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Why Do Some Succeed? The Impact Of Goal Orientation And Need For Closure On Learning And Engagement In A Problem-Based Learning Environment

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WHY DO SOME SUCCEED? THE IMPACT OF GOAL ORIENTATION AND NEED FOR CLOSURE ON LEARNING AND ENGAGEMENT IN A PROBLEM-BASED LEARNING ENVIRONMENT

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ABSTRACT

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In the instructional strategy of problem-based learning (PBL), teachers pose students with real-world problems, and students make meaning of the content in the process of solving the problem. There has been considerable research confirming the effectiveness of PBL at fostering deep-level learning, but questions remain about how motivational factors may influence learning and engagement in a PBL context. I explored how elementary and secondary pre-service teachers experienced a PBL unit within the context of an undergraduate educational psychology course. I was interested in what factors might predict students' learning and engagement within the same PBL unit. The factors I chose to explore in my dissertation research were achievement goal orientations and need for closure. Within the context of this investigation, I found it important to also investigate issues of debate in achievement goal theory, namely what goal constructs should be used and at what level of measurement.

My first two research questions focused on investigating the factors describing course-level and project-level goals and if students' course-level goals differ from their project-level goals. My next two research questions focused on

investigating whether course-level, project-level goals, and need for closure predicted learning and engagement, controlling for prior experience. My final three research questions focused on describing the students' experience with the PBL unit, how students explained their goals for the PBL unit, and how a student's group impacted his or her experience with the PBL unit.

To answer my research questions, I chose to utilize a sequential explanatory mixed methods design, by collecting both quantitative and qualitative data. Participants completed a course-level goal measure and a need for closure measure at the beginning of the semester in which they were enrolled. Two days into the PBL unit, participants completed a project-level goal measure. I then ran descriptive statistics on these variables with the purpose of choosing participants to interview based on their goal and need for closure scores. After the completion of the PBL unit, students took a learning assessment (measuring recognition learning and transfer), a transformative experience measure, and a project interest measure, and I interviewed the participants previously chosen.

Factor analyses on the goal items suggested a three-factor solution of achievement goals comprised of mastery, outcome, and validation (ability + normative goals) best fit the course-level and project-level goal items. After analyzing the data, I found that course-level goals did differ from project-level goals. Also, participants' score on the course-level mastery goals predicted transformative experience and transfer, suggesting students who held higher levels of mastery goals for the course were more likely to apply the information they learned outside of the confines of the course. In addition, project-level

mastery goals also predicted transformative experience and project interest. The qualitative findings from the interviews suggested that students overall enjoyed the PBL unit, tended to report mastery and outcome goals more than other types, and were impacted (both positively and negatively) by the group element of the project. These results work to further inform the literature on how level of measurement of goals matters and indicate that some motivational characteristics (such as holding mastery goals) may influence learning and engagement within a PBL unit.

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TABLE OF CONTENTS

CHAPTER

LIST OF TABLES

LIST OF FIGURES

CHAPTER I

INTRODUCTION

Problem-based learning (PBL) is a type of instructional strategy that holds much promise for the future of education. Researchers have explored various outcomes of PBL, but few researchers have investigated why some students succeed and others struggle in PBL environments. The purpose of this study was to investigate how a university student's goal orientation and need for closure predict his or her engagement and learning in a PBL environment.

Problem-Based Learning

In general, learning environments tend to fall along a continuum from completely teacher-led to completely student-directed. Problem-based learning is an instructional strategy which falls toward the student-centered and more constructivist end of the continuum, and includes students working together to engage in a problem related to course content. In PBL, self-directed and meaningful learning is emphasized by asking students to solve authentic problems with information they may have to seek out for themselves. Problem-based learning environments also emphasize cooperative rather than competitive learning, as the problems are often of an ill-structured nature which need to be addressed within the context of groups rather than individually (Hmelo-Silver, 2004). Effective versions of PBL utilize scaffolding, or supporting students

through the process of constructing knowledge in the process of addressing the problem presented (Hmelo-Silver, Duncan, & Chinn, 2007).

Research on PBL has yielded mixed outcomes (Strobel & van Barneveld, 2009). In general, research indicates PBL benefits deep learning, engagement, critical thinking, and ability to apply course material (Dochy, Segers, Van den Bossche, & Gijbels, 2003; Wirkala & Kuhn, 2011). Although PBL does seem to have these advantages, it does not as consistently show benefits to content learning when compared to the more traditional strategy of direct instruction (Kirschner, Sweller, & Clark, 2006).

One of the possible reasons for the mixed results of PBL could be individual differences among student learners in how they respond to the learning environment. That is, some students may respond more favorably to a PBL environment and others to a more teacher-led learning environment. Students tend to differ in what and how they approach an educational environment. Two aspects of these individual differences would include the types of goals a student sets related to academic achievement and his or her need for cognitive closure, or the desire to obtain a solid answer to a problem. Within a PBL environment, the types of goals a student sets as well as how much they want to find closure could result in the learning experience and engagement in the learning environment being more or less successful. While PBL has been generally connected to favorable deep learning outcomes such as integrating and applying information, individual differences among students within a PBL environment may drive variations in learning and engagement outcomes.

Achievement Goal Theory

Achievement goal theory helps to explain how a student's goals are connected to behaviors in the classroom. Goal orientations are the profiles of the types of goals students tend to set for themselves within an academic environment (Kaplan & Maehr, 2007). Within the area of goal orientations, one main division exists between whether students' goals are to move toward, or approach, academic tasks, or alternatively to move away from, or avoid, academic tasks. In general, research has reached the consensus that avoid-type goals are not beneficial to learning; however, there is still debate about approach-type goals, specifically in the category of performance-approach goals. The two most commonly discussed and researched goal orientations are performance-approach goals, where students aim to demonstrate competence for the content and mastery goals, where students aim to develop competence for the content (Ames & Archer, 1988; Dweck & Leggett, 1988). Research on the impact of goal orientation on learning outcomes has been inconsistent; some studies suggest mastery goals help an individual gain deep understanding about the topic, while not directly related to positive learning outcomes (Linnenbrink-Garcia, Tyson, & Patall, 2008). Other studies have focused on performance-approach goals, with some research suggesting performance goals may be harmful in a learning environment (Midgely, Kaplan, & Middleton, 2001; Kaplan, & Middleton, 2002) and others suggest performance-approach goals are not maladaptive and can be helpful, directly relating to positive learning outcomes

(Harackiewicz, Barron, Pintrich, Elliot, & Thrash, 2002; Senko, Durik, & Harackiewicz, 2008; Senko, Hulleman, & Harackiewicz, 2011).

One element at play in the effectiveness of a student-held goal may be the type of learning environment encountered by the students, and whether the goals students hold coincide with the expectations of the environment. For example, a performance-approach goal may be adaptive and helpful in a class that requires students to compete against each other for points or grade opportunities, but it may prove detrimental in an environment that requires students to cooperate. Within a PBL environment (such as the one utilized in the context of this study), students are working in groups to develop knowledge by solving an ill-defined problem. As developing a deep understanding of the content as well as the problem is crucial to succeeding in a PBL environment, mastery goals might be particularly helpful. A student who holds a mastery goal might be more likely to focus on developing and connecting knowledge, or mastering the content. Meanwhile, an individual who holds a more performance-approach goal working in a PBL context may feel frustrated by the lack of clarity of the environment and no clear path to success.

In a prior study as part of a research team, I compared the effectiveness of PBL to traditional instruction and the relationship between learning and goal orientation in both types of environments (Pugh, Phillips, Bergstrom, & Machlev, 2012). In the traditional environment, goal orientation was unrelated to the outcomes of general learning and transfer of learning. In the PBL environment, transfer performance suffered slightly when a strong endorsement of a

performance-approach goal was paired with a low mastery goal orientation. These results suggest performance-approach goals might be maladaptive in a PBL setting. However, this proposition needs to be further explored by taking a more comprehensive approach to conceptualizing and measuring goal orientations, particularly a performance-goal orientation.

Level of goal measurement. The level at which goal orientation is measured can play a large role in how influential it may be on the student's academic achievement. Some researchers have compared students' personal goals and how the students' goals interact with classroom goal structures, suggesting classroom goal structures and personal goals play different roles in predicting outcomes (Murayama & Elliot, 2009). In a prior study similar to the nature of this dissertation, goal orientation was measured at the class level (e.g., "It's important to me that I thoroughly understand my class work."; Pugh et al., 2012). However, students may adopt a different goal orientation in the context of the PBL project and this more context-specific goal orientation may be a stronger predictor of success in the project. For the current study, I measured both students' course-level goal orientation as well as their project-level goal orientation in order to explore the relationship between these two levels of academic goals.

Defining performance goals. In the research on performance-approach goals, different researchers have utilized different conceptions of performance-approach goals when measuring this construct. Some performance-approach items focus more on the normative or competitive nature of the goals, with items

like “My goal is to perform better than the other students” (Elliot & Murayama, 2008), while other performance-approach items focus more on the demonstration of competence in comparison to others, with items like “One of my goals is to look smart in comparison to the other students in my class” (Midgley et al., 2000). Some scholars have attempted to explain these differences by stating the essential element to a performance-approach goal may be the normative, or competitive, nature, as opposed to simply demonstrating competence (e.g., Senko et al., 2011). For example, Senko et al. (2011) argued that performance goals that focus on the normative, or social comparison element, correlate more strongly with subsequent performance than performance goals that do not focus on comparison. Other researchers (Grant & Dweck, 2003; Brophy, 2005) contend while social comparison may arise in performance goals, it is not an essential element of a performance goal. In fact, Brophy (2005) saw normative goals and ability goals (where the goal is to do well in order to validate one’s ability) as similar enough to fall under a category he called validation goals.

For the current study, I decided to utilize the approach of measuring types of performance goals, some of which include social comparison (or a normative element) and some which do not. I adopted Grant and Dweck’s (2003) framework regarding goal items, which break performance-approach goals down into normative, outcome, and appearance goals (also called ability goals). For the current study, I decided to create normative versions of basic outcome and ability goals. Outcome goals include those met simply by obtaining some type of outcome (e.g., “It is very important for me to get good scores on this project”),

while a normative version of this goal would include the element of social comparison (e.g., “A major goal I have for this project is to get higher grades than the other students”). Appearance or ability goals include goals in which the prime motivator is focused on appearing more intelligent or capable (e.g., “One of my important goals for this project is to validate my intelligence through my work”), with the normative version focusing on comparing one’s self to others (e.g., “One of my goals for this project is to look smart in comparison to the other students in my class”). In addition to the approach versions described above, I also utilized avoid versions of each goal category. One purpose of this study was to investigate which of these goal orientation constructs separate from each other and factor together, so I can contribute to the understanding of goal orientations and ideas about productive ways of conceptualizing goal orientations.

In addition, to more fully understand why students adopt the goals they do and how they assess completion of a goal, I interviewed students after the PBL unit on the topic of their goals. I hoped to illuminate what specific elements of goals result in learning and engagement within a PBL environment. Within the research on goal orientation, researchers continue to debate the role certain goals play in relationship to achievement as well as to try to clarify such issues as what different conceptions of performance-approach goals actually measure.

Need for Closure

In addition to exploring course-level and project-level goal orientations as factors in one’s learning and engagement in a PBL setting, I also measured students’ need for closure. Need for closure (NFC) is part of an individual’s

epistemic beliefs, or part of how the individual views and experiences the world. While epistemic beliefs fall across a wide range of topics, need for closure focuses on an individual's need for a solid answer to a question, as measured through a self-report scale featuring items such as, "When I am confronted with a problem, I'm dying to reach a solution very quickly" (Roets & Van Hiel, 2011). Educational environments can provide specific closure (i.e., solving a word problem to obtain the one, correct answer) or environments can provide nonspecific closure (i.e., working to understand a concept, without one correct answer, Roets & Van Hiel, 2011). In the case of PBL, the environment is one of nonspecific closure; students work together to solve a problem, but no clear solution exists. Although I have not been able to find a study in which need for closure is measured specifically in the context of PBL, the association seems logical; part of the nature of a PBL project is the solving of an ill-defined problem for which there is no clear answer. If an individual reports high levels of need for closure, they might also experience more frustration within a PBL unit, which could in turn influence their learning and engagement in the unit.

