mastery of soft skills.

This questionnaire is anonymous and the results will be kept confidential.

Next

Teamwork and Soft Skills Questionnaire

*** 1. Please give your first and last name.**

Name:

Prev Next

Teamwork and Soft Skills Questionnaire

Directions Choose one response for each of the following fifteen items

***2. I find it easy to communicate using technology.**

Strongly Agree | Agree | Neither Agree nor Disagree | Disagree | Strongly Disagree

***3. I find it easy to communicate in face-to-face learning environments.**

Strongly Agree | Agree | Neither Agree nor Disagree | Disagree | Strongly Disagree

***4. I find it easy to solve complex problems.**

Strongly Agree | Agree | Neither Agree nor Disagree | Disagree | Strongly Disagree

***5. I am more successful when I solve problems by myself.**

Strongly Agree | Agree | Neither Agree nor Disagree | Disagree | Strongly Disagree

***6. I am able to solve problems better when I work with a group.**

Strongly Agree | Agree | Neither Agree nor Disagree | Disagree | Strongly Disagree

***7. I like teamwork.**

Strongly Agree | Agree | Neither Agree nor Disagree | Disagree | Strongly Disagree

***8. Teamwork is fair.**

Strongly Agree | Agree | Neither Agree nor Disagree | Disagree | Strongly Disagree

***9. Teamwork grades are accurate.**

Strongly Agree | Agree | Neither Agree nor Disagree | Disagree | Strongly Disagree

***10. Group projects are better than independent projects.**

Strongly Agree | Agree | Neither Agree nor Disagree | Disagree | Strongly Disagree

***11. Group projects have to be instructor-controlled.**

Strongly Agree | Agree | Neither Agree nor Disagree | Disagree | Strongly Disagree

***12. Group projects are a valuable part of my education.**

Strongly Agree | Agree | Neither Agree nor Disagree | Disagree | Strongly Disagree

***13. I would recommend group projects to other instructors and students.**

Strongly Agree | Agree | Neither Agree nor Disagree | Disagree | Strongly Disagree

***14. I feel comfortable during group projects.**

Strongly Agree | Agree | Neither Agree nor Disagree | Disagree | Strongly Disagree

***15. Teamwork is a good use of classroom time.**

Strongly Agree | Agree | Neither Agree nor Disagree | Disagree | Strongly Disagree

***16. I find teamwork nonthreatening.**

Strongly Agree | Agree | Neither Agree nor Disagree | Disagree | Strongly Disagree

Prev Done

APPENDIX I

CAP480 COURSE SYLLABUS

Instructor Information	Class Session Information
Name:	Meeting Dates:
Office:	Meeting Times:
Phone:	
E-Mail:	

Course Information

I. **Course Credits:** 3 Semester Hours

II. **Course Prerequisites:** Approval of Academic Advisor and Arts and Sciences Department Head, 6 credits in Communication, 3 credits in Math, 4 credits in Natural Science, 3 credits in Humanities, 3 credits in Social and Behavioral Science, and 3 credits in Computer Literacy

III. **Course Description:** This course is designed to enhance and reinforce a student's breadth of knowledge from their Arts and Sciences experience. Students will learn to integrate knowledge and skills from different disciplines to examine real-world problems. Upon successful completion of this course, students will be able to produce projects that support their academic goals and that synthesize approaches from a variety of disciplines within the Arts and Sciences.

IV. **Degree Program Student Outcomes Supported by This Course:**
This course supports all of the Arts and Sciences curriculum themes and expected outcomes for all Bachelor of Science Degree Programs.

V. **Learning Objectives:**
Upon successful course completion, students will be able to:

1. Assess current issues in society or a specific field of study utilizing a combination of quantitative and qualitative research.
2. Formulate solutions to a current issue in society or in a specific field of study.
3. Judge validity of sources by critically analyzing the author, purpose, content, intended audience, and design of those sources.
4. Integrate research and knowledge from previous course work to produce communication that incorporates written and visual elements.
5. Demonstrate cooperation and professionalism.

VI. <u>Course Grading</u>:

Since this is a research-based course, there will be no pretest or posttest

Course Component	Percentage
1. Phase 1: The Nonprofit Organization Project	30%
2. Phases 2 & 3: The Nonprofit Proposal	40%
3. Wikis	20%
4. Participation	10%

Grading Scale:

90 – 100	A	65 - 69.9	D
80 – 89.9	B	Below 65	F
70 – 79.9	C		

*** All coursework will be tied to specific Learning Outcomes**

APPENDIX J

CAP480 OBJECTIVES MAP

Course	CAP480: Arts and Sciences Capstone
Course Terminal & Enabling Learning Objectives	
T.1. Assess current issues in society or a specific field of study utilizing a combination of quantitative and qualitative research.	
	E.1.1. Brainstorm current issues in society or a specific field of study
	E.1.2. Locate nonprofit organizations that work on a specific issue in society or in a specific field of study.
	E.1.3. Summarize a nonprofit organization based upon quantitative research.
	E.1.4. Summarize a nonprofit organization based upon qualitative research.
	E.1.5. Create a new nonprofit organization.
T.2. Formulate solutions to a current issue in society or in a specific field of study.	
	E.2.1. Generalize the needs of a current issue in society or in a specific field of study.
	E.2.2. Devise a company that can meet the needs of a nonprofit organization.
T.3. Judge validity of sources by critically analyzing the author, purpose, content, intended audience, and design of those sources.	
	E.3.1. Locate three nonprofit organizations.
	E.3.2. Tell each nonprofit organization's goals, mission statement, needs, strengths, and weaknesses.
	E.3.3. Give correct APA references for sources used.
T.4. Integrate research and knowledge from previous course work to produce communication that incorporates written and visual elements.	
	E.4.1. Create a presentation about a newly created nonprofit organization.
	E.4.2. Write a company proposal that will meet a nonprofit organization's needs.
	E.4.3. Design a presentation to propose the company that will meet a nonprofit organization's needs.
T.5. Demonstrate cooperation and professionalism.	
	E.5.1. Explain cooperation.
	E.5.2. Describe professionalism.
	E.5.3. Give examples of cooperation.
	E.5.4. Give examples of professionalism.
	E.5.5. Use professionalism to complete group projects.

	E.5.6. Apply appropriate cooperation to complete group projects.
	E.5.7. Evaluate one's ability to act cooperatively and professionally in group settings.
	E.5.8. Evaluate one's peers' ability to act cooperatively and professionally in group settings.

APPENDIX K

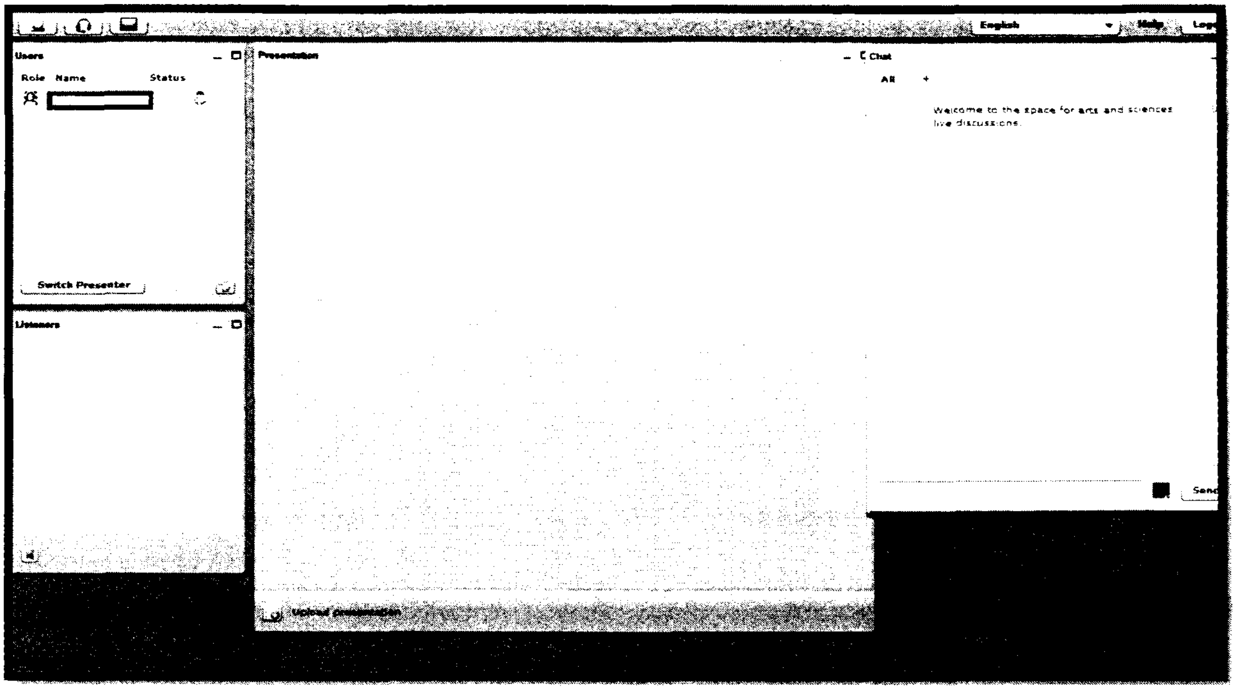
MAP OF COURSE COMPONENTS TO ENABLING LEARNING OBJECTIVES

Course	**CAP480: Arts and Sciences Capstone**
Course Enabling Learning Objectives	
E.1.1. Brainstorm current issues in society or a specific field of study	
E.1.2. Locate nonprofit organizations that work on a specific issue in society or in a specific field of study.	
E.1.3. Summarize a nonprofit organization based upon quantitative research.	
E.1.4. Summarize a nonprofit organization based upon qualitative research.	
E.1.5. Create a new nonprofit organization.	
E.2.1. Generalize the needs of a current issue in society or in a specific field of study.	
E.2.2. Devise a company that can meet the needs of a nonprofit organization.	
E.3.1. Locate three nonprofit organizations.	
E.3.2. Tell each nonprofit organization's goals, mission statement, needs, strengths, and weaknesses.	
E.3.3. Give correct APA references for sources used.	
E.4.1. Create a presentation about a newly created nonprofit organization.	
E.4.2. Write a company proposal that will meet a nonprofit organization's needs.	
E.4.3. Design a presentation to propose the company that will meet a nonprofit organization's needs.	
E.5.1. Explain cooperation.	
E.5.2. Describe professionalism.	
E.5.3. Give examples of cooperation.	
E.5.4. Give examples of professionalism.	
E.5.5. Use professionalism to complete group projects.	
E.5.6. Apply appropriate cooperation to complete group projects.	
E.5.7. Evaluate one's ability to act cooperatively and professionally in group settings.	
E.5.8. Evaluate one's peers' ability to act cooperatively and professionally in group settings.	

Curriculum Components	**Supports Enabling Objectives...**
Practice Activity	2.1, 5.5, 5.6, 5.7, 5.8
Project Phase 1	1.1, 1.2, 1.3, 1.4, 1.5, 2.1, 3.1, 3.2, 3.3, 4.1
Project Phase 2	2.2, 3.3, 4.2, 5.5, 5.6
Project Phase 3	3.3, 4.3
Self-Reflection Wiki 1	5.1, 5.2, 5.3, 5.4
Self-Reflection Wikis	5.7, 5.8