Outcomes

In addition to assessing elements that might predict differences between students in a PBL setting, I also measured the learning and engagement outcomes during the PBL unit.

Learning. I assessed two different types of learning: 1) recognition learning (as measured by multiple choice items over the content), and 2) transfer (as measured by response to open-ended application questions). One common

finding from studies on learning outcomes in PBL is that while students in PBL environments perform about the same as those in traditional instruction on general content learning, individuals in PBL environments tend to perform better on application or transfer measures (Russell & Pugh, 2010; Vernon & Blake, 1993). For the current study, I explored whether the variables of goal orientation and need for closure affected the outcome of learning in a PBL environment.

Engagement. I addressed the outcome of engagement in two ways: 1) through a self-report measure of transformative experience, and 2) through a self-report measure of situational (or project) interest. Transformative experience is when students view their experiences outside of school through the lens and with the use of knowledge they acquired within school (Pugh, 2004). Transformative experience is a type of engagement, as students need to be actively making connections between their school and everyday experiences. Situational interest measures if an individual shows interest for an activity or due to how a topic was presented (Krapp, Hidi, & Renninger, 1992). These measures of engagement helped me assess whether the level of a student's engagement in the PBL project might be partially dependent on the student's incoming goal orientation and/or need for closure.

Current Study

For this dissertation, I utilized a mixed methods design to investigate how students' goal orientation and need for closure in a PBL unit influence learning and engagement within the context of an undergraduate education course. I focused on assessing student-reported mastery, normative, outcome, and ability

goals (as defined by Grant & Dweck, 2003) both prior to the PBL unit (course-level goals) and during the unit (project-level goals). In this way, it affords the opportunity to compare the influence of pre-existing goals on the goals they develop for the PBL unit specifically. It also allowed me to explore the factor structure of goal orientations at both levels and investigate which categories of goals factored together. In addition, I evaluated students' need for closure by adapting the need for closure measure (Roets & Van Hiel, 2011). I aimed to explore whether course-level goals, project-level goals, and levels of need for closure could predict a student's learning (through a learning assessment of recognition learning and transfer) and engagement (as measured through self-report measures of transformative experience and interest) within the context of a PBL unit.

I conducted interviews with purposefully selected students (selected based on quantitative data) after the completion of the PBL unit. Through analysis of the interviews, I hoped to illuminate the experience of students during the PBL unit, the types of goals students reported for the unit and if the goals differed from goals they typically set, and how a student's group impacted their experience of the project.

Research Questions and Hypotheses

Q1. What are the underlying structures or factors for the course-level and project-level goal orientation items?

H1. I hypothesized that the course-level and project-level goal orientation categories would generally factor into mastery and performance categories. I also hypothesized that approach and avoid items would not form separate factors (as was the case in Russell & Pugh, 2010).

Q2. Does students' course-level goal orientation differ from their project-level goal orientation? If so, how?

H2. I hypothesized that students would respond to course-level goal orientation items differently than they respond to project-level goal items, in that the factor structures would not be identical and the same categories of goals would not be very highly correlated between course-level and project-level goal orientations.

Q3. Do course-level goal orientation and need for closure predict learning and engagement, controlling for prior achievement?

Q3a. Do course-level goal orientation and NFC predict recognition learning and transfer?

H3a. I hypothesized that course-level goal orientation would not predict recognition learning, but mastery-type goals would predict transfer and performance-type goals would negatively predict transfer (based on the results from prior research, e.g. Russell & Pugh, 2010). No specific predictions were made for outcome goals because of lack of prior research. In addition, I hypothesized that NFC score would not predict recognition learning nor transfer.

Q3b. Do course-level goal orientation and NFC predict transformative experience and project interest?

H3b. I hypothesized students holding course-level mastery-type goals would report higher levels of transformative experience and project interest compared to students holding course-level performance-type goals. No specific predictions were made for outcome goals because of lack of prior research. In addition, I hypothesized students high in NFC would have lower levels of transformative experience and project interest, as high levels of NFC might work to decrease students' engagement in the context of a PBL unit.

Q4. Do project-level goal orientation and need for closure predict learning and engagement, controlling for prior achievement?

Q4a. Do project-level goal orientation and NFC predict recognition learning and transfer?

H4a. I hypothesized students' levels of mastery-type goals will be more predictive of recognition learning and transfer than

performance-type goals. In terms of transfer, I also hypothesized that students' levels of performance-type goals would be negatively related to transfer (based on the results from prior research, e.g. Russell & Pugh, 2010). In addition, I hypothesized that NFC score would not predict recognition learning nor transfer.

Q4b. Do project-level goal orientation and NFC predict transformative experience and project interest?

H4b. I hypothesized students' level of project-level mastery-type goals would predict transformative experience and project interest more than students' level of project-level performance-type goals. No specific predictions were made for outcome goals because of lack of prior research. In addition, I hypothesized students high in NFC would have lower levels of transformative experience and project interest, as high levels of NFC might work to decrease students' engagement in the context of a PBL unit.

Q5. How do students experience the PBL unit?

Q6. How do students explain their goals for the PBL unit?

Q7. How does a student's group impact his or her experience with the PBL unit?

CHAPTER II

REVIEW OF LITERATURE

The major topics of interest in this study include the areas of problem-based learning (PBL) and achievement goal theory, with the minor topics of need for closure, transfer learning, and engagement through transformative experience and interest. In this chapter, I will review work in all these areas, focusing in on how the areas interact. While the focus of the current study was on course-level and project-level goal orientations, in order to best understand the components associated with learning and engagement I also measured need for closure, interest, and transformative experience. Although the predictive and outcome variables are important to review, they are all set within the context of the constructivist instructional approach of PBL, which will lead the review.

Problem-Based Learning

Problem-based learning is an instructional strategy focused on providing students with realistic problems related to course material, which they are asked to solve (Savin-Baden & Major, 2004). Through the process of understanding and solving the problem, students learn information about the topic of the problem, and they are able to construct their own understanding of the material through the lens of the problem. Problem-based learning has developed out of the more broad area of constructivist learning environments in general, so in the

following section I will more broadly discuss constructivist learning environments prior to focusing on PBL specifically.

Constructivist Learning Environments. Constructivism can be broadly defined as the view that all knowledge one holds has been actively constructed by the individual via their interaction with the world (Crotty, 1998). In other words, the world provides objects, but it is humans who must make meaning of these objects; thus humans construct knowledge based on their interactions with the external world (Piaget, 1954). Constructivism has been a particularly popular theory in the field of education; studies have concluded that students taught via constructivist methods tend to retain the information longer, have increased theoretical comprehension and application of ideas, and have more knowledge of how to solve authentic problems in their field of study (Hardy, Jonen, Moller, & Stern, 2006; Loyens, Rikers, & Schmidt, 2006). Constructivist teaching can include methods such as presenting students with applicable problems to solve or creating an environment that encourages student comprehension of a concept. The goal of these types of educational environments is to provide opportunities that encourage students to interact with the world in a meaningful way.

There have been many variations of teaching methods and studies of teaching methods labeled as constructivist. Constructivist learning and teaching practices have become more prevalent; however, literature on constructivist teaching is relatively fragmented (Gordon, 2009). When one contends that knowledge can be found only when it is constructed by the individual, the risk is

that one interprets this as somewhat of an “anything goes” teaching discourse, which encourages individuals to make meaning, but has no guides in place to ensure the process is actually taking place (Gordon, 2009). This risk highlights the need for more conclusive research on the relationship between a constructivist environment and student learning outcomes. It could be that a constructivist model works well for some students and not so well for others.

One aspect that many constructivist pedagogies have in common is an opportunity for active learning. Mayer (2004) argues that many individuals have jumped to the conclusion that active learning necessitates active teaching, an assumption he believes is incorrect. Active learning refers to the individual being cognitively active, integrating new information and experiences with previously held schemas (Piaget, 1954). Active learning does not mean that teachers should simply provide an environment and then not interfere or scaffold the discourse taking place in that environment; in fact, this type of discovery learning approach without guidance has *not* been successful in terms of encouraging learning (Mayer, 2004). If information and strategies are successfully scaffolded for students, learning benefits (Vygotsky, 1978). One example of a study illustrating the benefits of scaffolded understanding includes research by Hardy et al. (2006). They reported third grade students who received instructional support in a constructivist learning environment by way of scaffolding statements made by the teacher showed long-term (after one year) reduction of misconceptions and adaptation of scientific explanations for the concept of “float or sink.” Ideally, teachers should be guiding student interaction with the

environment and content, and it should be the teacher's job to help students make connections between the classroom information and concepts the students already know.

Arguments about constructivist teaching strategies. Educational researchers and practicing teachers have argued as to whether minimal guidance instructional strategies, which focus on the student constructing knowledge, are effective. Within the literature on constructivist instructional strategies, various authors have argued on what types of specific utilizations of strategies provide benefits, and which are detrimental to learning. In 2006, Kirschner, Sweller, and Clark authored an article underlining their analysis of the failure of constructivist teaching strategies. In their paper, they discussed constructivist, discovery, problem-based, experimental, and inquiry-based teaching strategies as a group. They posited guided instruction is superior to minimally or un-guided instruction, as all information has to be pulled through working memory in order for a long-term memory to occur. They drew on cognitive research to suggest unguided learning is less efficient and less effective than direct instruction (or guided instruction), thus teachers should not be encouraged to use what was defined as unguided learning instructional strategies (Kirschner et al., 2006).

A number of researchers authored theoretical and research-based papers in direct response to the Kirschner et al. (2006) paper described above. Hmelo-Silver et al. (2007) began their argument by contending Kirschner et al. (2006) should not have grouped PBL and inquiry learning with discovery learning. They

argue effective versions of the PBL and inquiry learning pedagogies include substantial scaffolding, which works to guide students through the learning process. In addition, when PBL or inquiry learning techniques are scaffolded effectively, they decrease cognitive load, encourage complex thinking, and have social benefits such as collaboration and self-directed learning. Finally, the authors also discussed one of the issues at the root of the argument; individuals in the field hold different ideas about what the goals of learning and instruction should be (e.g., to transmit information vs. to help facilitate the construction of knowledge). In an article by Schmidt, Loyens, van Gog, and Paas (2007), the authors argued Kirschner et al.'s (2006) statement that minimally guided techniques were not compatible with current knowledge of human information processing. In contrast, specifically in reference to PBL, the authors refuted the statement, providing evidence that PBL is actually quite compatible with the way humans' cognitive architecture is organized to construct knowledge.

The authors of the original piece responded to critiques of their first article against minimally guided teaching techniques (Sweller, Kirschner, & Clark, 2007). One of their prime arguments against PBL is that it focuses on having learners discover their own answers rather than having a teacher provide learners with answers and pertinent information. The authors argue learning is more efficient and effective if correct information is simply provided to students. These types of arguments and discussions in the field underscore the need for additional research in the area of PBL along with how it impacts outcomes such as engagement and learning.

Problem-based learning. The act of constructing knowledge from an environment to make meaning closely parallels the pedagogical technique of PBL. Blumenfeld et al. (1991) described PBL as an instructional method focused on addressing a driving question, a process that helps people learn and can impact motivation and thought by engaging through investigation. Problem-based learning is defined as having both: 1) a central question or problem which serves to organize and drive activities and, 2) the project results in artifacts or products. In PBL contexts, self-directed and meaningful learning is emphasized by asking students to solve authentic problems with information they may have to seek out for themselves. Problem-based learning environments also emphasize cooperative rather than competitive learning, as the problems often embarked upon within the context of groups (Hmelo-Silver, 2004).

General outcomes of PBL. Educational researchers have reported on the positive impact of PBL on student learning and ability to transfer and connect knowledge. Sudzina (1997) reported when case studies were utilized in educational psychology courses for pre-service teachers, the students scored better on learning outcomes such as higher order thinking skills and demonstrating a more elaborate understanding of issues presented in the case. Sudzina's study is considered an example of case-based learning, which is similar to PBL in that both are constructivist approaches, but PBL frames the content as a problem. Overall, the specific pedagogical method of PBL has produced positive results when measuring ability to learn and apply information.