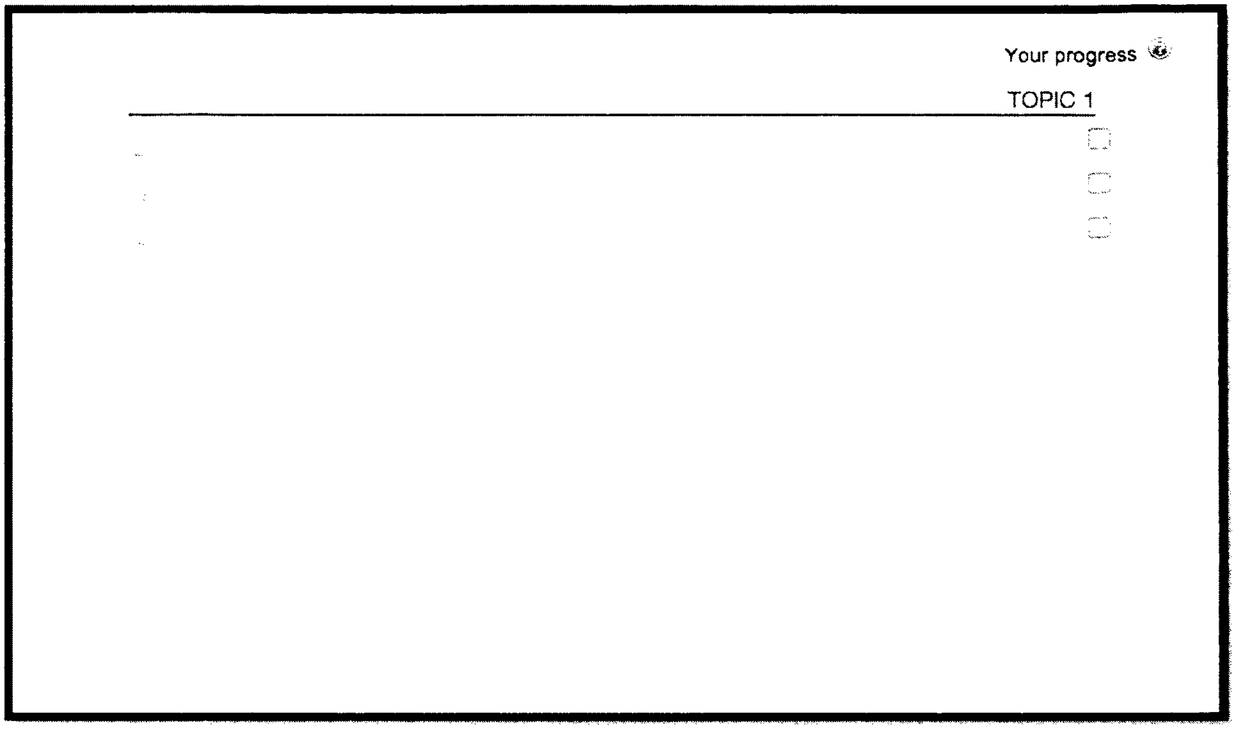
APPENDIX L

BIG BLUE BUTTON MEETING SPACE



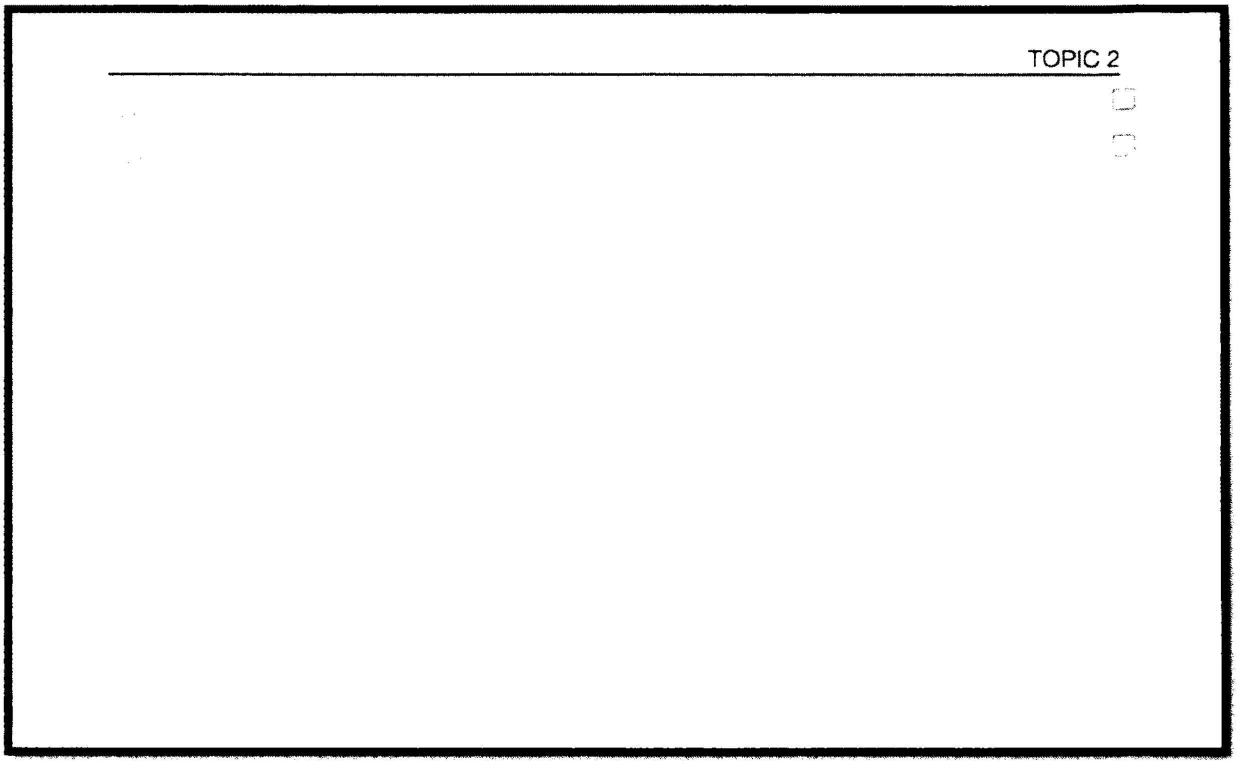
APPENDIX M

WEEK 1 COURSE MOODLE PAGE



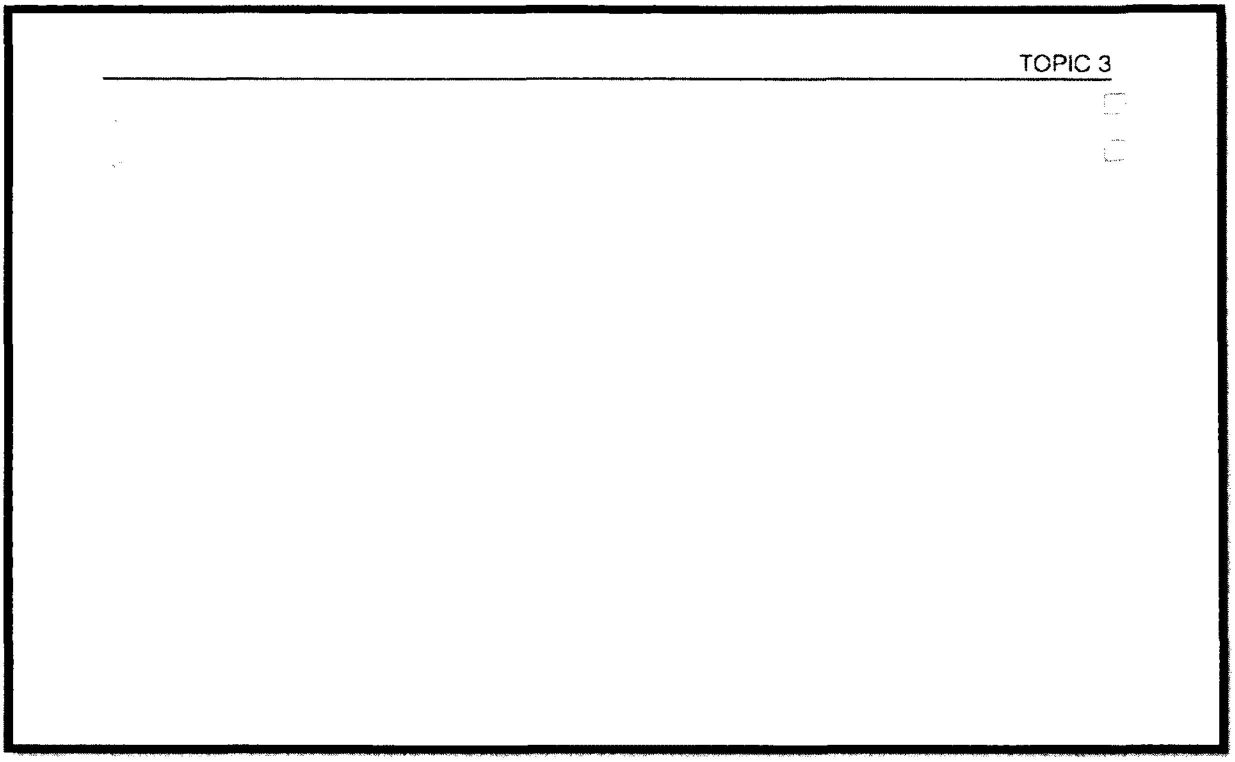
APPENDIX N

WEEK 2 COURSE MOODLE PAGE



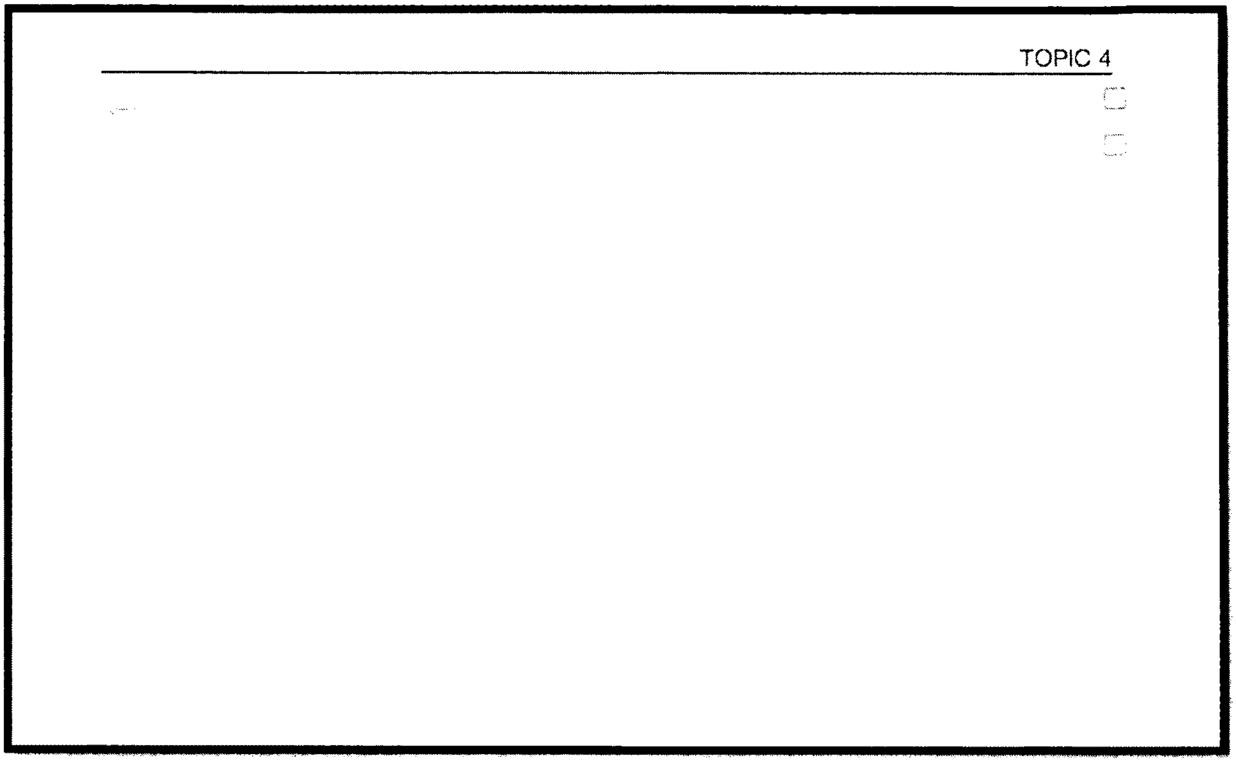
APPENDIX O

WEEK 3 COURSE MOODLE PAGE



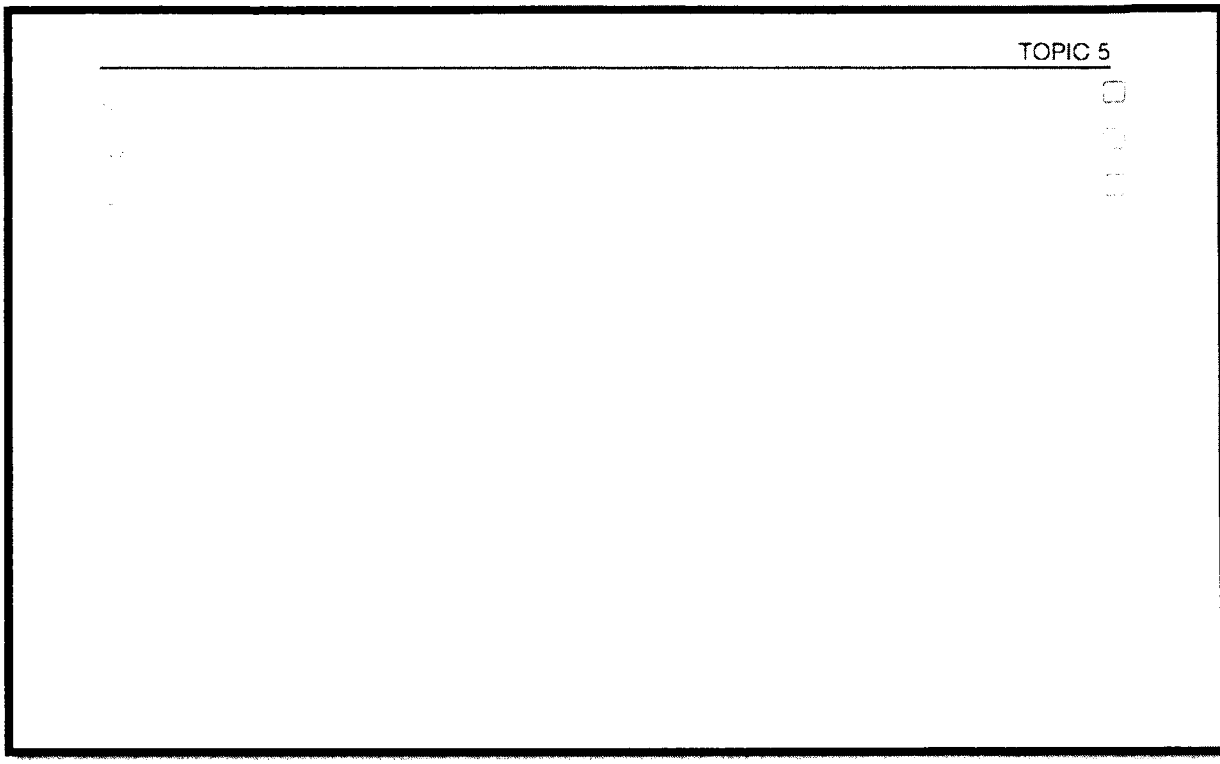
APPENDIX P

WEEK 4 COURSE MOODLE PAGE



APPENDIX Q

WEEK 5 COURSE MOODLE PAGE



APPENDIX R

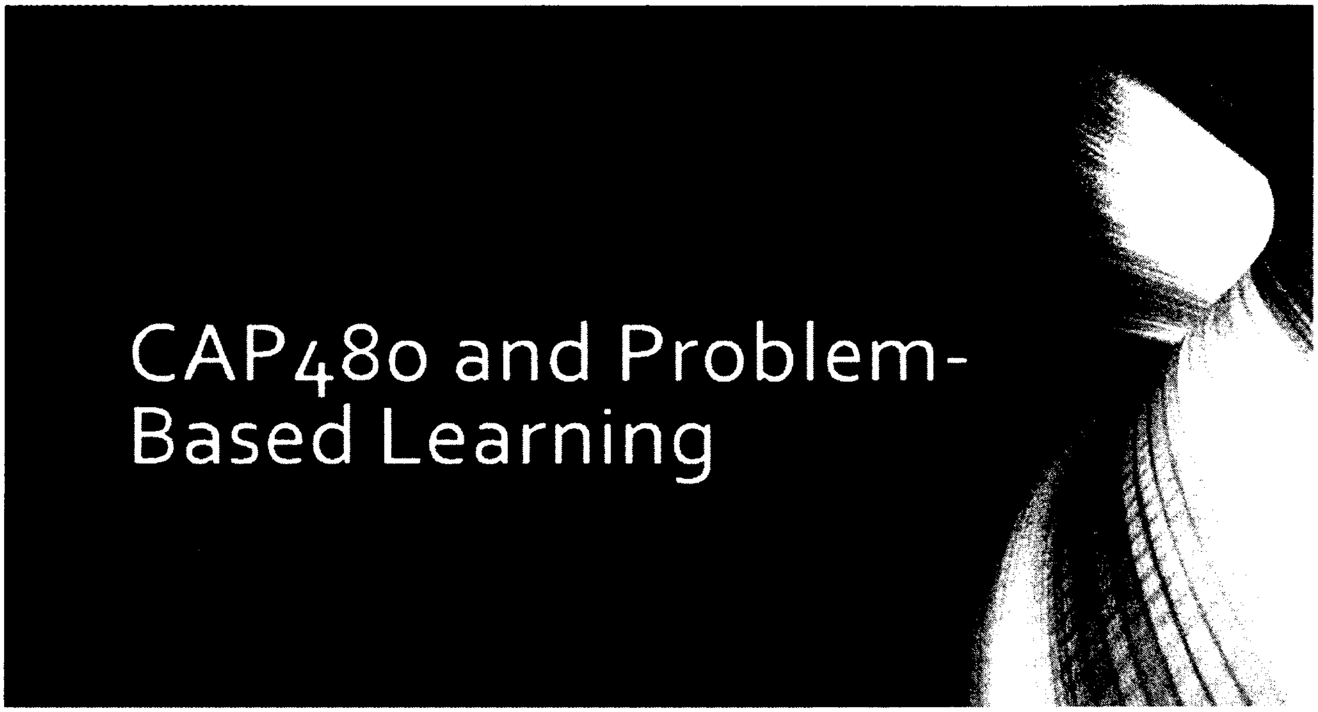
FACULTY COURSE OVERVIEW

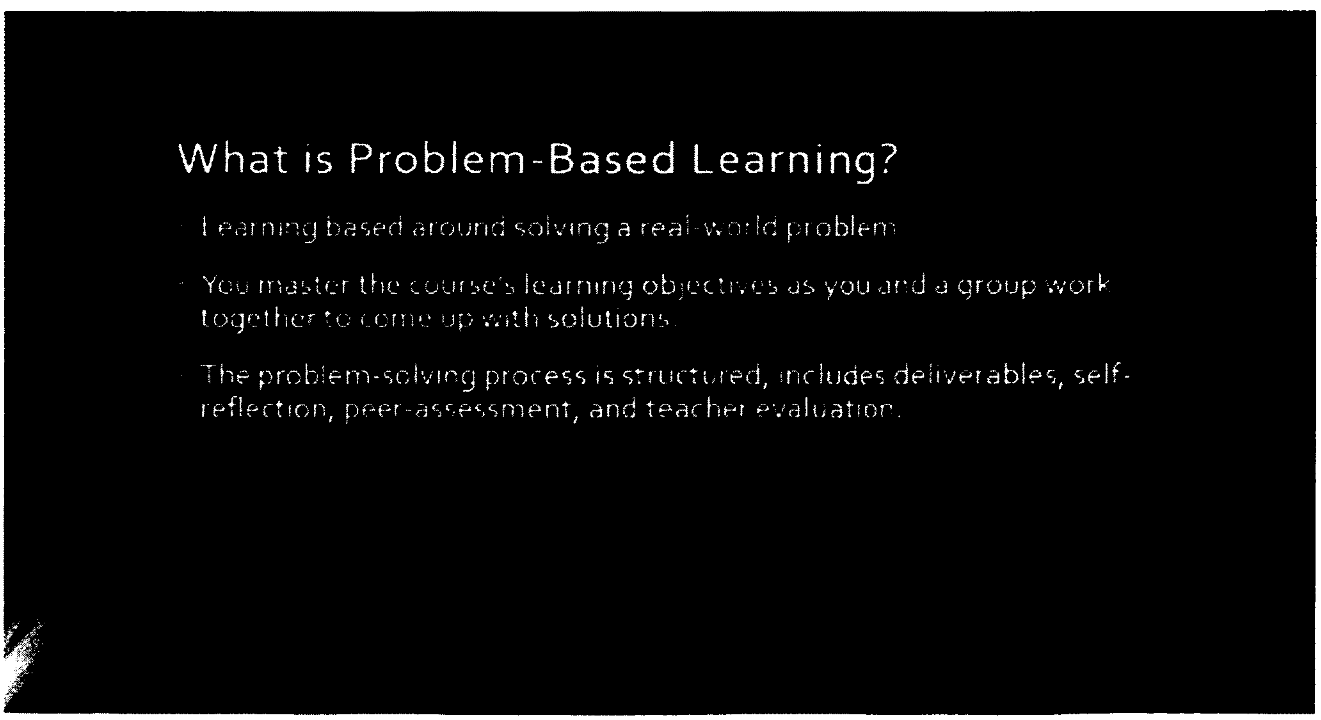
Unit/Week	Day	Topics/Activities/Assignments
1	1	• Syllabus and Introductions • Overview and Discussion of Group Project/Course Design • Pre-Questionnaire (Survey Monkey, link in Moodle shell) • Guided practice with groups • Overview of Course Assignment & Phase 1 • Group Assignments • Develop Group Guidelines & Develop Plan • Group Member Roles • Self-reflection Via Wiki (located in Moodle Shell)
1	2 (BLENDED)	• Phase 1 teamwork via BigBlueButton • Submit Deliverable 1 • Self-reflection Via Wiki (located in Moodle Shell)
2	1	• Phase 1 teamwork face to face • Submit Deliverable 2 • Self-reflection Via Wiki (located in Moodle Shell)
2	2 (BLENDED)	• Phase 1 teamwork via BigBlueButton • Submit Deliverable 3 • Self-reflection Via Wiki (located in Moodle Shell)
3	1	• Presentations on Nonprofit organizations by all groups • Discuss Phase 2/3 requirements • Groups choose a nonprofit to write their proposal and presentation • Self-reflection Via Wiki (located in Moodle Shell)
3	2 (BLENDED)	• Phase 2/3 teamwork via BigBlueButton • Submit Deliverable 4 • Self-reflection Via Wiki (located in Moodle Shell)
4	1	• Phase 2/3 teamwork • Submit Deliverable 5 • Self-reflection Via Wiki (located in Moodle Shell)
4	2 (BLENDED)	• Phase 2/3 teamwork • Submit Deliverable 6 • Self-reflection Via Wiki (located in Moodle Shell)
5	1 (BLENDED)	• Phase 2/3 teamwork • Submit Deliverable 7 • Reflection Via Wiki (located in Moodle Shell)
5	2	• Phase 3: Group presentations given to a panel of instructors and peers

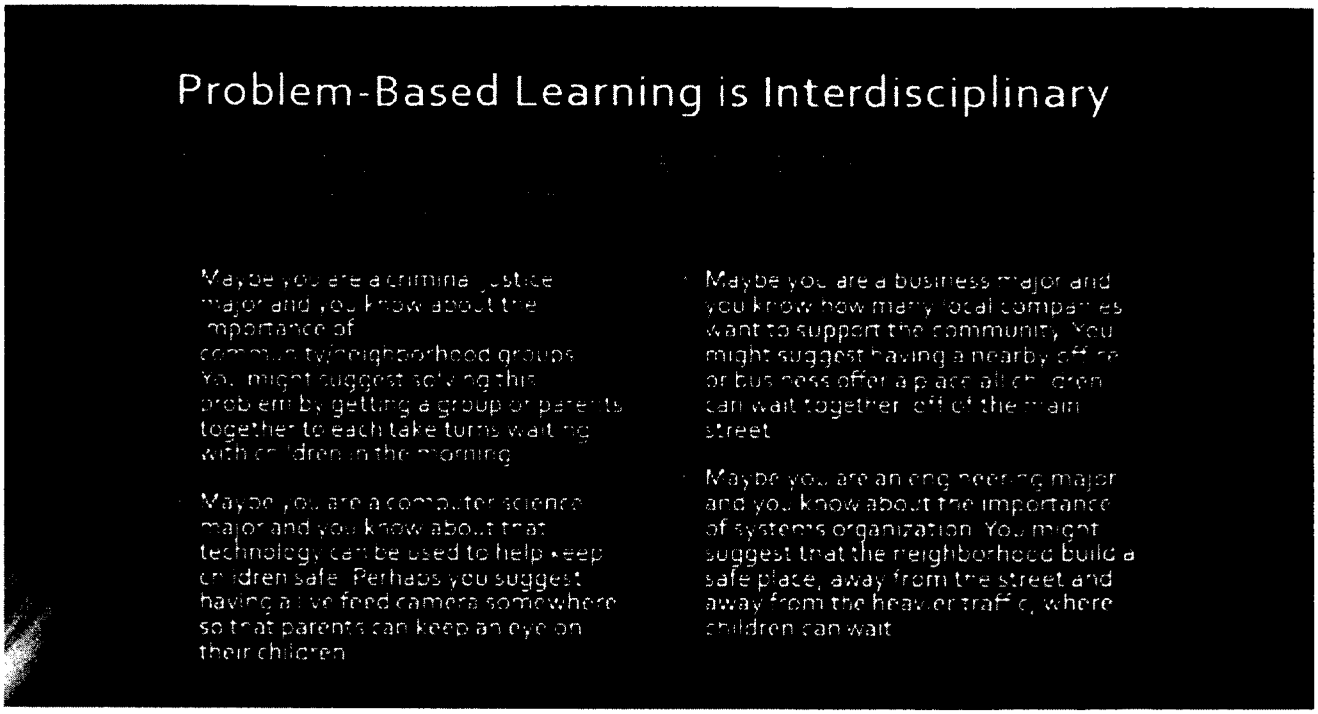
		• Final reflection Via Wiki (located in Moodle Shell) • Post-questionnaire (Survey Monkey, link in Moodle shell) • Final Peer, Self, and Instructor Evaluation (Deliver the paper evaluations to the researcher after class)

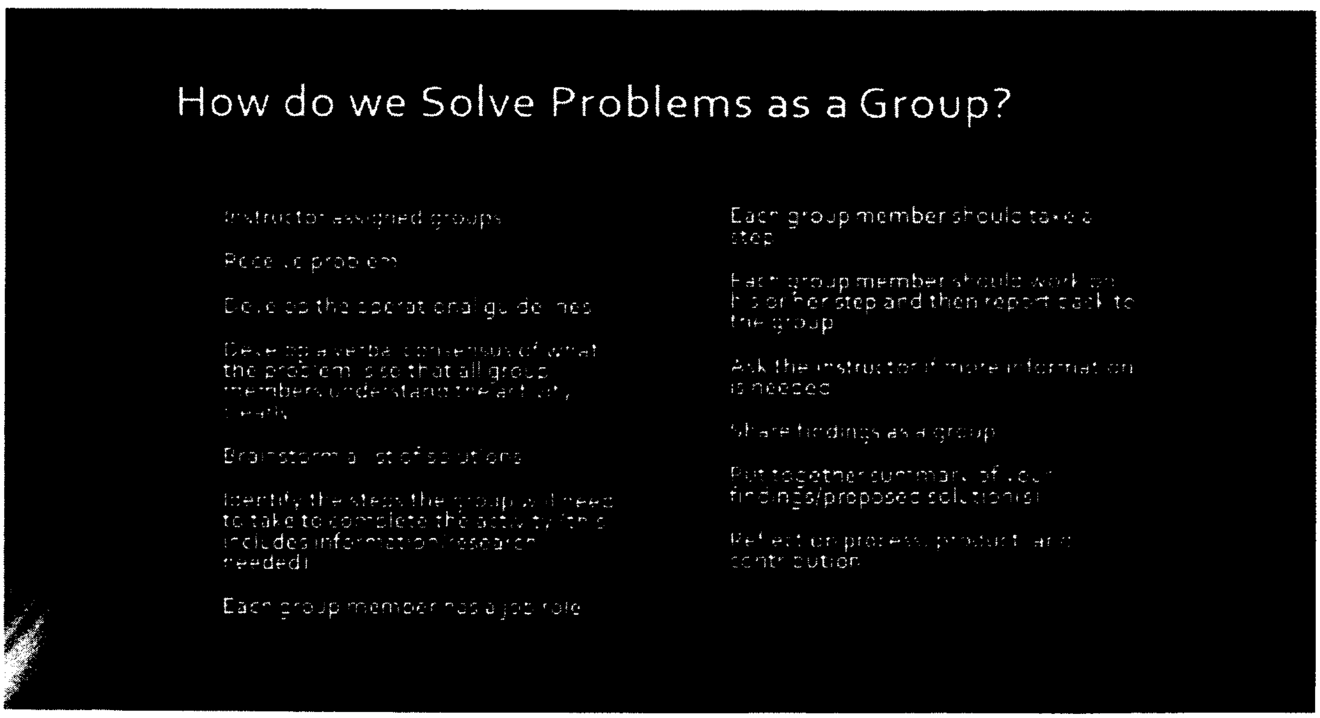
APPENDIX S

LECTURE ON PROBLEM-BASED LEARNING






Problem-Based Learning is Interdisciplinary
Maybe you are a criminal justice major and you know about the importance of community/neighborhood groups. You might suggest solving this problem by getting a group of parents together to each take turns waiting with children in the morning
Maybe you are a computer science major and you know about that technology can be used to help keep children safe. Perhaps you suggest having a live feed camera somewhere so that parents can keep an eye on their children
Maybe you are a business major and you know how many local companies want to support the community. You might suggest having a nearby office or business offer a place all children can wait together off of the main street
Maybe you are an engineering major and you know about the importance of systems organization. You might suggest that the neighborhood build a safe place, away from the street and away from the heavier traffic, where children can wait


How do we Solve Problems as a Group?
Instructor assigned groups
Read the problem
Develop the operational guidelines
Brainstorm a list of solutions
Each group member has a job role
Each group member should take a step
Each group member should work on his or her step and then report back to the group
Ask the instructor if more information is needed
Share findings as a group
Put together summary of your findings/proposed solution(s)
Reflect on process, product, and contribution

How Does This Type of Learning Fit CAP480?