Other researchers have examined how certain students self-select to participate in a more constructivist PBL learning environment versus a more traditional lecture-focused learning environment (Loyens et al., 2006). When asked about their concepts on learning, students in the PBL condition agreed more on constructivist assumptions including the importance of cooperative learning and authentic problems. The authors proposed students' conceptions of constructed learning activities (such as the problems in PBL) may work as a moderator of the effects of PBL (Loyens et al., 2006). The same authors later reported that agreement with conceptions of constructivism was related to the regulation and processing strategies students utilized (Loyens, Rikers, & Schmidt, 2008). As mentioned earlier, further research in PBL may suggest it benefits students with certain characteristics more so than other students.

Specific learning outcomes of PBL. Instead of comparing PBL to traditional direct instruction in terms of effectiveness in a general sense, it may be more productive to investigate the effect of each teaching method on a particular type of learning outcome, as models may foster some types of outcomes better than others. Some research has suggested PBL environments are more effective than traditional environments at fostering problem-solving and real-world application skills, but no more or less effective at fostering basic skills and knowledge. Vernon and Blake (1993) found PBL environments in medical schools fostered greater clinical skills than traditional environments, but not greater medical knowledge in general. Educational environments utilizing PBL may be effective for fostering problem-solving and real-world application skills,

but no more effective at fostering other outcomes. More research is needed, particularly in contexts other than mathematics education and medical school instruction, fields in which PBL has been utilized commonly in the past.

One study reported on the use of the *Jasper* laserdisc program, which was an interactive, constructivist-type math curriculum (Hickey, Moore, & Pellegrino, 2001). The study focused on motivational, as well as academic outcomes. The researchers measured problem solving, knowledge of math concepts, and mathematics computation. Students who experienced the *Jasper* intervention overall showed larger positive gain scores in mathematics problem solving and data interpretation, smaller gains in math concepts and estimation, and no difference in mathematics computation scores. Overall, in terms of academic gains, the *Jasper* curriculum resulted in positive gains, particularly in problem solving, with no negatives.

A series of studies have investigated the impact of PBL types of instructional strategies on students' ability to transfer information after the completion of the unit of interest. Kuhn (2007) described a study focused on the comparison of direct instruction to problem solving in fourth-grade students, conditions of only problem solving practice, only direct instruction, or an introduction utilizing direct instruction followed by problem solving practice. The result was the direct instruction plus practice group performed highest on the initial assessments, while the effect of learning in the practice-only group was most enduring—positively affecting scores 6 weeks after the unit. In a similar study, also utilizing fourth-grade students and various combinations of direct

instruction and discovery learning, the authors attempted to tease apart the necessity of direct instruction in the transfer of learning (Dean & Kuhn, 2007). As opposed to an earlier study supporting direct instruction (Klahr & Nigram, 2004), which measured transfer one week after the unit, Dean and Kuhn focused on measuring students' ability to transfer information six months after the unit had been completed. The results suggested direct instruction was neither a necessary nor sufficient condition for acquisition or maintenance of knowledge over time.

Another study focused on fourth grade students, which compared a PBL learning activity versus direct instruction over the same content (Drake & Long, 2009). The study was a quasi-experimental design, which aimed to compare students in a PBL condition to students in a "thematic" instruction condition. The problem that students were asked to solve included a college student who needed to study during electrical outages at her school. Students' content knowledge, time on task, opinions of scientists, and transfer of problem-solving skills were compared across groups. For the fourth-grade students, the PBL condition fostered better transfer of problem-solving skills and more time-on-task behavior compared to students in a direct instruction condition, although groups tended to perform comparably on test scores measuring content knowledge of the material.

Similar results were found in a population highly different from the above studies utilizing fourth graders. The PBL method was compared with a version of direct instruction within graduate students in an MBA program, and learning was

assessed 6 and 12 weeks after the units (Capon & Kuhn, 2001). Groups who learned a concept under the direct instruction condition performed better on an assessment of general learning focused on that concept at 6 weeks. The group who learned a concept under PBL was better able to explain the concept at 12 weeks compared to those who were taught the same concept under the direct instruction condition. The authors wanted to identify specific outcomes of PBL, including acquisition, recall, or integration of information. The PBL group performed best compared to the control group on the integration aspects of assessment. Essentially, students in the PBL condition were better able to integrate their new knowledge with their preexisting knowledge on assessments. The benefit for PBL isn't necessarily in the acquisition or recall of information, but rather in deeper understanding and being able to integrate the new knowledge with the old (Capon & Kuhn, 2001).

In light of the above review of PBL studies, a few issues are clear. Problem-based learning seems to be a good strategy to foster the integration and transfer of knowledge; however, the effects of PBL on general learning are quite mixed. This dissertation will add additional information regarding the effects of PBL, and it will expand on prior research to study how individual differences, specifically in motivation, may impact an individual's learning experience in PBL. One element of the students' motivation on which I plan to focus is the goals students typically set, as organized through the achievement goal orientation framework.

Goal Orientation

Within the area of motivation, goal orientations refer to the general pattern of intentions and thus goals, which individuals display. More specifically, achievement goal orientations represent the types of goals students typically set within academic environments. Traditionally, theorists have made a distinction between two main types of goals: mastery goals, which focus on an individual developing competence, and performance goals, which focus on an individual demonstrating competence (Ames & Archer, 1988; Dweck & Leggett, 1988; Wigfield, Eccles, Roeser, & Schiefele, 2008). The difference between mastery and performance goals stems not only from what types of goals one sets, but also by what generally motivates the individual. For example, if an individual is more motivated by internal factors or enjoys the feeling of accomplishing a (possibly difficult) task, that individual is more likely to set mastery goals which tend to focus on effort, learning, and improvement (Wigfield et al., 2008). If an individual tends to be more motivated by external factors or rewards outside of the individual, that person is more likely to set performance goals which tend to focus on extrinsic incentives, ability, and performing to a set level (Wigfield et al., 2008). In the following sections, I will describe mastery and performance goals more thoroughly, and will expand to include outcomes typically ascribed to each type of goal.

Mastery goals. Mastery goals are generally considered to encourage behaviors which have been linked to deeper learning of material being covered (Midgley et al., 2001). Some of these traits include engagement, interest, and a

deeper understanding of material at hand. Interestingly, some of these traits have been found not only when students report a personal mastery goal, but also when mastery goals have been preset in a given situation. Standard mastery goals (as opposed to more difficult levels of mastery goals) that were preset for students in a lab-controlled research situation brought about higher levels of interest than difficult mastery or performance-approach goals in a word-finding puzzle activity (Senko & Harackiewicz, 2005). When analyzing goals that students set for themselves, the presence of performance-approach goals predicted performance, while the presence of mastery goals predicted continued interest within a subject (Harackiewicz, Barron, Tauer, & Elliot, 2002). In addition, Hulleman, Durik, Schweigert, and Harackiewicz (2008) found initial interest and mastery goals predicted future interest not only in academic settings, but also in sports settings, specifically in a high school football camp. Across domains and regardless of whether the goals were self-set or set by another individual, mastery goals seem to be more likely to result in higher levels of interest for the material as compared to other types of goals.

Performance Goals. Performance goals in general refer to goals that focus not on developing competence (as was the case with mastery goals), but rather with the demonstration or performance of competence. Performance goal orientation is typically broken down to include performance-approach and performance-avoidance goals (Elliot, 1999). People who have a performance-approach goal orientation tend to set goals that focus on a desire to outperform or illustrate their ability to others on a task. Meanwhile, people who adopt a

performance-avoidance goal orientation tend to set goals that focus on the avoidance of performing more poorly than others (Darnon, Harackiewicz, Butera, & Quiamzade, 2007). For example, if an individual held a goal focused on "setting the curve," or outperforming his or her peers on an assessment, it would be considered a performance-approach goal. Contrastingly, if an individual set a goal of not failing a test because of the possibility of ridicule from his or her peers, it would be considered a performance-avoidance goal.

Comparing mastery and performance goal outcomes. The general consensus of past researchers has been that while both mastery and performance-approach goal orientations have been related to higher achievement more than performance-avoidance goals, performance-approach goal orientation tends to result in higher performance and more focus on performance overall, whereas mastery goal orientation tends to result in higher levels of interest in the task or subject (Senko et al., 2008). In a number of early studies on goal orientation, a mastery orientation predicted important outcomes such as use of deep processing and metacognitive strategies, self-regulation, preference for challenging tasks, and high levels of effort and persistence, whereas performance-approach orientation was often found to be unrelated to such outcomes, and a performance-avoidance orientation was found to be generally maladaptive (Ames & Archer, 1988; Maehr & Pintrich, 1991; Ames, 1992; Pintrich, 2000b; Midgley et al., 2001). Consequently, mastery goals were viewed as superior to performance goals across the board by many individuals for a long time, as an important goal of education is not just to make a certain

grade, but rather to develop deep understanding for the material taught in school (Midgley, et al., 2001).

However, some researchers argue a performance-approach orientation may be beneficial because performance-approach goals consistently predict higher academic achievement, while a mastery orientation does not, despite its positive relation to cognitive engagement (Senko et al., 2008). Results like these suggesting benefits for students holding performance-approach goals, led researchers to investigate the possibility that an individual can pursue more than one type of goal at a time, or individuals with any goal orientation could hold any type of goal (Harackiewicz, Barron, & Elliot, 1998; Harackiewicz, Barron, Pintrich, et al., 2002). The result was the formation of the multiple goal perspective, which proposes individuals may benefit from holding not only mastery focused goals, but also performance-approach goals, and goal orientations do not necessarily have to entail an individual exclusively setting one type of goal (Barron & Harackiewicz, 2001). Research also indicates it may be beneficial to hold both mastery and performance-approach goals, as it is often necessary to master a concept, or hold mastery goals, prior to being able to outperform other individuals on a task, or hold performance-approach goals (Darnon, Dompnier, Gillieron, & Butera, 2010). The combination of performance-approach and mastery goals has proved beneficial in some environments; however, there has not been much research on this perspective in the context of more nontraditional learning environments, such as PBL.

Multiple goal perspective and researchers focusing on the benefits of performance-approach goals conclude performance-approach goals are beneficial when high academic achievement is sought (Harackiewicz, Barron, Pintrich et al., 2002). A recent review, however, challenges the claim that performance-approach goals are more strongly related to achievement than are mastery goals. Linnenbrink-Garcia et al. (2008) completed a review that investigated the results of more than 90 studies and found both mastery and performance-approach orientations positively predicted performance in about 40% of self-report studies and negatively predicted performance in about 5% of studies. In experimental studies, 20% of the results related to achievement favored a mastery condition and 10% a performance-approach condition, and 70% found no effect of either type of goal on achievement. The inconsistent effects for these various studies suggest moderating factors likely have a significant influence. Linnenbrink-Garcia et al. (2008) investigated potential moderators such as type of achievement task, psychological variables, and individual differences.

Theorists such as Brophy (2005) have suggested goal research move on from the forced choice of pursuing just mastery or performance goals. In fact, Brophy (2005) advocated viewing both normative and ability goals as belonging to a more general category called validation goals, as the focus of both types of goals is to validate the view of the student to either him or herself, or to others. In addition, Brophy (2005) discussed how only a limited number of studies utilizing methods other than self-report (i.e., eliciting goals from the students themselves)

suggest when students are allowed to generate their own goals (instead forced into a choice by a self-report survey), students rarely produce the type of performance-approach goals suggested by most research (e.g., Lemos, 1996). This proves particularly true when performance-approach goals are categorized as having an essential normative component, as the competitive nature of these goals can undermine more beneficial learning strategies (such as deep learning and integrating knowledge). Brophy (2005) also highlighted some of the research suggesting students who hold performance-approach goals may be particularly prone to adopting a performance-avoid goal if they experience failure, thus educators should not encourage performance-approach goals in their classes.