- Critical-thinking and problem-solving skills
- Social context of learning
- Learner-centered environment
- The importance of each learner's experience
- Cooperative group skills
- Real-world tasks
- Teacher as tutor
- Self-direction and responsibility

- LO1 Assess current problems in society or a specific field of study utilizing a combination of quantitative and qualitative research
- LO2 Formulate solutions to a current problem in society or in a specific field of study
- LO3 Judge validity of sources by critically analyzing the author, purpose, content, intended audience, and design of sources
- LO4 Integrate research and knowledge from previous course work to produce communication that incorporates written and visual elements
- LO5 Demonstrate cooperation and professionalism

Let's Re-Cap…

- Our work in this course will be based around solving a problem.
- We will work in groups.
- We will each be responsible to our group.
- Our grade will be based on peer, self, and teacher evaluation.

APPENDIX T

STUDENT/INSTRUCTOR TASKS BY DAY

Unit/Week	Day	Student's Tasks	Instructor's Tasks
1	1	• Pre-questionnaire • Practice Activity • Develop group guidelines. • Develop their plan. • Work on Phase 1. • Complete self-reflection wiki.	• Go over syllabus • Go over Lecture 1 • Explain that information about the structure of the class. • Give students the pre-questionnaire. • BREAK • Assign students into groups. • Go over the practice activity. Give student an hour to work. • BREAK • Have groups orally share their solutions. • Have students complete the grading rubric. • Have students orally discuss what they liked and didn't like about the process. • BREAK • Go over Course Assignment- students are beginning Phase 1, due the first day of the third week. • Assign groups. • Instruct students to develop their group guidelines and develop their plan (these are the steps and tasks students will need to do to complete the assignment. The

			group guidelines should be ground rules for interaction, division of labor, and procedures for reaching consensus. • Assign roles. • Have students complete their first self-reflection wiki.
1	2 (BLENDED)	• Students should meet in Blue Button during class time. • Work on Phase 1. • One group member should submit deliverable 1. • Complete self-reflection wiki.	• Instructor should be available during class time to answer questions. The instructor should attend each group session asking if anyone has any questions at least one time. The instructor should also encourage groups to revise their plan as needed.
2	1	• Students should meet in class. • Work on Phase 1. • One group member should submit deliverable 2. • Complete self-reflection wiki.	• Instructor should meet with each group and assess progress and answer any questions. The instructor should also encourage groups to revise their plan as needed. • Have students complete their self-reflection wiki.
2	2 (BLENDED)	• Students should meet in Blue Button during class time. • Work on Phase 1. • One group member should submit deliverable 3. • Complete self-reflection wiki.	• Instructor should be available during class time to answer questions. The instructor should also encourage groups to revise their plan as needed. The instructor should attend each group

			session asking if anyone has any questions at least one time.
3	1	• Presentations! • Revise group plan, if needed. • Work on Phase 2/3. • Complete self-reflection wiki.	• Go over Course Assignment Phases 2 & 3, due the last day of week 5. • Have students complete their self-reflection wiki.
3	2 (BLENDED)	• Students should meet in Blue Button during class time. • Work on Phase 2/3. • One group member should submit deliverable 4. • Complete self-reflection wiki.	• Instructor should be available during class time to answer questions. The instructor should attend each group session asking if anyone has any questions at least one time. The instructor should also encourage groups to revise their plan as needed.
4	1	• Students should meet in class. • Work on Phase 2/3. • One group member should submit deliverable 5. • Complete self-reflection wiki.	• Instructor should be available during class time to answer questions. The instructor should attend each group session asking if anyone has any questions at least one time. The instructor should also encourage groups to revise their plan as needed.
4	2 (BLENDED)	• Students should meet in Blue Button during class time. • Work on Phase 2/3. • One group member	• Instructor should be available during class time to answer questions. The instructor should

		should submit deliverable 6. • Complete self-reflection wiki.	attend each group session asking if anyone has any questions at least one time. The instructor should also encourage groups to revise their plan as needed.
5	1 (BLENDED)	• Students should meet in Blue Button during class time. • Work on Phase 2/3. • One group member should submit deliverable 7. • Complete self-reflection wiki.	• Instructor should be available during class time to answer questions. The instructor should attend each group session asking if anyone has any questions at least one time. The instructor should also encourage groups to revise their plan as needed.
5	2	• Presentations! • Submit final proposal document. • Complete self-reflection wiki. • Complete post-questionnaire.	• Group Closing Activity: Ask students to orally reflect on the "pros" and "cons" of the process. Ask students to tell what they learned.

APPENDIX U

PROBLEM-BASED LEARNING ACTIVITY

Directions: You have been assigned to groups and each individual student has a role as described below. In these groups, you will work together to solve the problem/issue. You will orally share your solution findings to the class. To do so, follow the steps below.
Individual Role Assignments
Everyone should contribute ideas equally. However, there are certain responsibilities that will be assigned to help the group meet its goal. Each group member should pick a job role.

1. **Project Coordinator** - This person is in charge of seeing to it that the group is organized, gets started on the essay quickly and everyone knows what to do.

2. **Project Facilitator** - This person keeps track of time to keep the teamworking smoothly. This person also sees to it that the group has everything it needs. The monitor is the only person who can pull the captain aside and remind her/him that s/he is not doing her/his job if the captain is off task.

3. **Recorder** - This person sees to it that the group has all the information it needs. This person sees to it that notes are taken or that information is NOT copied from a website and saved without proper citation. This person has the added responsibility to make sure that the team's work is original and not plagiarized.

4. **Developer**- This person makes connections between the topics. This person should also make sure all ideas are logical and well-explained. **(If there are only 3 group members, all members are responsible for the developer job)**

Problem/Issue: *Many of the students on campus are having problems with time. Some students have jobs and children, which prevent them from getting to class on time, being able to stay the whole class, or have time outside of class to complete schoolwork. The university wants to help these students be successful, but isn't sure how.*
Activity Steps:
1. Develop a verbal consensus of what the problem is so that all group members understand the activity clearly.
2. Brainstorm a list of solutions.
3. Identify the steps the group will need to take to complete the activity (this includes information/research needed)
4. Each group member should take a step.
5. Each group member should work on his or her step and then report back to the group.
6. Ask the instructor if more information is needed.

7. Share findings as a group.
8. Put together summary of your findings/proposed solution(s).

Group Project Grading:

Purpose: This form is used to give you the opportunity to rate the contributions of yourself and your fellow team members. The results will be used to determine each individual's performance grade. This page will not be shared with anyone else on the team, so think carefully and be open and honest with your evaluation.

Evaluate yourself and each person in your team and rate him/her on a scale of 1 to 5 in each of the categories.

Use the following scale to base your rating:

5. Above Average Work
4. Average Work
3. Slightly Below Average Work
2. Significantly Below Average Work
1. Poor or no work in this Category

The digital participation percentage column is a measure of your perception of how well you and each team member digitally contributed to the project. The total of the column must equal 100%. As an example, assuming a four-student team, if you feel that everyone on the team digitally participated equally, then assign 25 percent to each student (25% x 4 = 100%).

A. **Digital Age Literacy** – Basic, Scientific, Economic, and Technological literacies, including visual and information literacies as well as multicultural literacy and global awareness.
B. **Inventive Thinking** – adaptability, managing complexity, self-direction, curiosity, creativity, risk-taking, higher-order thinking and sound reasoning.
C. **Effective Communication** – teaming, collaboration, interpersonal skills; personal, social, and civic responsibility; interactive communication.
D. **High Productivity** – Prioritizing, planning, managing for results, effective use of real-world tools, ability to produce relevant, high-quality products.
E. **Digital Participation** to the group (in percent). ***The total for this must add up to 100%.***

	A	**B**	**C**	**D**	**E**
Team Member	Digital Age	Inventive Thinking	Effective Communication	High Productivity	Digital Participation %
1. (self)__________	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5	*_______%

2. ________________	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5	*________%
3. ________________	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5	*________%
4. ________________	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5	*________%
5. ________________	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5	*________%
6. ________________	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5	*________%
7. ________________	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5	*________%

* total for all must = 100%

APPENDIX V

GROUP PROJECT ASSIGNMENT & INSTRUCTOR RUBRIC

Nonprofit Organization Project and Proposal

Learning Objectives

After completing the following **group project** students will be able to:

LO1. Assess current problems in society or a specific field of study utilizing a combination of quantitative and qualitative research.
LO2 .Formulate solutions to a current problem in society or in a specific field of study.
LO3. Judge validity of sources by critically analyzing the author, purpose, content, intended audience, and design of sources.
LO4. Integrate research and knowledge from previous course work to produce communication that incorporates written and visual elements.
LO5. Demonstrate cooperation and professionalism.

The Task

In groups, you will create a nonprofit organization (NPO). You will design a proposal document with references and present your proposal through a presentation. The task will be completed in **three phases.**

Phase 1

1. After your instructor has assigned you to a group, then the group must research a minimum of three nonprofit organizations (NPO). You must analyze the NPO's goals, mission statement, needs, strengths, weaknesses, and more. (LO1, LO3)
2. Based on the research, your group must then design a new, believable NPO with its own strengths and weaknesses. Attention to detail, accuracy, and creativity are critical here. (LO1, LO5)
3. Some things that should be addressed of the newly designed NPO include:
    a. A mission statement
    b. A SWOT analysis (strengths/weaknesses)
    c. Testimonials
    d. Budget analysis
    e. Future goals
4. Your group must submit a References page in proper APA format. (LO3)
5. Your group must give a presentation with supporting visual elements to teach the class about their NPO. This presentation must also demonstrate visually the results of your research on other NPOs in terms of comparison and analysis. (LO4, LO5)

Phase 2

1. After listening to the various presentations and discussing as a group, your group must choose a NPO (other than your own) to write a proposal for. In other words, you must pretend to have received a solicited request for a proposal from the NPO. (LO5)
2. Before writing, the group must determine the needs of their chosen NPO. For instance, is there a need for better network security? Does the NPO need effective marketing? (LO2)
3. Then, your group must create a company (creativity grounded in reality is encouraged) that can meet the needs of the NPO. (LO2, LO5)
4. Your group must write a proposal to meet the NPO's needs. It should include a References page in APA format for any research done in designing the company. (LO4) *(see guidelines below after phase 3)
5. Some things your new company should consider in writing the proposal:
    a. What is the ultimate aim?
    b. What do you hope to accomplish?
    c. Whom do you hope to persuade?
    d. Why is this important? What is the significance of this work?

Phase 3

1. Your group must present their proposal using visual elements (Power Point or Prezi). In other words, this is a pitch or verbal proposal. Instructors from various disciplines may possibly be present to evaluate the presentations. (LO4, LO5)
2. Each group member must present for an equal amount of time.
3. Each group member is expected to dress professionally and treat the instructors as if they were the NPO members that solicited the request for proposal.

Proposal Guidelines
Sample

Computer Maintenance Proposal

For
Imaginary Nonprofit
100 Main St.
Manassas, VA 20110

Submitted by
Imaginary Name of Company/Group

Table of Contents
TOC should be a thorough and accurate listing of all headings (main and sub). If you provide only an outline, your reader will struggle to find information – so include key ideas of interest.

Abstract
The abstract is a brief (one paragraph or approximately 200 words) summary or overview of the proposal. These three things must be present: the problem that has led to a proposal, the solutions, and the advantages resulting when the solutions or suggestions are implemented.

Introduction
Should contain at least two important parts: Purpose and Problem
Purpose: why you are writing and what you hope to achieve (thesis)
Problem: your thoroughness here establishes much of your credibility. You have to prove to your reader that a problem does exist. You prove your knowledge of the situation. You establish your expertise. After reading this section, your reader should understand the problem well and trust you to solve it.

Discussion
This is the bulk of the text (the body). This is where you sell your product, service, and offer solutions. This part will differ based on the proposal. Some things to consider for this area:

- Analyses
  -Existing situation
  -Solutions
  -Benefits
- Product specifications
- User instructions
- Optional approaches for solving problems
- Managerial chain of command
- Biographical sketches of personnel
- Corporate and employee credentials (showcase your experience/track record here)
    - Years in business
    - Satisfied clients (provide testimonials)

    - Certifications
    - Previous accomplishments (can be previous similar projects that have been successful)
- Schedules
    - Implementation of schedules
    - Reporting intervals
    - Maintenance schedules
    - Delivery schedules
    - Completion dates
    - Payment schedules
    - Projected milestones
- Cost analyses (Keep it realistic)
- Profit and loss potential
- Warranties
- Maintenance agreements
- Online help
- Training Options

Conclusion
The conclusion should sum up the proposal – provide closure. It can also restate the problem, solutions, and benefits. Lastly, you can suggest a course of action or the next step for your client.

Glossary: Define abbreviations, acronyms, and specialized terms. Define jargon or technical terminology. Consider all levels of readers.

References: A reference page in proper APA format is expected indicating where you conducted research.

Appendix
Here's where you include any additional information (survey results, tables, figures, previous report findings, examples, or relevant correspondence) that you have not used in the discussion section of the proposal.

Overall text/page layout
A proposal must be reader-friendly and easily accessible. Use headings, boldface, italics, bullets, numbers, underlining, or graphics (tables and figures).

Individual Role Assignments

Everyone should contribute ideas equally. However, there are certain responsibilities that will be assigned to help the group meet its goal. Each group member should pick a job role.