Disagreement on performance-approach goal definitions. The traditional conception of goal orientation encompassed two main dimensions: whether the goal was mastery/learning or performance based, and whether the goal encouraged one to approach or avoid the focus of the goal (Elliot & McGregor, 2001). As measures were being developed focusing on attempting to create self-report scales to identify mastery, performance-approach, and performance-avoid goal orientations, different groups of researchers held slightly different conceptions about what particularly performance-approach goals entailed. Some performance-approach items seem to focus on goals one might hold to uphold their appearance, such as the performance-approach items on the PALS (e.g., “One of my goals is to show others that class work is easy for me,” Midgley et al., 2000, p. 12). Other performance-approach items focus on a more normative comparison, or holding a goal to outcompete other students. Such a

variation of a performance-approach goals is evident in the Achievement Goal Questionnaire (AGQ), and would include items such as, “It is important for me to do well compared to others in this class” (Elliot & McGregor, 2001, p. 504). These two conceptions represent different focuses for students who exhibit the goals; some students focus on preserving their appearance in front of others, while other students focus on the competitive element and thus set goals to outcompete others. Problems began when goal researchers clumped both conceptions under the general heading of “performance-approach” goals, and then proceeded to draw conclusions about the impact of these goals, even though they were potentially measuring two different concepts.

Overall, there is a lack of consensus on the essential elements of a performance-approach goal. Some believe the essential element to a performance-approach goal is the desire to demonstrate competence (e.g., Kaplan & Maehr, 2007; Midgley et al., 2000), whereas others believe the essential element is the desire to outperform one’s peers (Elliot & Murayama, 2008; Senko et al., 2011). One approach to clarifying at least some of the issues related to performance-approach goals is to measure and consider both goals focused on demonstrating competence as well as goals focused on outperforming one’s peers.

Grant and Dweck (2003) were also interested in clarifying the types of achievement goals and their impact, and they essentially broke all goals down into four main categories: outcome goals, ability goals, normative goals (further divided into normative outcome and normative ability), and learning goals

(divided into learning and challenge-mastery). Outcome goals are adopted when an individual simply wants to do well on a particular task, or to achieve a certain outcome, such as holding a goal to get an “A” in a class. Ability goals focus on one’s desire to seek to validate one’s ability at a task, such as holding a goal of wanting to do well in order to validate one is smart. Normative goals focus on the element of social comparison and competition with one’s peers. Normative outcome goals contain an element of competition, but they also have some set outcome from the comparison, such as wanting to do better in classes compared to others. Another type of normative goal, or goals focused on normative ability, tend to combine normative and ability goals, such as focusing in school on demonstrating that one is smarter than the other students. Learning goals overall focus on learning or mastering content, and overall provide less controversy in both their definition and the consistency of their reported outcomes. Specifically, learning goals emphasize the importance and benefits of learning content, such as holding a goal of focusing on developing one’s abilities and acquiring new abilities. Challenge-mastery goals focus not on learning content, but more on seeking out challenges, such as holding a goal of seeking out coursework that presents challenging material (Grant & Dweck, 2003).

A few researchers have responded to the differentiation of goals into subcategories positively, seeing a benefit to investigating ability and normative goals separately (Brophy, 2005). Others have responded more negatively, and responded there is no need to look at ability goals, as the essential element of a performance-approach goal lies in its competitive (normative) element (Senko et

al., 2011). The field of achievement goals may benefit from more research into how performance-approach goals can be better understood in relation to what element of the goal is central to the positive impact some have found connecting performance-approach goals to achievement.

Connection between Motivation and PBL

My dissertation research aims to shed light on how individual differences between students, particularly in terms of different types and levels of motivation, might influence the experience that student has within a PBL environment. In order to benefit from PBL, students must be engaged in the activity of addressing the problem, which is a motivating activity by its self. So basically PBL is motivational, as it fosters engagement (Blumenfeld et al., 1991).

A few data-driven studies have explored motivation in more constructivist learning environments in a variety of ways and across different populations. In a mixed methods design utilized to study PBL in middle school students, Liu, Horton, Olmanson, and Toprac (2011) studied a PBL unit composed of a computer program called *Alien Rescue* (a PBL unit for sixth graders on space science). A learning assessment for the science knowledge covered both factual and application types of questions. Students in the PBL condition had higher science knowledge scores, and they were more confident in their answers than students who did not experience the PBL unit. Students in the PBL condition also scored higher on a measure of intrinsic motivation compared to students not in the PBL condition. Through qualitative data analysis of student responses, the

authors found some students thought the experience was too hard or involved too much research, but most enjoyed it (Liu et al., 2011).

One specific connection between goal orientation and a PBL environment that is of interest to my dissertation is how an individual's incoming or pre-existing goal orientation interacts with one's experience of PBL. Two studies that have measured these constructs include a study by Belenky and Nokes-Malach (2012) and previous work I have done with colleagues in this area (Russell & Pugh, 2010; Pugh et al., 2012).

A study published by Belenky and Nokes-Malach (2012) focused on transfer of information and the influence mastery goals might have in this process. They hypothesized students who hold mastery-approach goals will also tend to illustrate cognitive processes that are reflective and constructive, and which will in turn aid the student in initial learning and subsequent transfer. Additionally, the authors wanted to investigate if different types of instruction yielded different goal profiles from students in both tell-and-practice (direct instruction) and inventive (discovery) conditions while working independently. They hypothesized college students in the inventive condition would adopt more mastery-approach goals. The experiment was conducted in a laboratory and focused on teaching basic statistical concepts. Inventive conditions in the past (Schwartz & Martin, 2004) were the only ones to facilitate transfer, and the authors posit this might have something to do with the students' motivation, specifically mastery goal adaptation. They looked at mastery goals in two ways: at the level of individual differences (or personal goal orientations) and as a result

of the learning environment's method of instruction (or more environment-based goals).

The motivation measure utilized was a 12-item (7-pt Likert scale) Achievement Goal Questionnaire (Elliot & McGregor, 2001) specific to math goals. The researchers created their own measure of goals related to the activity—trying to differentiate between goal orientation and adopted task goals. The results were students who held mastery goals tended to show more transfer (better performance on transfer items) in the inventive condition compared to the tell-and-practice condition. Higher student endorsement of mastery-approach goals predicted higher scores on a measure of transfer. The benefit of mastery goals was moderated by inventive activity, in that students high in mastery goals showed higher levels of transfer regardless of condition, while students low in mastery goals transferred more in the inventive condition compared to the tell-and-practice condition. Overall, student transfer and mastery goals were more encouraged in the more inventive/discovery condition compared to a tell-and-practice/direct instruction condition (Belenky & Nokes-Malach, 2012).

The research I have been involved with in the past has centered on how PBL and traditional classrooms differ in learning outcomes and how goal orientations that students hold may influence these differences (Russell & Pugh, 2012). Some results indicated students in PBL and traditional classrooms perform relatively similarly on simple response or multiple choice items. However, students in PBL classrooms outperform their more traditionally taught counterparts on open-ended items, or measures of ability to transfer knowledge

to a “real world” example. Students who held performance-approach goal orientations had significantly lower scores on all aspects of the learning outcomes within the PBL group, but students with similar performance-approach goal orientations did not show a decreased performance within the more traditional/direct instruction group. This indicates some students with certain characteristics (such as certain goal orientations) may fare better and have more beneficial outcomes from constructivist environments than other students. I expanded on these findings with this dissertation work, adding additional variables (need for closure, interest, and transformative experience), and utilizing a more precise instrument to tease apart normative, ability, and outcome goals (Grant & Dweck, 2003).

Application to current study. In the current research project I investigated if instructional environment (specifically a PBL environment) could be an additional factor of interest in the relationship between goal orientation and achievement. Essentially, certain goal orientations may be more or less adaptive in particular instructional environments. In the current study, I examined the relationship between goal orientation and performance within the specific instructional environment of PBL.

Given the connection between a mastery orientation and cognitive engagement, one would expect students with a mastery orientation to be more adept at engaging in the type of self-directed learning required for success in a PBL environment. In contrast, given the nature of performance-approach goals is to compare one’s own performance to that of one’s peers – a feature which

indicates at least a minimal level of competition – this orientation (particularly the types of performance goals which are normative) may not be as productive in a collaborative-leaning PBL environment. In addition, surface-level strategies that are sometimes associated with a performance-approach orientation (e.g., Kaplan & Midgley, 1997) may work just fine in a typical classroom, but these strategies may not work as well in a PBL environment. Finally, in order to better understand the types of goals which may be most facilitative (or detrimental) in a PBL environment, I adapted the Grant and Dweck (2003) scale, which breaks performance-approach goals down into normative, appearance, and outcome goals. Hence I would expect learning or mastery goals, but not normative, appearance, or outcome goals to be adaptive in a PBL environment. In the following sections, I will provide some background on the more minor issues related to the current study: need for closure, transfer learning, transformative experience, and interest.

Need for Closure

In educational settings, the beliefs one holds about knowledge and learning impact how one thinks about and reacts to learning tasks. The beliefs about the nature of learning and knowledge are generally referred to as one's epistemology (Hofer, 2001). Need for closure (NFC) is one element of epistemology that drives the individual to seek an answer to problems encountered, ideally quickly and permanently (Webster & Kruglanski, 1994). The concept (also referred to as need for cognitive closure) arose from Kruglanski's work in cognitive and motivational aspects of decision making. DeBacker and

Crowson (2008) described need for closure as a “motivated tendency to seek structure, simplify complex information, and avoid ambiguity” (p. 711). Individuals who are high in NFC often seek to make decisions in a quick manner, and they also would prefer to find a solution which would not require reappraisal. In addition, students who high in NFC prefer environments for which closure is a clear answer and they tend to dislike environments utilizing nonspecific closure, such as solving a problem for which there may be numerous solutions (DeBacker *&* Crowson, 2009). Webster and Kruglanski (1994) developed a scale to measure need for closure, and it encompassed five of the traits considered central to the need for closure construct: 1) people high in NFC appreciate and *prefer order*, 2) they prefer *predictability* within their lives, 3) they highly value *decisiveness*, or quickly making a decision, 4) they feel *discomfort with ambiguity* (and thus try to avoid nonspecific closure), and 5) they tend to be *close-minded*, unwilling to change based on other inconsistent evidence (Roets & Van Hiel, 2011).

When students who hold a high NFC experience environments in which there is nonspecific closure, such as is the case with PBL environments, they experience a cycle of “seizing” quickly on answers or solutions, then “freezing” and sustaining in the answer which was reached (DeBacker *&* Crowson, 2009). Prior to the seizing, one experiences an absence of knowledge or judgment about the problem. The seizing is described as an urgent tendency, where one’s confidence may be low, openness to new information high, and few competing propositions or hypotheses are devised. After the seizing, one experiences a

“crystallization” of their new decision or knowledge. The freezing is described as a result of the desire for permanence, with confidence in one’s knowledge being high, openness to new information low, and basically no competing suggestions generated (DeBacker & Crowson, 2009).

There has been at least one study that explored the link between achievement goals and need for closure. Harlow, DeBacker, and Crowson (2011) measured levels of classroom NFC in high school students. They found the items measuring classroom NFC factored into two main subscales: preference for certainty and preference for structure. Higher scores on the preference for structure subscales tended to be less problematic and more adaptive in the learning environment compared to higher scores on the preference for certainty subscale. In addition, the researchers found the relationship between classroom NFC and cognitive engagement was partially moderated by mastery goals. Essentially, preference for structure had more of an impact on deep processing if the individual also had a high score for mastery goals. Additionally, while preference for structure was positively related to mastery goals, preference for certainty was negatively related to mastery goals. A different study related levels of need for closure to how one responds to “soft” versus “hard” leadership tactics (Pierro, Kruglanski, & Raven, 2012). The researchers found that the benefits of soft leadership tactics (like wielding power with information and not dictating) decreased as a function of their subordinates’ levels of NFC; essentially, those higher in NFC prefer “hard” leadership tactics (like utilizing coercion and reciprocity) compared to those lower in NFC.

I have searched recently for research utilizing the need for closure within constructivist learning environments (and more specifically, within PBL environments), and have not yet found data suggesting a connection between these constructs. Despite the lack of research within this area, the connection between constructivist types of learning environments and the need for closure construct is reasonable. An essential element of the need for closure construct is the reluctance or willingness to "grapple with information" (DeBacker & Crowson, 2009, p. 303). In the case of PBL, the experience includes many less structured tasks, and essentially an extended period of dealing with information related to the content of the problem. It makes sense then, that individuals who have a high need for closure (and thus show a reluctance to experience environments which entail nonspecific closure) may experience a disconnect between their desire to seize on a solution and the needs of a PBL environment to consider and synthesize new information to solve the problem. In addition, the findings about NFC that relate to mastery goals and leadership tactics also suggest NFC may provide information related to the outcomes of learning and engagement. I think this construct may explain part of the reason why some students tend to enjoy and even succeed more in PBL settings compared to others.

Transfer Learning

Transfer refers to the application of learning in new contexts or on new tasks. Transfer can be described as near transfer, or transferring between similar topics of contexts, or far transfer, where one transfers information learned in terms of one topic, context, or task to another (Barnett & Ceci, 2002). Deep

transfer requires active learning and deep processing, as knowledge bases which are more connected and more thoroughly understood better facilitate the application of knowledge in different contexts (Pugh & Bergin, 2006). The ability to transfer information learned in one area to use it in another area is of crucial importance when considering educational environments; if one has difficulty transferring information from school to the real world, much of the benefit of education could be lost. For this dissertation, transfer learning will refer to a measure of near transfer, or being able to apply the knowledge gained in the PBL unit to a similar, but not previously encountered scenario. This works to change the task's functional context from being evaluative to being nonevaluative. In addition, the tasks differ in their social context, as the PBL unit is done in groups and the transfer learning task is completed individually (Barnett & Ceci, 2002).

In a review of studies on motivation and transfer, Pugh and Bergin (2006) found that in general personal interest, higher levels of self-efficacy, and a number of other motivational characteristics generally considered positive were related to higher levels of transfer. In addition, the authors reviewed a number of studies that specifically linked mastery goals (personal goal orientations, task goals, and goals encouraged by the environment) to higher levels of transfer, and a few studies found performance-approach goals were negatively related with transfer (e.g. Bereby-Meyer & Kaplan, 2005). More research on motivation and transfer, particularly in the context of a PBL environment, could bring a better understanding to the interaction of these constructs.

Transformative Experience

Transformative experience refers to when students use information they have learned in school to enrich their everyday experience outside of school (Pugh, 2004). Broadly, transformative experience can be explained as a type of engagement, as students are actively constructing and connecting information across the different realms of school and everyday experiences. Pugh (2011) described transformative experience as being a combination of three characteristics: motivated use, expansion of perception, and experiential value. Motivated use refers to when students utilize or apply the information learned in school to contexts out of school, when they are not required to do so. Expansion of perception refers to when a student uses a concept learned in school to see their own life in a new way—in terms of the new information learned. Finally, experiential value refers to the valuing of the content learned for the enriching and expansive elements it contributes to the individual's life (Pugh, 2011).

Levels of an individual's transformative experience can run a spectrum; from not using any of the content learned outside of the learning environment to experiencing a change in the way one sees the world based on the learning that occurred within the learning environment. Prior research has suggested that students who engage in higher levels of transformative experience also tend to exhibit deeper, more enduring learning for the course content and thus are more likely to be able to transfer their learning to different contexts or environments (Pugh, Linnenbrink-Garcia, Koskey, Stewart, & Manzey, 2010). A measure of transformative experience in the current study may help explain why some

students succeed more than others in light of their goal orientations, within a PBL environment.

Interest

Interest theory investigates the relationship between how much interest an individual has in an area or specific task and that individual's motivation to achieve within the given area or at the specific task. Theorists have described interest as being related to intrinsic motivation, but more specific in nature (Wigfield et al., 2008). Interests can be described as individual interests, or topics in which the individual has developed an enduring interest, or as situational interests, in which an individual shows an interest for an activity or topic stemming from how the activity or topic was presented (Krapp et al., 1992). For example, a child could have an individual interest in dinosaurs if he or she is able to name many types of dinosaurs and spends hours reading and learning about dinosaurs. The same child could be very intrigued by a demonstration on how electricity works, which could be classified as a situational interest.

Further research has clarified the impact of situational interest on the development of interest and the role in which individual interest plays. Situational interest can be further broken down into "catch" and "hold" varieties (Durik & Harackiewicz, 2007). Catch is the first step to developing an enduring interest and it is related to initial stimulation, while hold describes a continued interest to which an individual gives meaning, further strengthening the interest an individual experiences. Individual experience plays a role in the effectiveness of these different types of situational interest varieties. For individuals who exhibit low

levels of individual interest in a subject, catch activities (such as demonstrations or use of technology) result in higher levels of motivation for the activity (Mitchell, 1993). People who have high individual interest in an area respond more positively to hold activities by experiencing higher levels of motivation (Durik & Harackiewicz, 2007). Essentially, the impact of situational factors on interest varied as a function of individual interest.

Connection between goal orientation and interest. A number of more recent studies have assessed the connection between goal orientation and interest. As previously reported, standard mastery goals (as compared to difficult mastery goals or performance-approach goals) which were set for students brought about higher levels of interest in a given activity (Senko & Harackiewicz, 2005). In addition, Hulleman et al. (2008) found that initial interest and mastery goals predicted future interest not only in academic settings, but also in sports settings, specifically in a high school football camp. Across domains and regardless of whether the goals were environment- or self-set, mastery goals tend to result in higher levels of interest for the material as compared to other types of goals, specifically performance goals.

One of the most encompassing studies to examine the link between interests and goal orientations was completed by Harackiewicz, Durik, Barron, Linnenbrink-Garcia, and Tauer (2008). The researchers surveyed undergraduate college students in an introductory psychology class, and they found that within the semester the students took the course, relationships existed between initial interest, achievement goals, situational interest, and class performance.

Individual interest in the subject predicted mastery goal adoption, higher levels of situational interest, and high levels of continuing interest (Harackiewicz et al., 2008). So basically, high levels of individual interest produced mastery goals which then solidified and further developed interest in the subject. The researchers also followed up on the students seven semesters after the initial data collection. Longitudinally, situational interest (independent of individual interest) predicted future course choices, with students initially high in situational interest in the introductory psychology course more likely to take additional psychology courses in the future (Harackiewicz et al., 2008).

In general, higher levels of individual and situational interest results in the creation of more mastery goals, and in addition preset mastery goals result in higher levels of interest as compared to other types of achievement goals. I included measures of both goal orientation and interest in my dissertation research in order to more fully explain the connection between the goals one sets and their levels of interest within a PBL environment.

CHAPTER III

METHODOLOGY

For the current study, I investigated the overarching question of which students benefit most from problem-based learning (PBL) environments (focusing on goal orientation and need for closure measures) and how PBL impacts the learning and engagement outcomes among a group of pre-service teachers. This dissertation research expands on my previous work in the area of goal orientation and PBL, through a mixed methods approach. I collected the data over two semesters; I collected quantitative and qualitative data during the first semester and additional quantitative data during the second semester (with the purpose of increasing the sample size for the quantitative analyses).

First, I administered the course-level goal and need for closure measures prior to the PBL unit. Second, I assessed project-level goals during the PBL unit. Third, I measured engagement through interest and transformative experience self-report measures in addition to learning outcomes after the PBL unit was complete. Finally, I interviewed select students after the project on the topics of why they adopted the goals they did for the course and the project and how they experienced the PBL unit. In this chapter, I will expand to explain my theoretical perspective and philosophy, the research design, participants, setting, instruments, and procedure with which I collected the data to answer the

research questions. In addition, I will outline the methods I used to analyze the quantitative and qualitative data, utilizing the qualitative data to help explain and more fully understand the findings that emerge from the quantitative data.

Researcher's Theoretical Perspective

An epistemology represents a belief structure regarding the nature of knowledge. Constructivism as an epistemology posits that knowledge exists because we have consciously constructed or made meaning of our experiences with the external world (Piaget, 1954). The constructivist view of reality also indicates that knowledge is not waiting to be discovered, but rather humans construct this knowledge as we explore the world and knowledge does not exist until we construct it (Gordon, 2009). In the constructivist view, the mental representations that are a result of the constructed knowledge are just as real as the physical objects in the surrounding environment (Cakir, 2008). Constructivists believe that objects do actually exist (as opposed to more radical views about complete dominance of mental representations), but we as humans construct meanings of these objects and these meanings play a large role in our understanding about, and our beliefs of, reality (Crotty, 1998). The purpose of cognition in the constructivist view would be to organize the information we have obtained through our experiences with the world; in this way, cognition is quite adaptive, flexible, and dependent on the experiences, or affordances, we have had (Cakir, 2008). Given that the process of making meaning or constructing knowledge involves reorganizing and interpreting new and past experiences, it

requires that an individual actively participate in order to gain knowledge (Gordon, 2009).

Constructivism, as commonly referred to within the realm of education and educational research, is very broadly defined in terms of the extent to which individuals believe that knowledge is constructed. Cakir (2008) points out in radical constructivism, the "knower cannot objectively test the accuracy of correspondence between human knowledge and the external world, as the process of human knowing makes objectivity impossible" (p. 196). Most constructivists, as well as most applications of constructivism to education, would not conform to this more radical stance of constructivism, but the use of the word "constructivism" could be applied to both. Because of the wide-ranging definitions of the term, I believe it is important and beneficial for researchers to state their understanding of constructivism within the reporting of research or educational/pedagogical articles, so that the author's understanding of the term would be transparent.

Personal Philosophy and Application to Research

I would label my epistemological belief as constructivist, and I think utilizing a mixed methods design for the current study will run consistent to this belief. I believe knowledge is most easily gained and most strongly remembered when we are able to connect new knowledge to preexisting knowledge, expanding our knowledge base and further adding detail to our understanding of the world. The knowledge I gain from my coursework, research experience, and teaching experiences allows me to understand educational psychology and

teaching in even more rich detail and with greater ease. When I am able to connect new concepts to past experiences or preexisting knowledge I hold, I gain a deeper understanding of the concept and I better comprehend possible applications.

In terms of teaching, I have taught undergraduate and graduate level courses in the position of a teaching assistant or an adjunct instructor over the last nine years. In my own teaching, I have not facilitated a full PBL unit such as the one described in this dissertation; however, I have utilized more truncated versions of the project, primarily due to the time-span of the course I taught. I believe that there are definite benefits to facilitating more constructivist educational environments, with the PBL techniques being one way to encourage students to connect material to real-life scenarios.

Design

I planned to utilize a mixed methods design, in order to collect both quantitative and qualitative data to explore the research questions. More specifically, I chose an explanatory design in that I collected quantitative data prior to collecting qualitative data (Creswell & Clark, 2011). Specifically, I utilized a sequential explanatory design, where I collected and utilized information from the quantitative measures to choose participants for qualitative data collection and analysis (Creswell, 2009). I chose this type of design because it afforded an opportunity to use quantitative data to purposefully select qualitative participants. In addition, I wanted to not only explore variable relationships through quantitative self-report data, but also through more open-ended interview data to

help understand the students' experience of the PBL unit. In this way I was able to more fully understand the context and experience that the PBL unit provided for the participants.

Following the method of an explanatory design, I collected quantitative pre-data in the form of self-report surveys on course-level goals and need for closure. I completed an initial analysis of these data by running descriptive statistics, frequencies, and factor analyses on the items. In addition, I also collected quantitative project-level goal data during the PBL unit, with the focus of the questions being on the project. Finally, I collected quantitative post-data through the learning assessment, a project interest measure, and a transformative experience measure. For these data, I also ran descriptive statistics, frequencies, and factor analyses.

The results of the initial quantitative data analysis of the goal orientation and need for closure items drove the purposeful selection of cases for the following qualitative data collection during semester one (Creswell & Clark, 2011). I chose individuals whose quantitative data suggested they experienced particularly high or low motivation or need for closure profiles. For example, I selected at least one participant to interview who held a high need for closure, as well as one participant who held a low need for closure. I also thought it would be informative to interview at least one student from each of the groups formed for the PBL unit during that semester.