1. **Project Coordinator** - This person is in charge of seeing to it that the group is organized, gets started on the essay quickly and everyone knows what to do.
2. **Project Facilitator** - This person keeps track of time to keep the teamworking smoothly. This person also sees to it that the group has everything it needs. The monitor is the only person who can pull the captain aside and remind her/him that s/he is not doing her/his job if the captain is off task.
3. **Recorder** - This person sees to it that the group has all the information it needs. This person sees to it that notes are taken or that information is NOT copied from a website and saved without proper citation. This person has the added responsibility to make sure that the team's work is original and not plagiarized.
4. **Developer**- This person makes connections between the topics. This person should also make sure all ideas are logical and well-explained **(If there are only 3 group members, all members are responsible for the developer job; If there are more than 4 group members, the roles of developer, recorder, and coordinator can be share by as many as two peers at a time).**

Grading

Your grade will be averaged based upon three scores. The first score will be your instructor's assessment using the Instructor Rubric below. The second score will be based off of your average contribution percentage using the peer and self-evaluation rubric below. The third score will be your average work rating on quality of work, quantity of participation, timeliness, and level of work using the peer and self-evaluation rubric below.

Part 1: The Instructor Rubric

Skill	Exceptional (5)	Above Expectations (4)	Meets Minimum Expectations (3)	Below Expectations (2)	Needs Improvement (1)
Assessment of current problems in society using quantitativ e and	Societal problem is modern, assessment of problem is based on equal	Societal problem is modern, assessment of problem is based on reliable and	Societal problem is somewhat modern, assessment of problem is based on	Societal problem is somewhat modern, assessment of problem is based on	Societal problem is not modern, assessment of problem may not be based on data

qualitative data	distribution of reliable and current quantitative and qualitative data.	current quantitative and qualitative data. One type of data may be used more than the other.	quantitative and qualitative data that may not be reliable or current.	quantitative or qualitative data only.	or based upon unreliable and invalid data.
Forming solutions to current problem in society	Solutions to problem are well thought out, plausible, and explained in a detailed, clear way.	Solutions to problem are plausible and are explained in a detailed, clear way. There may be more solutions not addressed.	Solutions to problem may be plausible given certain circumstance s and are explained in clear way. Detail may be lacking.	Solutions to problem do not seem plausible in most circumstances and are not explained in clear or detailed way.	Solutions are not possible and lack clarity and detail.
Judging the validity of sources	Sources are critically analyzed including the author, purpose, content, audience, and design. Only high quality sources are included.	Sources are critically analyzed including 4 of the 5 evaluation criterions (author, purpose, content, audience, and design). Sources are mostly reliable; there may be one questionable source used.	Sources are analyzed including 3 of the 5 evaluation criterions (author, purpose, content, audience, and design). The majority of sources are mostly reliable; there may be one to two questionable source used.	Sources are analyzed including only 2 of the 5 evaluation criterions (author, purpose, content, audience, and design). Only a small portion of the sources are reliable; there are 3 or more questionable source used.	Sources are not analyzed using the evaluation criterions (author, purpose, content, audience, and design). All sources are questionable.
Integrating research to produce communica tion that incorporate s written and visual	Deliverables reflect senior-level APA research skills, exceptional written	Deliverables reflect senior-level APA research skills, clearly written communicatio n skills, and	Deliverables reflect senior-level APA research skills, clearly written communicati on skills, and	Deliverables do not reflect senior-level APA research skills, and the written/visual communicatio n is not clear.	Deliverable does not demonstrate research skills, and the written/visua l

elements	communication skills, and clear visual communication skills. Deliverables have been proofread and contain no major errors in research or communication.	clear visual communication skills. Deliverables may contain one to two minor errors in research or communication.	clear visual communication skills. Deliverables may contain three to four minor errors in research or communication.	Deliverables contain major errors in research or communication.	communication may be unclear or missing. Deliverables contain numerous minor and major errors in research or communication.
Teamwork skills	The entire team demonstrates exceptional collaboration, cooperation, and professionalism during in-seat and hybrid group sessions and during the presentation of deliverables.	The entire team demonstrates appropriate collaboration, cooperation, and professionalism during most in-seat and hybrid group sessions and during most of the presentation of deliverables.	The entire team demonstrates collaboration, cooperation, and professionalism during in-seat and hybrid group sessions and during the presentation of deliverables. There may be two sessions where teamwork skills were lacking.	The entire team may not collaborate cooperate, or act professional during in-seat and/or hybrid group sessions and/or during the presentation of deliverables.	The team does not collaborate or cooperate. Professionalism is missing. No skills are exhibited during in-seat or hybrid group sessions or the presentation of deliverables.

Parts II and III: Self and Peer Evaluation

- You will evaluate yourself and each person in your team based on a scale of 1 to 5 in each of the categories below.

A. **Digital Age Literacy** – Basic, Scientific, Economic, and Technological literacies, including visual and information literacies as well as multicultural literacy and global awareness.

B. **Inventive Thinking** – adaptability, managing complexity, self-direction, curiosity, creativity, risk-taking, higher-order thinking and sound reasoning.
C. **Effective Communication** – teaming, collaboration, interpersonal skills; personal, social, and civic responsibility; interactive communication.
D. **High Productivity** – Prioritizing, planning, managing for results, effective use of real-world tools, ability to produce relevant, high-quality products.
E. **Digital Participation** to the group (in percent). ***The total for this must add up to 100%.***

*The digital participation percentage column is a measure of your perception of how well you and each team member digitally contributed to the project. The total of the column must equal 100%. As an example, assuming a four-student team, if you feel that everyone on the team digitally participated equally, then assign 25 percent to each student (25% x 4 = 100%).

APPENDIX W

SUB-RESEARCH QUESTIONS

Primary Research Question Comparisons Between Groups/ Secondary Research Questions
1. To what extent do traditional problem-based model participants as compared to revised problem-based model participants vary in student achievement and satisfaction? o 1A. What are the differences in achievement between traditional problem-based model participants and revised problem-based model participants? o 1B. What are the differences in satisfaction between traditional problem-based model participants and revised problem-based model participants?
2. To what extent do traditional problem-based model participants in heterogeneous and homogeneous groups as compared to revised problem-based model participants in heterogeneous and homogeneous groups vary in achievement and satisfaction? o 2A. What are the differences in achievement between traditional problem-based model participants in heterogeneous and homogeneous groups? o 2B. What are the differences in achievement between revised problem-based model participants in heterogeneous and homogeneous groups? o 2C. What are the differences in achievement between traditional problem-based model participants and revised problem-based model participants in heterogeneous groups? o 2D. What are the differences in achievement between traditional problem-based model participants and revised problem-based model participants in homogeneous groups? o 2E. What are the differences in satisfaction between traditional problem-based model participants in heterogeneous and homogeneous groups? o 2F. What are the differences in satisfaction between revised problem-based model participants in heterogeneous and homogeneous groups? o 2G. What are the differences in satisfaction between traditional problem-based model participants and revised problem-based model participants in heterogeneous groups? o 2H. What are the differences in satisfaction between traditional problem-based model participants and revised problem-based model participants in homogeneous groups?

3. To what extent do traditional problem-based model participants in heterogeneous and homogeneous groups with instructor or student selected job roles as compared to revised problem-based model participants in heterogeneous and homogeneous groups with instructor or student selected job roles vary in achievement and satisfaction?

- 3A. What are the differences in achievement between traditional problem-based model participants in heterogeneous groups with instructor or student selected job roles?
- 3B. What are the differences in achievement between traditional problem-based model participants in homogeneous groups with instructor or student selected job roles?
- 3C. What are the differences in achievement between revised problem-based model participants in heterogeneous groups with instructor or student selected job roles?
- 3D. What are the differences in achievement between revised problem-based model participants in homogeneous groups with instructor or student selected job roles?
- 3E. What are the differences in achievement between traditional problem-based model participants and revised problem-based model participants in homogeneous groups with instructor selected job roles?
- 3F. What are the differences in achievement between traditional problem-based model participants and revised problem-based model participants in homogeneous groups with student selected job roles?
- 3G. What are the differences in achievement between traditional problem-based model participants and revised problem-based model participants in heterogeneous groups with instructor selected job roles?
- 3H. What are the differences in achievement between traditional problem-based model participants and revised problem-based model participants in heterogeneous groups with student selected job roles?
-
- 3I. What are the differences in satisfaction between traditional problem-based model participants in heterogeneous groups with instructor or student selected job roles?
- 3J. What are the differences in satisfaction between traditional problem-based model participants in homogeneous groups with instructor or student selected job roles?
- 3K. What are the differences in satisfaction between revised problem-based model participants in heterogeneous groups with instructor or

student selected job roles?

- 3L. What are the differences in satisfaction between revised problem-based model participants in homogeneous groups with instructor or student selected job roles?
- 3M. What are the differences in satisfaction between traditional problem-based model participants and revised problem-based model participants in homogeneous groups with instructor selected job roles?
- 3N. What are the differences in satisfaction between traditional problem-based model participants and revised problem-based model participants in homogeneous groups with student selected job roles?
- 3O. What are the differences in satisfaction between traditional problem-based model participants and revised problem-based model participants in heterogeneous groups with instructor selected job roles?
- 3P. What are the differences in satisfaction between traditional problem-based model participants and revised problem-based model participants in heterogeneous groups with student selected job roles?

APPENDIX X

PRIMARY RESEARCHER'S BRACKETING

Professionalism	I think that professionalism is the way a person presents his or herself in business situations. I see professionalism as being a part of a person's basic knowledge in a field, behavior, communication, treatment of others, appearance, and timeliness. I do not think that a person has to have experience or years of knowledge to be professional.
Cooperation	I think that cooperation means people work together towards a common goal. People could cooperate to solve a problem or create a deliverable. I think that cooperation involves sharing ideas, compromising, putting in extra effort when needed, being present and supportive of your peers, and being respectful of other's ideas.
Learning Objectives	I think that assessing current problems in society or a specific field of study means that students examine their personal and professional surroundings and determine a significant issue affecting more than one person or group of people. Then they should investigate this problem by examining quantitative data such as survey results and test scores; qualitative data should be examines, such as personal experiences and pictures. I believe the validity of these sources lies solely in the researcher's ability to judge the experience of the authors. Then they should come up with a list of solutions, not necessarily based upon effectiveness or probability. Solutions can then be analyzed for effectiveness and solutions that are plausible can be researched. In the end, a written report is best to present the whole process and this written report should use sections, citations, and good grammar.
Group Participation	I think group participation is more than just showing up. Participating means doing the work pre-meeting and spending time thinking about the group's tasks before the group meets. This also means listening to the ideas of others, a willingness to take on tasks not assigned to one, and always having one's work done on time.

APPENDIX Y

WIKI 1 HORIZONTAL CODES

Code	Definition
CC-Goals	Meeting the goals of the project by working together.
CC-Project-Agreement	Despite anything, focusing on getting the project done, putting aside any differences of opinion.
CC-Uniformity	Working together with little problems.
CC-Harmony	Coming to a consensus on topics.
CC-Attitude	The way one acts when working with the group.
CC-Working with Others	Sharing the project and doing everything together.
CC-Easier	Splitting the work up means less for one to do on his or her own.
CC-Respect	Listening to others in the group and validating their opinions.
CC-Follow Guidelines/Rules	Doing what is asked of one in the group as set up by the instructor.
CC-Listening	Allowing others to share their experiences and thoughts.
CC-Supportive	Giving the other group members what they need when they need it.
CC-Equality of Workload	Everyone having a separate part and responsibility within the group.
CC-Open-Mindedness	Allowing others to share ideas one may not agree with.
CC-Compromise	Going along with ideas one may not agree with.
PC-Behavior	Being mature, positive, dedicated
PC-Compromise	Willing to accept the ideas of other people who are knowledgeable in the field.
PC-Goal Oriented	Being focused on getting jobs done and completing

	goals.
PC-Equality	Being fair to others in the field and their knowledge.
PC-Expertise	Being knowledgeable in one's field and specialty.
PC-Maintaining Composure	Being calm when others are wrong.
PC-Good Communication	Communicating with others in the field in a mature and fluid way.
PC-Timeliness	Being prompt for meetings and staying for the duration of meetings.
PC-Respectful	Treating all others in the field with respect and as an equal.
PC-Responsible	Being reliable and following through with demands in the field.
PC-Ethics	Doing what is right within the field.
PC-Politeness	Allowing others to speak, listening to them, and being kind.
PC-Follow Rules	Following the guidelines commonly established in the field.
PC-Support	Being supporting of others sharing their ideas, but not necessarily agreeing with the ideas.
PA-Attitude	Have a positive disposition towards the project and others.
PA-Equality	Treating all group members fairly.
PA-Timeliness	Being on time, staying the whole time, and turning part in on time during the group projects
PA-Positive Criticism	Accepting positive criticism.
PA-Negative Criticism	Accepting negative criticism with an open mind.
PA-Politeness	Not speaking over others, using appropriate language.
PA-Respectful	Not cutting down the ideas and actions of others.
PA-Focus on the Project	Not allowing personal issues to influence one's

	participation in the project.
PA-Work in & out of the Group	Helping peers within your group when they need it and helping peers outside of your group if they need it.
PA-Put Aside Differences	Accept others are different and still work with them to get the project done.
PA-Appreciate Diversity	Utilize the skills of others within the group who are different from you and have skills you do not have.
PA-Open-Mindedness	Being accepting of changes in the project or ideas that you may not agree with.
PA-Honesty	Not lying to team members and stating if you are having problems.
PA-Listening	Not speaking over others and hearing what they have to say and feel.
PA-Be Physically Present	Always staying the entire time to work on the project.
PA-Sharing the Workload	Doing your fair share of what it assigned to you.
PA-Quality of Work	Taking your time to do your part the best that you can.

Note. CC- Cooperation Codes; PC- Professionalism Codes; PA- Project Application

APPENDIX Z

WIKIS 2-10 HORIZONTAL CODES

Code	Definition
DAL	Using technology during the project, keeping up with new/changing technology, and using technology and tools used in the real world/field.
EC	Emailing group members, having small and large group meetings, Talking to group members about problems and issues.
HP	Going above what is being asked, taking on additional roles, organizing the project and who needs to complete which parts.
IT	Solving problems when they arise, re-arranging the plan if needed, coming up with modern solutions.
Positive Attitude Towards the Group Members	Enjoying working with the group and each member's contribution.
Negative Attitude Towards the Group Members	Not enjoying working with the group members and not thinking their ideas are helpful.
Positive Attitude Towards the Group Projects	Liking the process of sharing the workload and ideas.
Negative Attitude Towards the Group Projects	Finding the group process of sharing the workload pointless and a waste of time.