After the qualitative participants were selected (twenty-four students), I conducted individual interviews with the fifteen participants who consented to the

interview. I recorded and transcribed each interview. During the interviews, I asked questions about their experiences with the PBL unit and about the individuals' goals (particularly what kinds of goals they set for the project and if these goals differed from goals they typically set). I then analyzed the qualitative data by coding and reading for emerging themes.

Participants

The target population for the current study was college students enrolled in a course that utilizes a PBL method of instruction. The participants were pre-service elementary and secondary education teachers enrolled in seven sections of a required educational psychology course for education majors. During semester one, two sections of the course were utilized for the research and were taught by the same instructor. During semester two, five sections of the courses were utilized, with three instructors teaching the courses. See Table 1 for numbers of participants in each section and for information on the sections. I recruited participants by visiting the courses and explaining the study prior to passing out the informed consent sheets and the initial questionnaires. Concurrent with prior research of this type (Russell & Pugh, 2010), close to 90% of students across all sections consented to participate in the study.

Participants for the current study included 162 preservice elementary and secondary education teachers enrolled in one of seven sections of two comparable courses: Educational Psychology for Elementary Teachers (n=93) and Educational Psychology for Secondary Teachers (n=69). The average age of all participants in the study was 21.0 years old (standard deviation = 3.67,

ranging from 18 to 52 years old). The sample included 21.7% (n=35) males and 78.3% (n=126) females. In terms of classification, 1.2% (n=2) were Freshmen, 24.8% (n=40) were Sophomores, 54.0% (n=87) were Juniors, and 19.9% (n=32) were Seniors. In response to a question on ethnicity, 81.5% (n=132) replied White, 6.2% (n=10) replied Latino/a, 2.5% (n=4) replied Asian/Pacific Islander, 1.2% (n=2) replied Black, 0.6% (n=1) replied Native American, and 6.2% (n=10) replied Mixed Ethnicities.

Table 1

Participants by Section

Section	Participants
1: Ed Psych for Secondary Teachers Fall 2012, Instructor 1	19
2: Ed Psych for Secondary Teachers Fall 2012, Instructor 1	25
3: Ed Psych for Elementary Teachers Spring 2013, Instructor 1	30
4: Ed Psych for Elementary Teachers Spring 2013, Instructor 1	27
5: Ed Psych for Elementary Teachers Spring 2013, Instructor 2	22
6: Ed Psych for Elementary Teachers Spring 2013, Instructor 2	14
7: Ed Psych for Secondary Teachers Spring 2013, Instructor 3	25
Total	162

Setting

As was discussed in Chapter II, one factor that can influence a student's motivation is the context in which the student is learning. For the current study, the context in general was an Educational Psychology for Elementary or Secondary Teachers course at a mid-sized public university in a small city in the Rocky Mountain region of the United States, with the specific context being a problem-based learning unit on the topic of motivation completed with the students in instructor-assigned four to five student groups.

Instructors. Participants in this study were students in one of three instructors' sections of Educational Psychology for Elementary or Secondary Teachers (see Table 1). The first instructor developed and has used the same PBL project for roughly ten years prior to the study. The second instructor has also used the same PBL project for at least a year prior to the study. Both the first and second instructors are full time faculty members, and both are active in researching issues related to motivation. The third instructor was a teaching assistant, and he had not previously facilitated the PBL study; however, he was mentored by the first instructor throughout the unit and carried out the project in the same manner as the first two instructors.

Problem-based learning unit description. The instructors of the courses utilized a four- to five-week PBL project to cover the broad topic of motivation. The focus of the project was to identify, analyze, and address the maladaptive motivation patterns displayed by Calvin from the *Calvin and Hobbes*$_{tm}$ comics. Students were assigned by the instructors to a four to five student group, and were given a motivation theory to utilize throughout the project (either achievement goal theory, self-determination theory, interest theory, attribution theory, or self-regulation theory), with each group focusing on a different perspective. Students were provided with an online database of motivation articles on the theories covered and an online archive of relevant *Calvin and Hobbes*$_{tm}$ comics. The comics chosen to be in the online archive included episodes in which Calvin was dealing with an educational environment in some way (i.e. tests, projects, subjects in school).

Each group then created a wiki (a webpage with information answering the key questions on the website Wikispaces$_{tm}$) which presented information on their motivation perspective and analyzing Calvin's motivational patterns (see Appendix B for instructions given to students). Students first identified motivation patterns in relation to the perspective of the group, discussed the consequences of these patterns on learning and achievement, described factors that may have led to these profiles, and presented instructional strategies that could foster more productive motivation patterns. Next, students related the information above specifically to Calvin, by identifying Calvin's motivation patterns, explaining why Calvin may have developed these patterns, and proposing specific strategies for addressing Calvin's maladaptive motivation. For example, students might indicate that Calvin occasionally demonstrates performance-avoidance goal orientation and then comment on how Calvin could be encouraged to set more mastery goals. Each group completed peer-reviews of two other groups' wiki page utilizing a template provided by the instructors. Each group then gave a ten-minute presentation over their specific motivation perspective and their analysis of Calvin.

After the presentations, students participated in a jigsaw-format activity with new groups formed from one student from each of the motivation theory groups. In these new groups, students worked together to include information from all motivation theories with the purpose of developing a comprehensive plan for how to address Calvin's maladaptive motivation patterns. Each student in the group was responsible for one area of education (e.g., instruction, assessment)

and asked to describe strategies to foster productive motivation patterns in the context of their educational area. All group members provided suggestions stemming from their “expertise” with one of the motivational perspectives. This information was compiled in the form of a letter to Calvin’s teacher, Mrs. Wormwood.

Over the duration of the project, the instructors often scaffolded student activity by assisting groups in assigning responsibilities, discussing issues related to the motivation perspectives with the groups, and providing feedback and technical support to the groups. The instructors evaluated the wiki pages by utilizing a rubric, which was presented to students at the beginning of the PBL project. Students were asked to provide a list of individual responsibilities and contributions of group members. In the case of discrepancies in the quantity or quality of individual contributions, individual scores for the wiki varied across group members. Presentation scores were based on an average between the instructor’s rating and other students’ ratings. The comprehensive plan (in the format of a letter to Calvin’s teacher) was evaluated by the instructors, with individual scores possibly varying based on student contributions.

Instrumentation

As this is a mixed methods study, both quantitative and qualitative data were collected to help answer the research questions. Quantitative data included self-report measures of goal orientation (course-level and project-level), need for closure, transformative experience, project interest, and the learning assessment (assessing recognition learning and transfer). Qualitative data included interviews

with fifteen students upon the completion of the PBL unit. Each instrument will be described in detail below, divided into predictor, outcome, and control variables.

Predictor variables. I assessed the variables of goal orientation and need for closure as possible predictors of learning and engagement. Goals were measured at two times throughout the analysis: within the first two weeks of the semester as a measure of course-level goals and two full class periods into the project as a measure of project-level goals.

Goal orientation items. I measured students' goal orientations at both a course and project level. The course-level measure was given prior to the PBL unit and the project-level measure was given during the second day of the PBL unit. Grant and Dweck (2003) developed and tested items which essentially divided the traditional constructs of performance-approach and mastery goals into four different, more specific, categories: outcome goals, ability goals, normative goals (further divided into normative outcome and normative ability goals), and learning goals (further divided into learning goals and challenge-mastery goals).

The most popular measures of performance goals, from the PALS (Midgley et al., 2000) and the Achievement Goal Questionnaire (AGQ, Elliot & McGregor, 2001), have focused primarily on normative goals. Senko et al. (2011) divided the types of normative goals down further, arguing the PALS focused on "appearance" goals (called normative ability goals in the Grant and Dweck scale), while the AGQ focused on actual normative goals (called normative outcome goals in the Grant and Dweck scale). Results of studies seem to differ dependent

on the version of performance-approach goals used (Hulleman, Schrager, Bodman, & Harackiewicz, 2010), thus it is important to investigate outcomes related to all the different conceptions of both mastery and performance goals.

I adapted goal items Grant and Dweck (2003) developed. In addition, I supplemented their items with a few items from the PALS (Midgley et al., 2000), particularly in terms of wording avoidance items. Thirty-two items measured both the course-level and project-level goal orientations, with three items for outcome goals (e.g., “It is very important to me to do well in my courses.”), three items for ability goals (e.g., “It is important to me to confirm my intelligence through my schoolwork.”), three for normative outcome (e.g., “I try to do better in my classes than other students.”) and three for normative ability (e.g., “One of my goals for this course is to look smart in comparison to the other students in my class.”). In addition, there were also avoidance items for each of the above categories: three for outcome avoid (e.g., “I really want to avoid getting a bad grade in this course.”), three for ability avoid (e.g., “It is important for me to avoid disconfirming my intelligence in this course.”), three for normative outcome avoid (e.g., “A major goal I have for this course is to avoid getting a lower grade than other students.”), and three for normative ability avoid (e.g., “One of my goals for this course is to keep others from thinking I’m not smart.”). Finally, there were eight items for mastery goals divided into subcategories: five for learning (e.g., “It’s important to me that I learn a lot of new concepts during this course.”) and three for challenge-mastery (e.g., “I seek out courses that I will find challenging.” See Appendix C for course-level items).

For the course-level goal orientation measure distributed prior to the PBL unit, I utilized the items described above as they were written, with the object being to measure the student's overall goal orientation at a course level. Because I intended to compare the goals students reported at a course level to the goals they reported for the PBL project, I altered the wording of the items to refer to the project when giving the scale during the PBL project (see Appendix D for project-level items). For example, the item "It is very important to me to do well in my courses compared to others" was changed to state "It is very important to me to do well on the motivation project compared to others." These changes resulted in the scale given during the PBL unit to represent more task-specific goal orientations and the scale given at the beginning of the semester to represent a more course-level measure of goal orientation.

Need for closure. Need for closure is a construct that aims to assess an individual's need to have a solid answer to a problem. I administered the revised 15-item Need for Closure measure (Roets & Van Hiel, 2011; originally from Webster & Kruglanski, 1994). The measure was designed to be unidimensional and it has five subscales, each composed of three items in the following categories: order (e.g., "I enjoy having a clear and structured mode of life."), predictability (e.g., "I don't like to go into a situation without knowing what I can expect from it."), decisiveness (e.g., "When I have made a decision, I feel relieved."), ambiguity (e.g., "I don't like situations that are uncertain."), and close-mindedness (e.g., "I do not usually consult many different opinions before

forming my own view."). The scale was measured on a five-point Likert scale, with 1 being strongly disagree and 5 being strongly agree (See Appendix E).

Outcome variables. I assessed the general outcomes of engagement and learning at the end of the problem-based learning unit. For engagement, I measured transformative experience and project interest. I measured learning through a learning assessment, designed to assess both recognition learning and transfer.

Transformative experience. Transformative experience is when students relate information they have learned in school to their everyday experience outside of school (Pugh, 2011). I measured transformative experience (TE) after the completion of the PBL unit with the TE measure adapted from Pugh et al. (2010; see Appendix F). The scale consisted of 23 items rated on a Likert scale where 1 is strongly disagree and 4 is strongly agree. The items have been adapted to refer specifically to the motivation project (e.g. "I found it exciting to think about the motivation ideas we learned in class even when I was not in class."). The scale utilizes Rasch analysis to produce a Rasch logit score, which will be utilized in subsequent analysis.

Project interest. An additional variable I used to explore engagement was a measure of situational interest focused on the task at-hand. I utilized the same measure used in the Phillips, Pugh, Machlev, and Bergstrom (2012) study, which assessed interest in the PBL unit (see Appendix G). The scale contains 14 items (e.g., "What we learned from this project is fascinating to me.") and is measured on a Likert scale where 1 is strongly disagree and 6 is strongly agree.