Note. DAL-Digital Age Literacy, EC-Effective Communication, HP-High Productivity, IT-Inventive Thinking.

APPENDIX AA

WIKI 1 TEXTURAL CODES

Code	Definition
CC-Project-Focus	Despite anything, focusing on getting the project and its goal done, putting aside any differences of opinion.
CC-Agreement	Coming to a consensus on topics and on problems.
CC-Behavior	The way one acts when working with the group.
CC-Working with Others	Sharing the project and doing everything together.
CC-Easier	Splitting the work up means less for one to do on his or her own.
CC-Follow Guidelines	Doing what is asked or expected of one in the group.
CC-Listening	Allowing others to share their experiences and thoughts and validating their opinions.
CC-Supportive	Giving the other group members what they need when they need it.
CC-Equality of Workload	Everyone having a separate part and responsibility within the group.
CC-Open-Mindedness	Allowing others to share ideas one may not agree with.
CC-Compromise	Going along with ideas one may not agree with.
PC-Attitude	Being mature, positive, dedicated
PC-Compromise	Willing to accept the ideas of other people who are knowledgeable in the field.
PC-Work Ethic	Being focused on getting jobs done and completing goals.
PC-Equality	Being fair to others in the field and their knowledge.
PC-Expertise	Being knowledgeable in one's field and specialty.
PC-Personhood	Who you are as a person.

PC-Good Communication	Communicating with others in the field in a mature and fluid way. Being calm when you do not agree. Listening to others.
PC-Timeliness	Being prompt for meetings and staying for the duration of meetings.
PC-Respectful	Treating all others in the field with respect and as an equal.
PC-Ethics	Doing what is right within the field.
PC-Follow Rules	Following the guidelines commonly established in the field.
PC-Dedication	Being supporting of others sharing their ideas, but not necessarily agreeing with the ideas to get the project done. Following through with ideas.
PA-Attitude	Have a positive disposition towards the project and others.
PA-Equality	Treating all group members fairly.
PA-Timeliness	Being on time, staying the whole time, and turning part in on time during the group projects.
PA-Positive Criticism	Accepting positive criticism.
PA-Negative Criticism	Accepting negative criticism with an open mind.
PA-Respectful	Not cutting down the ideas and actions of others. Not speaking over others, using appropriate language.
PA-Focus on the Project	Not allowing personal issues to influence one's participation in the project.
PA-Work in & out of the Group	Helping peers within your group when they need it and helping peers outside of your group if they need it.
PA-Put Aside Differences	Accept others are different and have different skills. Still work with them to get the project done.
PA-Open-Mindedness	Being accepting of changes in the project or ideas that you may not agree with.
PA-Honesty	Not lying to team members and stating if you are having

	problems.
PA-Listening	Not speaking over others and hearing what they have to say and feel.
PA-Sharing the Workload	Doing your fair share of what it assigned to you.
PA-Quality of Work	Taking your time to do your part the best that you can.

Note. CC- Cooperation Codes; PC- Professionalism Codes; PA- Project Application

APPENDIX BB

WIKIS 2-10 TEXTURAL CODES

Code	Definition
DAL-Basic Literacy	Knowing how to use basic tools such as email and Microsoft Suite.
DAL-Scientific Literacy	Knowing how to evaluate scientific research within the computer science, medical, and engineering fields.
DAL-Economic Literacy	Understanding how to compute money and financial reports.
DAL-Technological Literacy	Knowing how to use advanced technological tools.
Lack of DAL-TL	Not knowing to use various technological tools.
DAL-Global Awareness	Making connections between the problem and the global world.
DAL-Multicultural Literacy	Considering other cultures when working on the project problem.
EC-Interactive	Using messaging tools, text messaging, and chat rooms to complete the project.
EC-Personal Responsibility	Communicating with others what you are personally working on or struggling with.
EC-Social Responsibility	Communicating with the group members in and outside of the project on a regular basis.
EC-Civic Responsibility	Understanding how decisions that are made affect the community around one.
EC-Cooperation	Working with the others in the group and being fair and timely.
HP-High Quality Products	Turning in products that are edited, revised, and formatted in an almost final way.
HP-Using Real World Tools	Experimenting and testing the solutions in labs and on simulations.

HP-Managing	Taking a stand when it is needed to make sure everyone is doing what he or she needs to be doing at given times.
HP-Planning	Looking over and revising the plan as needed.
HP-Prioritizing	Moving parts of the projects around to complete items when needed.
IT-Adaptability	Doing more than your fair share to get the project done.
IT-Self-direction	Keeping yourself on task and focused.
IT-Creativity	Coming up with new and improved ideas.
IT-Risk Taking	Proposing ideas that may be different, but being willing to experiment with the idea.
IT-Higher-Order Thinking	Taking the basic information and applying it to new problems and in new ways.
IT-Curiosity	Teaching yourself/reading about/learning about something that is not part of your current knowledge.
IT-Sound Reasoning	Coming up with solutions that are plausible.
Struggles with DAL-TL	Frustration with technology and tools.
Struggles with IT	Unable to problem solve.
Struggles with EC	Struggles with communication with group members and from group members.
Struggles with HP	Unable to perform to expectations.
Comparing Project to a Metaphor	Describing personal experiences through a well-constructed metaphor.
Positive Attitude Towards the Group Members Personally	Liking the group members on a friend basis.
Positive Attitude Towards the Group Members Behavior	Enjoying working with group members.
Negative Attitude Towards the Group Members Personally	Not liking the personalities of group members and not wanting to be friends.

Negative Attitude Towards the Group Members Behavior	Not enjoying with the group members.
Positive Attitude Towards the Group Projects	Liking the process of sharing the workload and ideas.
Negative Attitude Towards the Group Projects	Finding the group process of sharing the workload pointless, difficult, or a waste of time.

Note. DAL-Digital Age Literacy, EC-Effective Communication, HP-High Productivity, IT-Inventive Thinking.

APPENDIX CC

WIKI 1 STRUCTURAL CODES

Code	Definition
CC-Behavior- Follow Guidelines	Doing what is asked or expected of one in the group.
CC-Behavior-Listening	Allowing others to share their experiences and thoughts and validating their opinions.
CC-Behavior-Supportive	Giving the other group members what they need when they need it.
CC-Equality-Workload	Everyone having a separate part and responsibility within the group.
CC-Equality-Ideas	Allowing others to share their experiences and thoughts and validating their opinions.
CC-Work Ethic-Project-Focus	Despite anything, focusing on getting the project and its goal done, putting aside any differences of opinion.
CC-Work Ethic-Working with Others	Sharing the project and doing everything together.
CC-Work Ethic-Compromise	Going along with ideas one may not agree with.
PC-Work Ethic-Dedication	Being focused on getting jobs done and completing goals.
PC-Work Ethic-Equality	Being fair to others in the field and their knowledge.
PC-Professional Expertise	Being knowledgeable in one's field and specialty.
PC-Professional Attitude	Being mature, positive, dedicated
PC-Professional Ethics	Doing what is right within the field, following rules and guidelines from the field.
PC-Behavior- Good Communication	Communicating with others in the field in a

	mature and fluid way. Being calm when you do not agree. Listening to others.
PC-Behavior-Timeliness	Being prompt for meetings and staying for the duration of meetings.
PC-Behavior-Dedication	Being supporting of others sharing their ideas, but not necessarily agreeing with the ideas to get the project done. Following through with ideas.
PA-Attitude-Disposition Treatment of Others	Have a positive disposition towards the project and others. Put aside difference.
PA-Attitude-Verbal Treatment of Others	Not cutting down the ideas and actions of others. Not speaking over others, using appropriate language.
PA-Criticism-Negative	Accepting and giving negative criticism with an open mind.
PA-Work in & out of the Group	Helping peers within your group when they need it and helping peers outside of your group if they need it.
PA-Honesty	Not lying to team members and stating if you are having problems.
PA-Sharing the Workload	Doing your fair share of what it assigned to you.
PA-Quality of Work	Taking your time to do your part the best that you can.

Note. CC- Cooperation Codes; PC- Professionalism Codes; PA- Project Application

APPENDIX DD

WIKIS 2-10 STRUCTURAL CODES

Code	Definition
DAL-Basic Literacy	Knowing how to use basic tools such as email and Microsoft Suite.
DAL-Scientific Literacy	Knowing how to evaluate scientific research within the computer science, medical, and engineering fields.
DAL-Economic Literacy	Understanding how to compute money and financial reports.
DAL-Technological Literacy	Knowing how to use advanced technological tools.
Lack of DAL-TL	Not knowing how to use various technological tools.
DAL-Global Awareness	Making connections between the problem and the global world.
EC-Interactive	Using messaging tools, text messaging, and chat rooms to complete the project.
EC-Personal Responsibility	Communicating with others what you are personally working on or struggling with.
EC-Cooperation	Working with the others in the group and being fair and

	timely.
EC-Lack of Cooperation	Not being successful working with others.
HP-High Quality Products	Turning in products that are edited, revised, and formatted in an almost final way.
HP-Managing	Taking a stand when it is needed to make sure everyone is doing what he or she needs to be doing at given times.
HP-Planning	Looking over and revising the plan as needed.
HP-Prioritizing	Moving parts of the projects around to complete items when needed.
IT-Adaptability	Finding ways to move past problems.
IT-Self-direction	Keeping yourself on task and focused.
IT-Creativity	Coming up with new and improved ideas.
IT-Curiosity	Teaching yourself/reading about/learning about something that is not part of your current knowledge.

Note. DAL-Digital Age Literacy, EC-Effective Communication, HP-High Productivity, IT-Inventive Thinking.

APPENDIX EE

FINAL CODEBOOK

Code	Definition	Example
CC-Behavior-Follow Guidelines	Doing what is asked or expected of one in the group.	• P2Cooperation is typically when two or more people come together for a common purpose, they all work together in an organized fashion and get the workdone • P138Cooperation is the willingness to follow set rules, support team goals or yield to the team members when needed for the success of a project. • P45Cooperation is having everyone on the same page. All teammates should have the same idea and understand the idea. • P90Cooperation mean to me the ability to agree and stand in agreement on a topic, situation and or job • P1Cooperation is the ability to work with one or more people in a calm, clear manner to reach a common goal. It is the ability to listen to each other and provide constructive and positive feedback, as well as receive it.
CC-Behavior-Listening	Allowing others to share their experiences and thoughts and validating their opinions.	• P3Humility is needed so that every idea and opinion is not shot down, but taken into consideration. • P87Cooperation is an individual's willingness to give feedback and interact with an activity or event. • P233I think cooperation is not necessarily agreeing with the same idea but instead it is coming to an understanding between people to get a task done. • P164When i think bout cooperation there are many words that come to mind. But the first to two that come to mind are openminded, and respect. • P54Cooperation is getting along and functioning well with other people. Communicating and understanding one another is key to cooperating.
CC-Behavior-Supportive	Giving the other group members what	• P214Having a positive attitude and willingness to learn are all actions that should be a part of cooperation.

	they need when they need it.	• P145I believe cooperation requires taking initiative and being a value to the project. • P23It is one's ability to contribute to, and be part of team. • P65Actions that should be a part of cooperation should include listening to the opinions of other members of your group, helping others in the group that need assistance in order to collectively arrive at the same goal. • P4Cooperation consists of each team member contributing their ideas, solutions, and the work towards completing the goal or task. • P188Cooperation is the backbone of teamwork. Without it, you have individuals doing the same job twice or overlapping each other's work when it is not necessary. It only takes one person to open the door. Yet if your hands are full and I see you approaching the door, by holding it open for you I am in essence cooperating with you to help you pass through the threshold of the doorway. Cooperating is making things easier for others by kind of going along with the plan and or even going as far as to predict what the goals are and filling in the needs area. • P201Cooperation is when a group of people come together form a team to achieve one goal. It is achieved when all of the members of team participate, collaborate, and assist one another. • P167Cooperation to me is being able to listen and do what your supposed to do without someone telling you what to do. Taking care of what you need to do is an example.
CC-Equality-Workload	Everyone having a separate part and responsibility within the group.	• P24Cooperation is where individuals or groups collectively interact together to complete a task or achieve a goal. • P1Cooperation is the ability of individuals to work together and take their strengths and weaknesses and use them toward a common goal • P45it's one or more people unitizing together

		to reach one common goal in a reasonable amount of time if not in a scheduled amount of time. • P190Cooperation is to work together to accomplish something. Things I feel are a part of cooperation are attitude, enthusiasm and willingness to get the job done • P16Cooperation to me is the willful participation of individuals in a group environment (more than one person). • P222I think cooperation is all about building a relationship to a point where there needs to be a little give and take from all sides. That there has to be a certain outcome but the way to get there has to be agreed upon by everyone. • P207The way I would describe cooperation is when a group of people who are like-minded or completely indifferent come together for a common goal to be accomplished as a team with equal effort from every member of the group or team. • P26Cooperation to me is the coalition of all aspects of a group or a party. The concept of action to help a group advance to an envisioned goal. Anything that allows progress through the effort of each individual.
CC-Equality-Ideas	Allowing others to share their experiences and thoughts and validating their opinions.	• P1I believe that cooperation means putting aside your own personal views and opinions, being open minded, and willing to listen to other ideas and suggestions and respond accordingly • P45Cooperation would best be described as the ability to function as a team player, understanding that ones own ideas are not the only valid ideas. • P207When one cooperates, he/she listens with an open mind, reflects and analyzes his ideas, and offers relative feedback • P87Cooperation should include listening and imputing. • P65To foster a cooperative environment people should be able to share their views and opinions without feeling like they will be judged. A consensus is also important so