Learning assessment. The learning assessment aimed to measure both recognition learning of content through 10 multiple-choice items adapted from Ormrod's testbank (2008) and transfer through two open-response items adapted from vignettes from Stipek (2002). The assessment was in paper and pencil format, and all students in the educational psychology course took it one week after the completion of the PBL unit, regardless of whether or not they chose to participate in the study (see Appendix H). The instructors required all students to complete the assessment, but it did not count towards a grade and it was unannounced to the class (to ensure the best measure of recognition learning and transfer, instead of measuring preparation for the test). The multiple-choice items aim to assess recognition learning and understanding of the motivational theories by presenting simplified application situations. Correct answers to these items were given one point for each item.

For the open-response items, students were asked to analyze two motivation profiles adapted from Stipek (2002). Each vignette described a student in an educational setting who depicted multiple maladaptive motivational patterns. One focused on a student who depicted performance-avoidance goals, self-handicapping, low ability beliefs, and learned helplessness. The second vignette depicted a student who was very extrinsically motivated (with no intrinsic motivation), performance-approach goal oriented (and a lack of mastery goal orientation), high self-regulation, and lack of interest (see Appendix H for exact wording of items). Performance on these items represents students' ability to apply or transfer the motivational theories to authentic, real-world situations.

Responses to these items were independently coded by two individuals. I was one of the coders, and I trained the second coder with a scoring rubric (see Appendix I). The coding scheme was created in order to assess the number of theories students mentioned in their responses, in addition to accounting for the accuracy and depth of the information connected to each theory. For each open-ended question, students could receive up to three points per theory for accurately applying a motivational theory to the profile. Students received no points if they did not mention the theory, one point if they referenced the theory, but did so incorrectly or if it was not clear whether they were referencing the theory or not, two points if they accurately labeled the theory or components, three points if they mentioned the theory or components, accurately labeled the behavior, and provided some accurate explanation or elaboration, and four points if the response went above and beyond simply explaining, including multiple examples to illustrate. For example, if a student responded, “Sally shows lack of personal interest, which decreases her motivation,” that response would be coded as a two, as the response correctly identifies a component of interest theory, but it does not expand or elaborate on the matter.

Five theories, corresponding to the perspectives covered in the PBL unit, were possibilities to utilize when analyzing the motivation of the individuals in the profiles. For this open-ended portion of the learning assessment, students could score up to 15 points on each item (a max of three points for each of the five theories). However, each profile related to some motivational theories more than others and students were not expected to apply every theory to each profile.

The two raters (a trained undergraduate research assistant and myself) scored each open-response item independently. Inter-rater reliability, as determined by the correlation between rater scores, was r=.852 for item one, and r=.873 for item two. The two raters then went through each score, addressing discrepancies in scoring, and reached an agreement on a final score for each participant's items. We reached agreement by rereading the response and discussing which coding category we felt best fit the response. The agreed upon scores were utilized for subsequent analyses.

Control variables. In order to help control for and explain individual differences, control variables of student's GPA for the semester just prior to participation and demographic data were collected. The students were informed that if they participated in the study, I would look up and record their GPA from the semester prior to participation on the university's records site. The self-report demographic data included year in school, concentration, sex, age, ethnicity, and whether they were currently observing a K-12 classroom.

Interviews. In addition to collecting the quantitative data, I also collected qualitative data through the purposeful sampling of students (based on their levels of goal orientation and need for closure) who I interviewed after the PBL unit was completed. As is common in the explanatory mixed methods design (Creswell & Clark, 2011), I utilized the initial analysis from the quantitative data to select students who exhibited particularly high or low levels of normative goals, outcome goals, ability goals, mastery goals, and need for closure. My goal was to interview eight to ten students, and I ended up interviewing fifteen.

I conducted one-on-one, semi-structured interviews with fifteen secondary education students about their experience with the PBL project. The semi-structured interview is a desirable format that allows issues and topics to be explored at appropriate levels (Merriam, 1998). I asked students a number of questions about the PBL unit, the group dynamics during the project, and what goals they held for the PBL unit (see Appendix J for interview questions). I also asked students if the goals they set for the PBL unit were similar to goals they typically set. The interview questions were developed by me and pilot tested on an undergraduate student not involved in the study. As a result of the pilot testing, some questions were reworded and refined in order to increase clarity (Creswell, 2007). Interviews were digitally recorded and I transcribed each of the interviews. Interviews lasted between eight and twenty-two minutes and once I had asked all of the predetermined questions, I asked the individual if he or she had any additional comments, thoughts, or insights related to the PBL unit.

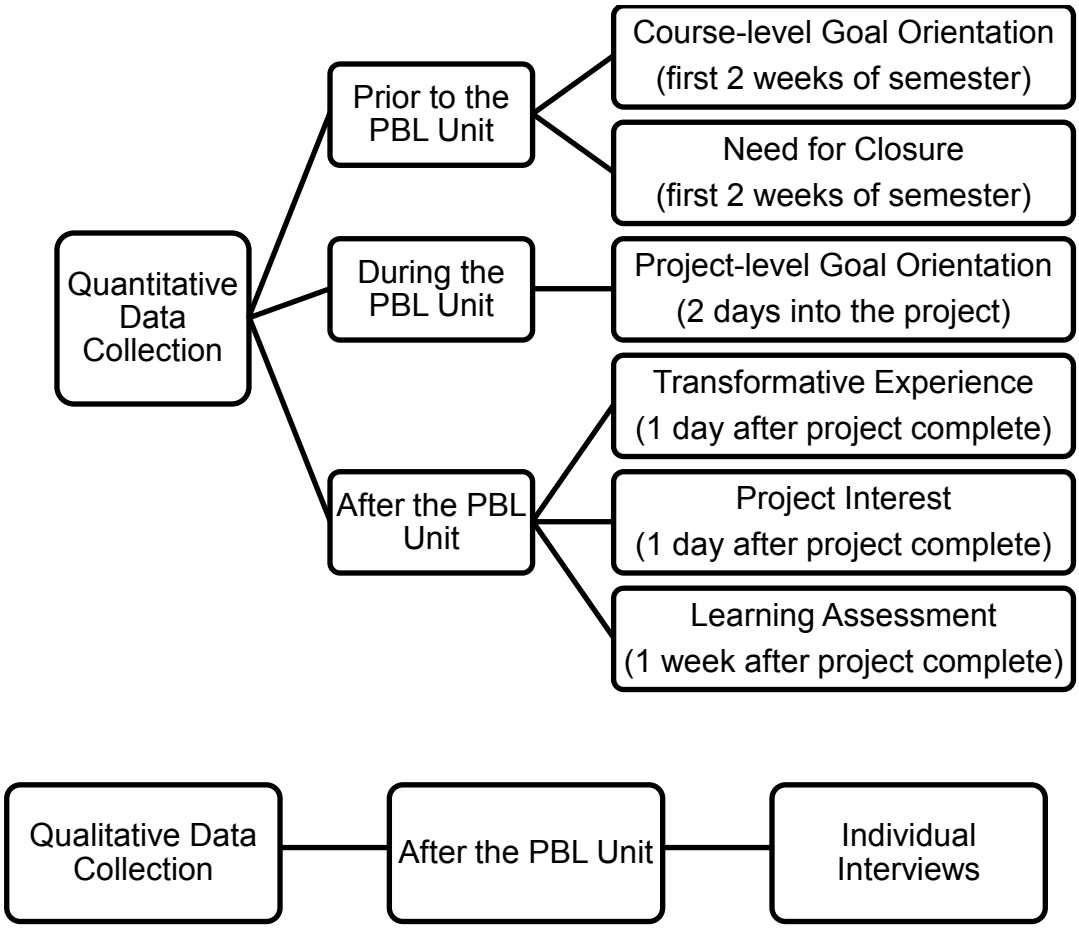
Procedures

Prior to conducting any research, I submitted an application to the university's Institutional Review Board (IRB). A copy of the IRB email confirmation I received is located in Appendix K. I administered the goal orientation and need for closure surveys within the first two weeks of the semester. During the unit, I administered the project goal items after the second full class day of the project, with the items modified to refer to students' goals for the PBL project. After the PBL unit was over, participants took a measure of transformative experience and a measure of project interest. One week after the

completion of the project, the instructors administered the learning assessment that focused on content from the PBL unit. I will detail the data collection below, and it is visually depicted in Figure 1.

Figure 1

Visual Depiction of Data Collection



As one of my purposes was to better understand the experience of being a student in a PBL environment, I observed and took written field notes during my observations of each class session throughout the PBL unit in one section of the Educational Psychology for Secondary Teachers during the first semester of data collection. The purpose of this information was to better understand the setting of the PBL unit, not to use as data to draw conclusions (Wolcott, 2005). I visited the class each class period (75 minutes twice a week) for the duration of the PBL unit, and I took field notes on the general class atmosphere and what type of learning environment the PBL setting encouraged. These observations gave me a context for understanding the nature of the PBL project and students' comments regarding participation in the project.

Data collection. Within the first week of the semester, I visited each instructor's courses to inform the students about the study. I passed out informed consent sheets, and the students who chose to participate completed an initial questionnaire packet composed of the course-level goal, the need for closure items, and demographic questions, including age, year in school, concentration, ethnicity, and whether they were currently observing in a K-12 classroom. Students did not use their names on the surveys, but rather they created a code, and subsequent questionnaires were labeled with the participant's code. Data were not anonymous, but efforts were made to keep the data confidential; I collected all the data myself, thus the instructors of the courses never saw the raw data or knew which students participated.

After the second full day of the PBL unit, I administered the project-level goal items. The items were given to students at this time so they would have had the opportunity to experience the project for a few days. This allowed students to have a good understanding of the project and what it entailed prior to answering questions on the goals they held for the project. In addition, I observed and took field notes during all the class periods during semester 1 to describe the environment of the class and the implementation of the PBL unit.

Upon conclusion of the unit (during the following class period), students completed the follow-up questionnaire, which included the transformative experience measure and the project interest measure. One week after completion of the unit, students took the learning assessment covering the motivation theories learned in class. Students were not given prior notification of the assessment so performance would represent learning resulting from engagement with the content rather than studying for a test. The assessment was not used for grading purposes; however, the length of responses and general high level of performance in both conditions on the assessment in past utilizations (Russell & Pugh, 2010) indicates students took the assessment seriously.

Data Analysis

For the present study, I was most interested in investigating how students experienced the PBL unit and how individual differences in project-level goal orientation, course-level goal orientation, and need for closure predicted one's learning and engagement in a PBL setting. Given the explanatory mixed

methods design (Creswell, 2009), I performed basic quantitative analysis on part of the quantitative data (course-level goal orientation items and NFC) prior to participant selection for the qualitative data collection. I then collected more quantitative data (project-level goal orientation items, transformative experience, project interest, and learning assessment), conducted the qualitative interviews, and then analyzed all quantitative and qualitative data.

Quantitative data analysis. I analyzed the quantitative data through factor analyses, investigation of correlations, and regression analyses. Prior to running the analyses to address the research questions, I first assessed the reliability and validity of the course-level and project-level goal measures. I checked the reliability by producing and examining reliability statistics of internal consistency for the data. I assessed validity (and worked to answer my first research question) by performing an exploratory factor analysis, as well as a confirmatory factor analysis on the course-level and project-level goal orientation scales (to answer the first research question), need for closure, interest, and transformative experience scores. The transformative experience scale was analyzed through Rasch analysis (Pugh et al., 2010). Additionally, I checked to see that the statistical assumptions for stepwise linear regression were met, including homoscedasticity, linearity, normality of residuals, absence of measurement error, and inclusion of all important variables.

A variety of data analysis techniques drove the most direct answers to my research questions. To answer the first research question, I performed exploratory and confirmatory factor analyses on the course-level and project-

level goal orientation data. To answer the second research question, I compared the factor structures, correlations, and alphas for course-level and project-level goal orientation categories. To answer the third research question, I ran regression analyses to assess the predictive value of course-level goals and need for closure on both learning and engagement variables. To answer the fourth research question, I ran regression analyses to assess the predictive value of project-level goals on both learning and engagement variables.