		every team member will feel valued. • P156The word cooperation means working well with people especially in a team. It also means respecting the ideas and not judging your peers.
CC-Work Ethic-Project-Focus	Despite anything, focusing on getting the project and its goal done, putting aside any differences of opinion.	• P05I would describe cooperation as working together well and being willing to set aside your own needs and desires for the betterment of the group and its needs • P68Cooperation is every one putting aside differences to attain a goal. Listen to all ideas without being judgmental, Giving up something for the team. • P115To me cooperation is when a group of people come together and are willing to work as one complete unit. I feel that to cooperate successfully a team needs to listen to one another's ideas so they can come up with one great idea. I also feel that you compromise with your team members. • P9Cooperation is the ability to create and adapt to ideas around you and put emphasis on the way you behave when a conflict arises. • P234How I would describe cooperation is the ability to work together in a group regardless of differences between people in the group and to pool ideas together. • P146Cooperation should include sharing of ideas and resources and some form of compromise to reach intended result.
CC-Work Ethic-Working with Others	Sharing the project and doing everything together.	• P36Listening to members of your group and volunteering for tasks that are needed by the group are actions that show cooperation. • P199Cooperation is making an effort to cohesively work with another individual or group of people to provide a common goal. • P89Cooperation is working together towards the same goal in a cohesive and positive manner. This could mean if the leader of the group allocates tasks and duties that all participants take on these tasks without argument. Also if two people are working together as a team they willing to complete tasks with the help of the other. • P200I would describe cooperation as

		everyone working together to get to the same goal. • P225When given an assignment you do your equal share. • P21Everyone completing their share of the goal/task. Sometimes when cooperating with other people, someone ends up with a larger share to complete the goal/task at hand and helping them out is part of that.
CC-Work Ethic-Compromise	Going along with ideas one may not agree with.	• P57Cooperation is when two or more people working towards a goal reach consensus, through compromise • P7Cooperation is working together to get the job done. No matter if you don't like where the team is going you still give input and work together. • P119Cooperation needs give and take from both sides, it involves compromise from everyone. • P54Cooperation requires each person involved step back and put aside differences that may get in the way of cooperation. • P117Solid cooperation requires a high level of adaptability to ever-changing situations • P111When a person works or make compromises to help better each other to where they can work together on a subject or task • P236Compromise is key for success • P189once a direction is chosen, regardless of your feelings on the direction, being capable of supporting the goal of the team • P5Cooperation is the ability to create and adapt to ideas around you and put emphasis on the way you behave when a conflict arises
PC-Work Ethic-Dedication	Being focused on getting jobs done and completing goals.	• P34Professionalism is having good judgment and displaying ethical behavior at all times. • P160To me professionalism means having style, experience, good judgment, and good behavioral skills when dealing with people or situations. Having good judgment means knowing when and how to use the knowledge and experience one has to get the job done • P56When you are trying to show your professionalism the best qualities to display are

		competence and dedication. I say competence, because to properly assess a situation you must know what you are speaking about. Dedication is important, because it can shows how well rehearsed you are in your activities and also the consistency you have in working towards a goal. • P89Dedication to completing tasks given is a part of professionalism. • P202Professionalism is working with a standard or having a high regard of work ethics. It is completing assigned task, within the allocated timeframe without procrastination.
PC-Work Ethic-Equality	Being fair to others in the field and their knowledge.	• P1To me actions include, doing what you say you will do, doing the best job you can do, and treating others with fairness and respect. • P204Part of this is being able to separate yourself from your personal bias and treat everyone fairly • P98willing to compromise of the work load making sure every member has a fair input and one individual is not left doing all the work themselves.
PC-Professional Expertise	Being knowledgeable in one's field and specialty.	• P70Professionalism to me is about respect and accuracy • P3Professionalism includes high level of skill • P44My personal definition of professionalism is any one person that has successfully mastered or on the way to mastering his/her trade or job industry. • P155Being professional simply means to be a business savvy.
PC-Professional Attitude	Being mature, positive, dedicated	• P2Professionalism is how you act when dealing with others • P145Professionalism means being respectful, having class and taking responsibility for how you act and how you present yourself and you treat the people around you • P24One must possess a positive attitude and carry themselves with respect to self and others regardless of the situation • P88maintain a positive attitude even if it's something I might not personally choose.
PC-Professional	Doing what is right within the	• P100Professionalism is doing what is right even when others are not around

Ethics	field, following rules and guidelines from the field.	• P43Professionalism is doing what is right whenever nobody is looking. • P27Professionalism is the act of performing duties and exhibiting oneself in a manner that reflects strong leadership and also adheres to the policies of the company.
PC-Behavior-Good Communication	Communicating with others in the field in a mature and fluid way. Being calm when you do not agree. Listening to others.	• P100Professionalism is a manner of treating others with respect and dignity. • P165It includes polite behavior and good judgement • P222Professionalism is where you treat people with respect and how you communicate with all parties involved • P218Professionalism in this environment is being courteous, listening, and giving honest feedback to fellow group members. Such things as let people complete ideas or sentences. • P30I think one of the main things in handling situations with professionalism is by remaining calm, even if inside you are screaming and wanting to pull your hair out • P16 be calm and composed no matter the situation.
PC-Behavior-Timeliness	Being prompt for meetings and staying for the duration of meetings.	• P8Professionalism, for me is when a person works hard, comes to class/work on time and works hard to maintain good communication • P22Professionalism is being able to responsibly and efficiently complete assigned tasks • P190Professionalism is work place etiquette. Some examples are being on time for meetings. • P217Examples of this action is completing assignments on time with your best effort; also, showing up to meetings on time and ready to work
PC-Behavior-Dedication	Being supporting of others sharing their ideas, but not necessarily agreeing with the ideas to get the project done. Following through with	• P90I think some examples of professionalism are when a person consistently does what it right by their coworkers and customers even when it is not the easiest thing to do. • P154A professional will put the achievement of the task before their personal feelings • P18Professionalism is maintaining your composure and finishing the job no matter if you agree with the team

	ideas.	• P222Professionalism is being able to address a problem very respectfully and to remain calm under tense situations. • P205Professionalism is how you carry yourself and how you work with others with respect.
PA-Attitude-Disposition Treatment of Others	Have a positive disposition towards the project and others. Put aside difference.	• P14During any group projects cooperation and professionalismare very important because we need both to be able to worktogether and even when we don't agree on something we can cometo a place of common ground and continue towards our goal. • P67In my group project I am open to ideas from others and willing to compromise of the work load making sure every member has a fair input • P111During the group project I would listen to my fellow group members and discuss their suggestions and thoughts. I would also treat them with respect .
PA-Attitude-Verbal Treatment of Others	Not cutting down the ideas and actions of others. Not speaking over others, using appropriate language.	• P30During a group project I would apply professionalism by listening to everything that the people had to say and give positive and professional feedback. • P122I would apply both of this attribute, by listening to other group member ideas and respecting them. • P187Listening to my teammates ideas and opinions is an excellent way to do this. • P205I encourage others to express their ideas, while playing devil's advocate to build upon ideas to find the best solutions.
PA-Critcisim-Negative	Accepting and giving negative criticism with an open mind.	• P66The challenge comes when one has to criticize someone else's ideas without being condescending or obnoxious. I have worked in groups before with a positive outcome and will do my best to be a positive member of any team to which I am assigned. • P216Give out positive and negative criticism on individual work to show accomplishments and room for work. • P45constructive criticism is accepted, not belittlement. • P32To accomplish this, you need to be open and willing to listen to advice and at the same

		time be able to offer your own constructive criticisms.
PA-Work in & out of the Group	Helping peers within your group when they need it and helping peers outside of your group if they need it.	• P178With our project we are trying to keep everyone equal so the professionalism of what each person knows will help with any issues that arise and with all of us ensuring completion of the project no one will be left behind. • P65I would also help them in anyway that I can and get my work done in a timely manner. • P235While we are doing projects co-operation means turns your work on time and be part of the team and do everything professionally so it will help out to other team members to complete project successfully • P2I would apply these to my group project by interjecting with my group and to listen to their ideas and help mold all of the ideas into a cohesive finished product
PA-Honesty	Not lying to team members and stating if you are having problems.	• P4Ask for help, being a professional is not being perfect it is being accountable to your imperfections. • P76Professionalism helps to ensure there are equal shares amongst the group members while also ensuring that people are being honest in their individual work. • P109giving honest feedback to fellow group members.
PA-Sharing the Workload	Doing your fair share of what it assigned to you.	• P14During group projects, people need to contribute equal parts and treat each other with respect. • P29Groups must act in a professional manner where they can divide up the work and make sure everyone can behave ethically by not slacking. • P111Also, being able to complete my portion of my task instead of passing it off to others. • P162During group projects I would apply cooperation and professionalism by ensuring that I do my part with every group project.
PA-Quality of Work	Taking your time to do your part the best that you can.	• P1help others by answering questions to the best of my knowledge and respecting the other memebers of my group. • P90I would be professional by competing all that is required of me on a timely manner with only my best

		• P160I will apply my best effort to ensure that I deliver accurately and on time. I will try my best to give feedback when needed and follow up and updates on my progress. • P240Being given a task to do as a group and you do it the best of your ability and in a timely manner.
DAL-Basic Literacy	Knowing how to use basic tools such as email and Microsoft Suite.	• P9 (day 9)Today as a group we finalized a few things for the course project. Working in powerpoint we put together some of our ideas in the proper categories. • P46 (day 10) We had the information, paper, and powerpoint; what we did not do was rehearse the presentation and trim the fat. • P113 (day 7) I appreciated the anticipation of members who were engaged into creating PowerPoint and its layout with ease and knowledge of doing so. • P200 (day 5) Which meant that I was the person in charge of the powerpoints based on the fact I know more about technology than some of my other teammates but that's ok cause what I lack in other areas get made up by my teammates • P1 (day 9) This assignment was an excellent exercise in our team's ability to utilize various Microsoft software in new ways in order to accomplish a successful project. • P35 (day 4) I learned that I have a great deal of digital age literacy. I can navigate easily through computer programs and can use powerpoint and excel • P224 (day 6) In our group we talk about the importants of Password and the best way to secure your password for hackers.We also talk about important of changing your password on regular basic.
DAL-Scientific Literacy	Knowing how to evaluate scientific research within the computer science, medical, and engineering fields.	• P5 (day 2) Instead, we took the time to gather information about competitors, the technologies required to create the device, and other aspects of that required research. • P119 (day 6) I was also doing research on a company to find if their system is in fact a MIS • P98 (day 2) The hardware research is going at a smooth pace. Plans for the Linux portion of the project is already taking shape."

		• P160 (day 5) We presented scientific information, statics, and cultural beliefs. • P90 (day 2) we as a group, had the idea to do our project around Washington RIET. We looked at the company and I found an article from the CIO that talked about the system
DAL-Economic Literacy	Understanding how to compute money and financial reports.	• P67 (day 3)The primary contribution I have made to the group has been financial research and budget development. Utilizing a simple, pre-made, template, I constructed a detailed budget sheet that detailed the cost of individual jobs, any items purchased, accounted for investor donations, rent and licenses, and more. • P5 (day 4) I have decided to take the lead on this portion researching the different cost of materials and manufacturing cost and will be doing the financial analysis and emailing it out to the group. • P9 (day 2) With devices and applications in my charge I have a lot of research ahead of me and need to firm up my numbers to get to finanaces. • P99 (day 7) I put together the entire financial analysis while getting all the correct information via research and my other teammates • P76 (day 5) By researching similar companies within the industry, and by using industry standards, I am able to supply everyone in the group with a template and guide that could be used to help us in developing the vision of our company. • P217 (day 7) Getting the pricing for all the equipment needed and software will be the lengthiest part of my task. Once everything is accounted for the price will then reflect the total for all equipment. Working as the Cost specialist is a very tedious job that takes more than math skills.
DAL-Technological Literacy	Knowing how to use advanced technological tools.	• P9 (day 3) I also helped with the research project by mobile phone while not able to access a computer. • P106 (day 8) By using resources like realtor.com and google we were able to find and research a likely house for rehabilitation and restoration. • P44 (day 2) Using the internet to research the

		advantages and disadvantages of our project topic made it easy to cover a lot of information in a short time. • P114 (day 5) I'm creating a visual diagram of drop placements so that we can determine equipment necessary • P202 (day 6) . I made some changes to the HIPAA document especially how data would be protected using advanced encryption software and hardware • P54 (day 4) We also established a share drive folder so that we can all up load things to the same place and easily get everyone the information need for the project. • P25 (day 2) During this class session, we didn't focus on completing any particular portion of the project. Instead, we took the time to gather information about competitors, the technologies required to create the device, and other aspects of that required research. The intent was to have as much information as possible so that creating the project documents would progress as smoothly as possible. • P134 (day 6) Personally, I have been able to get well documented Visio drawings together of the overall network, the server and IP breakout, and the site to site connections. • P288 (day 4) Working in powerpoint we put together some of our ideas in the proper categories. Also we worked on the Spec book and the brochure. • P113 (day 3) We created a diagram to demonstrate a breakdown of the project into separate sub-areas in order to better organize and create direction for the group. • P89 (day 9) each individual gave a brief presentation on their e-portfolio that was created on the weebly.com site.
Lack of DAL-TL	Not knowing how to use various technological tools.	• P66 (day 2) I don't do well researching topics on the internet. • P119 (day 3) As I practice more with the subject, I will become more familiar with the information and the tools associated with. In other words I'm getting da skills!!
DAL-Global Awareness	Making connections	• P2 (day 8) I think we will make our mark in the green movement and people will talk about

	between the problem and the global world.	how our company changed the hybrid car industry. I really hope we have great success with this because it would be cool to tell my kids about how this company really started and everything like that. • P209 (day 3) Preparing for the government project with the emphasis on daycare. Building out project guidelines, I am focusing on the Activities for the daycare children, • P44 (day 2) Then continued to talk about how our NPO can benefit women all over the world. I personally feel that it is one of the best ideas for women because I have experienced some situations in my past that had I known some of the techniques that we would teach then I would not have been so scared and able to keep a calm head. • P84 (day 2) The group that I am apart of has chosen to deal with the problem that occur during the times of heavy snow. Our idea will take some experimentation and we must also be able to identify materials that will hold up to the pressures that our product would undergo. Our idea would help motorists that would be stuck in the snow, this would be mostly for safety purposes. • P99 (day 3) We are working on developing a new idea that will change the way police and other people in authority will act towards people who have our system deployed in their vehicle. We developing a system that will monitor how traffic stops and other incidents around a vehicle with this system is deployed. It will change the way police and other people in authority decide to act knowing that this system is deployed. • P70 (day 3) We as a group started to research what and how fruad is effecting consumers globally using the WWW. We are trying to come up with an idea that will provide with a solution to fraud in order to strenghten the problem at hand.
EC-Interactive	Using messaging tools, text messaging, and chat rooms to	• P14 (day 2) I even took down emails so even when we are at home we are able to get in contact with one another, just in case we have important questions or anything of the sort • P216 (day 8) We used our emails to send out

	complete the project.	our portions and prepare for finalizing our presentation by the end of class • P9 (day 4) Today I learned to work with the discussion board on moodle. I started a forum discussion on the phase two project. The rest of the team had not logged on yet but im well aware that they are great partners whom all are dedicated • P91 (day 4) After the change of our project we started to gather new information off the internet about our new topic then again went back to Google docs and started to collect the information into a central repository for easy reference and discussion thanks to the chat option that the document provides. • P144 (day 5) We communicated via email and we were all on the same channel and on our computers at the same time, making response time fast • P98 (day 9) Additionally, we utilized actual digital technology, Skyping on an iPad, to present a portion of our presentation. • P214 (day 7) I find the Google Hangout is very interesting during class • P160 (day 4) We already have a cloud storage setup so we can easily communicate and share ideas while working on the group assignments. • P106 (day 2) I receive email directly to my phone and check this every day. I will be professional and responsive to emails
EC-Personal Responsibility	Communicating with others what you are personally working on or struggling with.	• P224 (day 8) This reflection I find myself at home not feeling well at all, but I did not want to slow my team down. So I made sure I was able to do a good hand off with my teammate, who position I was sitting in for. • P110 (day 6) We discussed that if we are having any trouble with our part of the project to speak up so that we call all pitch in and help
EC-Cooperation	Working with the others in the group and being fair and timely.	• P69 (day 3) My group is coming together very nicely and we dont fight or argue, we just discuss everything and listen to see who has the better point. Then the better point is taken after everyone has an input on it. • P188 (day 9) This class has really shown me skills to work in a team, and this has been the

		only class where I can say that the whole team has worked together to complete a task. Normally in other classes either one person or the whole team slacks off at their assignment, making it harder for the work to be completed.
EC-Lack of Cooperation	Not being successful working with others.	• P44 (day 4) I thought I was an effective communicator. But now I think other wise. I have a member on my team that did not understand the task at hand • P77 (day 6) There have been some issues with the group over the progress of the project. Some of the other group members come in on their own accord. • P229 (day 4) Group work can be difficult and easy at the same time, it is less work because you are dividing up the work between your group members, but it can be difficult to know what to assign another person to do • P100 (day 8) Team members may be late to meetings, slow to produce results, and fail to meet deadlines. Many of the meetings may be and usually are unproductive because members won't trust one another opinions and ideas. Bogging things down in arguments, and revisiting of topics later because they could not be resolved in a timely manner. • P9 (day 8) i wish i could of communicated better with the group. if i didnt have to work so much, i would have communicated better. im highly dissapointed with myself • P14 (day 7)Email has been an option to keep the communication flowing, but I feel that it has been ineffective. • P203 (day 9) There was some miscommunication and it was difficult to speak about a part that had not intended on speaking about, but it all came together. • P55 (day 4) Communication was a little shakey today, when receiving multiple e-mails and attatchments but we all sorted it out. • P185 (day 3) I am the Beast Keeper. This group is akin to a wildlife preserve. I have a peacock, llama, wild boar, and a hyena. Most of the animals do as they are asked. When it is time to eat, they eat. When it is time to enter their assigned habitat for the evening, they do. It

		seems as though they interact well without a desire for superiority. The hyena is a different story. When it is time to eat, he chases the other animals and try's to eat them. When asked why he behaved this way, considering that he has food specifically for him, he blames the other animals and attempts to point out how he is a victim of the other animals. When it is time to go to his habitat for the evening, he decides that he wants to run amok and states that he only did it because the other animals were doing it. His interaction with the other animals is not appropriate for the environment. He often disappears into the surrounding brush with little regard to the safety needs of the preserve.I have already determined that interaction with the hyena will be terminated in 4 weeks. He is not an asset to this collection of animals. • P99 (day 8) Group work is possibly one of the hardest assignments that can be given for a grade.
HP-High Quality Products	Turning in products that are edited, revised, and formatted in an almost final way.	• P32 (day 7) We finished up our ruff draft and made sure that we had all of our information together. We reviewed our power point and verified its completion and added any suggestions. • P116 (day 8) Today we finalized our group effort by our separate sections of the audit rubric. We worked together by giving each other ideas and recommendations to our individual portions
HP-Managing	Taking a stand when it is needed to make sure everyone is doing what he or she needs to be doing at given times.	• P90 (day 4) Starting to get a little frustrated with a certain member of our team. In earlier team meetings/discussions, we had divided up our assignment into segments and gave each member specific responsibilities. Now after partner #1 and myself have done our part, it seems that partner #3 is still confused as to what his tasks are. This is really frustrating because I know that I have put in a lot of effort with my piece, and it scares me that my grade is in the hands of a classmate taht doesn't seem to be on board. • P154 (day 8) I feel like my main job in the group is to be the glue. And I do not mind • P13 (day 5) With there being six people in

		this group I have tried to make sure that everyone is communicating effectively. I have also helped keep our team on direction by suggesting that we break down each part of our assignment into group tasks. This keeps the work load small on everyone and also brings us together as a team when we come back and turn our individual work into a group made final draft." • P202 (day 6) I keep things simple and fun. I try to break down the tasks into uncomplicated packages then bring the packages together to form the more intricate project • P3 (day 6) I'm trying keep everyone organized and make sure the project is completed accurately and in a timely manner. I'm nottrying to step on anyones toes, but not everyone wanted to speak up or cared to have an opinion.
HP-Planning	Looking over and revising the plan as needed.	• P17 (day 2) We have discussed and determined who will be responsible for which part of our proposal. After we have each done our individual parts we will get together and go over what we have done and iron out any remaining details • P62 (day 3) Today, our group working with one another to assign and distribute responsibilities for our research proposal. From there we split up, working on our individual portions of the proposal, while using one another as sounding boards for our ideas. We laid out a plan in which we can work together today, utilizing our group members for planning, and then go more in-depth and expand on our personal responsibilities over the weekend. • P143 (day 4) When it comes to our group formation and the first set of our group I think we are doing very well. We have all talked about what we need to do in case we are not able to show up and make it to class • P3 (day 2) We have established a project manager, which, unfortunately is going to be me as no one else wanted to do it. I have been surfing the internet for ideas on how to set some ground rules and have come up with about a

		dozen so far.
HP-Prioritizing	Moving parts of the projects around to complete items when needed.	• P50 (day 8) When our Project Mgr had removed himself, I stepped up to keep the ball rolling. • P88 (day 5) This class was a turning point for out team. It made us truly come together and solve a huge problem. The group leader left the group; therefore all of roles needed to be considered to determine who needed to do what task to make sure everything was able to get completed by the deadline • P113 (day 6) I have written out all the objects that need to be completed before the final week. We had a clear understanding of what each of us is responsible for • P207 (day 5) I had forgotten to reflect on the fact that several key people were absent. Causing a few people to shift positions to cover the missing positions, now they are back and wanting an update. I am not annoyed with the people who had spoken up and said that they were going to be absent, but the ones that did not communicate with the group are the ones that need to step up this week. • P16 (day 2) We split the work between the three of us which was a lot easier. • P33 (day 2) When the instructor hand out and assignment we split the parts within the group a everyone has a fair share and do they part for the most part. • P176 (day 2) We got together and went over the grading rubic for projects together. Then for the reset we all took sections that we wanted to do so that we could break up the work. • P219 (day 4) We as a group came up with the outline for our proposal. Breaking it down individually so that we can collectively put our research into the project. • P234 (day 5) The group is working well. Assignments are being divided and completed
IT-Adaptability	Finding ways to move past problems.	• P11 (day 9) This has been the most stressful day of the entire process. Another person missing while trying to finish the project. Though the project did get done eventually it was difficult with a missing person. Everything took longer than it should. Always the most

		frustrating part of every group project is trying to get everyone together to finish the project up. • P216 (day 6) So, today was stressful, as two members of my group decided to no longer be apart of the group and left the rest of us hanging. • P130 (day 8) I noticed he did not use any in-text citations, and also had poor formatting on the works cited for an APA paper. Of course once I saw this, I tried to help him fix it and explain anything that he did not understand because we are a team, but he said he did not need my help although he never truly fixed the problem. Of course, it could also be related to the heavy workload he was enduring, but without wanting to stir up the controversy I fixed the mistakes myself and left it at that. • P200 (day 9) The other thing that I have found about myself is that I am able to adapt when needed. I have had a few times where I was moving code around only to have something not work as I expected then I needed to adapt or utilize a higher-level of thinking to determine just how or why it didn't work as expected. • P204 (day 4) Because the video did not work, we gave the class a real-time demonstration of two basic self-defense techniques that we were focusing on. • P99 (day 7) I do feel that age has played a role in some of the problems faced by the group yet has also been a positive force in dealing with many aspects. Due to the differences in age there are varying perspectives on subject matter which can sometimes lead to disorder but can sometimes lead to coming up with solutions that one group or the other could not, or would not have thought of previously. We were able to overcome some of the obstacles • P112 (day 6) I went through and I fine-tuned with the help of other team members on my responsibilities. I also went through and helped my team members out on what they were looking to fix in their responsibilities • P4 (day 4) When a question would arise, we put our heads together and pushed to find a

		solution • P88 (day 6) It is a little difficult to complete a task when you don't know what people are doing therefor you don't know what to do. The PM should be taking care of this but I found that is not always the case. • P100 (day I used effective communication to him as well as making sure the project manager is also aware of all that I had done. With this I believe that my team will be able to adapt and change the complexity of the current stage of our project to keep things on time. • P1 (day 9) As the deadline nears the group is becoming independent to complete the sections required and need little guidance.
IT-Self-direction	Keeping yourself on task and focused.	• P118 (day 5) I feel that my team and I have communicated well. They keep me up with what they've worked on, and what it is I need to work on. • P70 (day 8) It has been real easy working with my team mates because we tend to just jump into it so we won't be hurrying last minute. • P5 (day 6) I need to work more closely hand in hand with the individual doing expensies so we are on the same path • P167 (day 7) I am sticking with the plans and ways I do things within the group because it's working and everything is going smoothly • P232 (day 10) Today has been a very trying day for me doing this project because I am want to ensure I am producing the best possible product for the group but not getting much feedback from the group with what I am doing and how they feel. • P31 (day 4) I personally made some mistakes because each presentation something i have never work with i have had to use. With practice we will be able to become a stronger group and brings us closer together. None of us put anyone down or said anything negative to each other
IT-Creativity	Coming up with new and improved ideas.	• P96 (day 2)Everyone thinks that we have a great idea. A refrigerator that can do online ordering, suggest recipes, and keep inventory of items is very unique. • P180 (day 5) I have been able to show myself that I am creative in a sense that allows

		for me to build websites to fulfill needs • P222 (day 10) Definitely learned alot from my team mates. They brought out the better side of my critical thinking as well as my creative side.
IT-Curiosity	Teaching yourself/reading about/learning about something that is not part of your current knowledge.	• P236 (day 2) For some time now, I have been thinking about something, this doesn't really happen very often, but the curiosity of the topic is making me want to research and write about it. So i guess that curiosity does make you think, and for me, make me write about it because that it intrigues me. • P163 (day 3) Today, we brainstormed companies that have made strides in innovation when it comes to technology. We have come up with using Sentara since they have made technological strides in the medical field. They have their eCare, patient identification, and utilize information systems to regulate Quality Assurance. They seem to have a lot of information technology and I look forward to reading more about these various systems and how they relate to Management and Information Systems • P99 (day 2)I did give thought to which companies would be ideal as a subject. Adobe was the first one that came to mind. They are software company that makes products for print and digit graphics, website design and development, multimedia, gaming and marketing industries. Last year they embraced the cloud, making their software available online through a subscription service. It would be interesting to see how they use MIS in there company to support design, development, retail, online and business to business services

Note. CC- Cooperation Codes; PC- Professionalism Codes; PA- Project Application; DAL-Digital Age Literacy; EC-Effective Communication; HP-High Productivity; IT-Inventive Thinking.

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RESEARCH PAPERS/ PRESENTATIONS

- A Grounded Theory of the Impact of Study Abroad on Student Learning in Counseling-accepted to the *Journal of Counselor Education and Supervision.*
- Enhancing Counseling Students' Multicultural Competency through a Study Abroad Course-presentation presented at ACES 2013.
- Study Abroad Impact on Student Learning-presentation presented at SACES 2012.
- What do Students Learn Through Short Term Study Abroad-presented at the 2013 Winter Roundtable at Columbia University.
- Using Facebook to Facilitate Class Discussion in the Blended Learning Environment – presentation presented at the Sloan Consortium's Blended Learning Conference 2013.
- Postsecondary Perceptions of Blended Learning Environments- presentation presented at the Sloan Consortium's Blended Learning Conference 2013.
- Prewriting Instruction in the Secondary Classroom-proposal submitted to AATC 2013 (accepted, not presented).
- Teaching English Grammar to ESL Students- proposal submitted to AATC 2013 (accepted, not presented).
- Music as Motivation-presentation presented at the 2013 Third Annual Graduate Research Achievement Day (ODU).