Qualitative data analysis. The qualitative interview data were analyzed by using both cross-participant and within-participant analysis of themes to more fully understand the experience of the students in a PBL environment (Creswell, 2007). I transcribed the interviews and critically analyzed them, searching for themes to emerge from the data. I used content analysis to investigate student answers as to how they experienced the PBL unit, why they chose the goals they did, if and how their goals changed across the project, and the impact of group dynamics on their experience of the unit. After analyzing the quantitative and qualitative data separately, I related the findings of one method to the other. The quantitative and qualitative sets of data were meant to provide different types of information in order to provide a more thorough understanding of the experience and outcomes of a PBL unit. In this way, I was able to draw and support some conclusions about which students tended to succeed and be engaged in the PBL unit.

CHAPTER IV

RESULTS

In this chapter, I will detail the results of the quantitative analysis, and then describe the qualitative findings. I will begin by describing in detail the results of the quantitative analyses, including the factor analyses, descriptive statistics, and regression analyses. I will then describe the findings from the qualitative investigations into the PBL unit.

Quantitative Results

For the quantitative portion of the data, my main aims were to identify the factor structure of both the goal orientation and project goal scales and to assess the relationship between students' course-level goals, project-level goals, and need for closure on their engagement and learning. Prior to running any statistics, I wanted to make sure that the data between the three instructors and across the two types of courses were similar enough I could combine them for the following analyses. I completed eleven ANOVAs on the instructor variable, each measuring a different dependent variable: course-level mastery goals, course-level outcome goals, course-level validation goals, need for closure, project-level mastery goals, project-level outcome goals, project-level validation goals, transformative experience, project interest, recognition learning (multiple choice) score, and transfer (open-ended) score. Of all of these analyses, only the

ANOVA assessing project interest was significant (F (2, 153) = 5.613, p=.004). For project interest, instructor 1's courses (n=93) had an average score of 4.63, instructor 2's courses (n=33) had an average score of 4.95, and instructor 3's courses (n=24) had an average score of 4.24 out of 6 points. A post hoc comparison between instructors using Scheffe's test revealed no significant difference between instructor 1's courses and instructor 2's courses (p=.171), but the difference between instructor 1's courses and instructor 3's courses approached significance (p=.082), and there was a significant difference between instructor 2's courses and instructor 3's courses (p=.004). Overall, the instructors appear comparable in terms of the variables utilized in the study. However, it is possible that the second instructor used techniques to make the project more interesting. Possible implications of this difference on the results will be addressed in the discussion.

In addition, I completed *t*-tests on the same variables between the participants enrolled in the Educational Psychology for Elementary Teachers and the Educational Psychology for Secondary Teachers sections. None of the *t*-tests was significant, suggesting there was not much difference between the two courses on the variables. In light of these results, I combined the dataset and continued on to the analysis.

Factor Analyses Results

Within the current literature on goal orientation there has been disagreement on the vital components of the traditional groups of goals, particularly within the performance-approach goal category. Authors such as

Brophy (2005) and Grant and Dweck (2003) have suggested assessing goals at a finer level of analysis or including alternate distinctions of the traditional conceptions of goal orientation. One of the primary purposes of this study was to investigate the factor structure of a diverse set of goal items in order to determine which constructs separate and which factor together (research question one).

The goal orientation scale (for both course-level and project-level) measured ten types of goals: mastery-challenge, learning, outcome, outcome avoid, ability, ability avoid, normative outcome, normative outcome avoid, normative ability, and normative ability avoid. The purpose of having ten types of goals was to determine how students respond to goals of a specific nature (i.e., ability versus normative ability). I did not anticipate utilizing all ten types of goals in subsequent analyses, but rather I aimed to create groups of goal orientations that worked similarly with the aim to use these created groups in subsequent analyses. In addition, the process of combining goals that worked in similar ways statistically will help increase the validity of the goal measure—essentially helping me determine which goal items were working well and collapsing categories of goals which worked similarly (research question one).

In addition, another purpose of this study was to assess whether students' course-level goal orientation differs from their project-level goal orientation (research question two). Accordingly, I analyzed course- and project-level goal orientation scales separately to see if they yielded similar or different factor structures.

Exploratory factor analysis on course-level goal orientation. The method I chose to use in the identification and creation of groups of goals was initially exploratory factor analysis, with subsequent verification of the groups through confirmatory factor analysis. Exploratory factor analysis (EFA) was used initially, as a way to assess what factors the goal orientation items form. For each set of factor analyses, I ran both the course-level goal orientation data (prior to the unit) and the project-level goal orientation data (during the unit). I completed the exploratory factor analysis on IBM SPSS version 20, utilizing the principal component analysis extraction method and a Varimax rotation with Kaiser Normalization (as it was likely the goal orientation factors would be related). I then investigated the factors that formed by using eigenvalues over 1 and examination of the scree plot.

For the first EFA I ran on the course-level goal orientation items, six factors were extracted. The first factor was a combination of normative outcome, normative ability, normative outcome avoid, and normative ability avoid items. The second factor also contained normative outcome, normative ability, normative outcome avoid, and normative ability avoid items, in addition to all three of the ability goal items. The third factor contained outcome and outcome avoid items. The fourth factor contained all the learning goal items. The fifth factor contained all the ability avoid items, and it also contained one outcome avoid and one normative ability avoid item. Finally, the sixth factor contained all of the challenge-mastery items. Overall, the data were factoring more by the specific content of the goal category than into distinct approach and avoid scales.

In fact, the first three factors contain both the approach and avoid versions of the same goal categories. Overall, the factors were hard to make sense of, particularly in the case of the first two factors as there was no pattern to how the normative outcome, normative ability, and ability goals were divided between them.

Next, I decided that it might be informative to see if the items would form better factors if I removed the challenge-mastery and learning items. I chose to remove these items, as each had formed its own factor, including only the items within that subscale. When I ran the EFA without the mastery items, the data formed four factors: the first factor contained normative outcome, normative ability, normative outcome avoid and normative ability avoid items; the second factor contained normative outcome, normative ability, normative outcome avoid, normative ability avoid, and all ability items; the third factor contained all outcome and outcome avoid items; the fourth factor contained all ability avoid items and one normative ability avoid item. I was still concerned with how the normative items in particular were functioning within the factor structure. In an attempt to try to clarify things, I ran an EFA with the same data (all items, not mastery), except this time I forced the data to form two factors. When I did this, factor one contained all normative and ability items (approach and avoid), and the second factor contained all outcome and outcome avoid items. When I received these results, it was fairly clear to me that I was not going to get the approach and avoid goals to form their own factors; while the approach goals were generally grouping together, the avoid goals were not at all consistent. A subsequent

confirmatory factor analysis on all items also confirmed that the fit was not good when forcing the items to divide into approach and avoid categories. At this point, I decided to focus only on the approach versions of the items. The avoid items across the normative and ability goal categories were worded in ways which were not easy to comprehend (e.g., “It is important for me to avoid disconfirming my intelligence through this project.”), and this may have played a role in students’ lack of consistency in answering avoid versions of these types of goals.

This decision to drop all avoid items was noteworthy for a few reasons. First, in the history of goal theory, much emphasis has been placed on the premise that approach and avoid goals are distinct (e.g., Elliot & McGregor, 2001). The data for this study suggests that the approach and avoid divide is not one of the central features in the factoring of the goal items. Additionally, most of the current debate in goal theory revolves around the value of performance-approach goals and investigating what these goals predict (e.g. Midgley et al., 2001; Harackiewicz, Barron, Tauer et al., 2002; Kaplan & Middleton, 2002; Senko et al., 2011). Thus, focusing only on approach goals not only makes sense in light of the factor analysis results, but also will still help address one of the central issues of debate in the goal theory literature (i.e., the value of performance-approach goals).

After deciding to remove the avoid items from further analysis, I wanted to determine how to group the remaining categories of goals (challenge-mastery, learning, ability, normative ability, outcome, and normative outcome) to use in regression analyses. In the EFA, four factors were extracted (had eigenvalues

over 1): the first factor contained all normative ability, normative outcome, and ability items, the second factor contained all learning goal items, the third factor contained all outcome items, and the fourth factor contained all challenge-mastery items. I was satisfied with the roughly simple structure produced (see Table 2; the items that double loaded did so between the challenge-mastery and learning categories), so I chose to move on to the project-level goal items.

Table 2

Rotated Component Matrix from Course-Level Goal EFA

	Factor			
	Normative/ Ability	Learning	Outcome	Challenge-Mastery
CL26NA	**.865**	-.031	-.095	-.057
CL16NA	**.855**	-.004	.090	.012
CL22NO	**.846**	.026	.036	-.005
CL28NO	**.796**	-.039	.073	-.018
CL20A	**.689**	**.400**	.151	-.094
CL30A	**.677**	.188	.236	.023
CL5NA	**.664**	-.144	.349	.124
CL9A	**.640**	.025	.320	.144
CL7NO	**.631**	-.155	.342	.210
CL25L	-.049	**.809**	.119	.196
CL21L	.055	**.701**	.195	.104
CL14L	-.047	**.671**	.037	.184
CL3L	.097	**.645**	.138	.116
CL10L	-.046	**.617**	.031	.386
CL11O	.236	.184	**.849**	.026
CL18O	.124	.115	**.831**	-.012
CL32O	.278	.336	**.715**	.084
CL1CM	.048	.240	.020	**.857**
CL12CM	.088	**.400**	.068	**.786**
CL23CM	.005	**.525**	.032	**.648**

Note: PL = Course-Level Goal Item, number indicates item number in measure, NA = normative ability, NO = normative outcome, A = ability, L = learning, CM = challenge-mastery, O = outcome.

Exploratory factor analysis on project-level goal orientation items. I performed the same general set of factor analyses on the project-level goal orientation items that I did on the course-level goal orientation items. When I ran the first exploratory factor analysis on all the items, the data returned five factors. For the project goal items, factor one contained normative ability, normative outcome, normative ability avoid, normative outcome avoid, ability, and ability avoid items. The second factor contained all learning and challenge-mastery items. The third factor contained all outcome items and two outcome avoid items. The fourth factor contained one ability avoid item, and the fifth factor contained one outcome avoid item.

I then ran the items without the mastery (learning and challenge-mastery) items. When I forced the items to conform to a two factor solution, I found the same factor structure as I did with the course-level goal items: the first factor contained all normative ability, normative outcome, ability, normative ability avoid, normative outcome avoid, and ability avoid items. The second factor contained all outcome and outcome avoid items. This finding clearly confirmed that both the course-level goal orientation and the project-level goal orientation scales were not forming factors based on the approach/avoid differentiation. The exploratory factor analyses I performed on both the course-level and project-level goal data supported my decision to continue the analyses without the avoid items.

After deciding not to include the avoidance items in subsequent analyses, I ran an EFA with the new set of items (challenge-mastery, learning, outcome,

normative outcome, ability and normative ability) corresponding with the above mentioned categories. The result was three factors extracted (had eigenvalues over 1; see Table 3): the first factor contained all normative ability, normative outcome, and ability items, the second factor contained all learning and challenge-mastery items, and the third factor contained all outcome items.

Table 3

Rotated Component Matrix from Project-Level Goal Items EFA

	Factor		
	Normative/ Ability	Mastery	Outcome
PL26NA	**.864**	.010	.053
PL22NO	**.858**	-.056	.047
PL16NA	**.820**	.114	.040
PL30A	**.815**	.106	.164
PL28NO	**.785**	.065	.001
PL20A	**.780**	.156	.215
PL9A	**.777**	.148	.200
PL5NA	**.764**	.165	.254
PL7NO	**.759**	-.089	.211
PL10L	.038	**.856**	.108
PL14L	.001	**.843**	.087
PL23CM	.196	**.839**	-.028
PL25L	.119	**.830**	.051
PL12CM	.137	**.802**	-.017
PL1CM	.016	**.795**	.016
PL3L	-.001	**.751**	.146
PL21L	.024	**.700**	.318
PL18O	.105	.138	**.869**
PL11O	.289	.043	**.831**
PL32O	.299	.195	**.779**

Note: PL = Project-Level Goal Item, number indicates item number in measure, NA = normative ability, NO = normative outcome, A = ability, L = learning, CM = challenge-mastery, O = outcome.

EFA summary. The EFAs for course- and project-level items produced slightly different results, as the course-level goal items resulted in four factors, and the project-level goal items resulted in three factors. The difference between the factor structures was that, while the course-level goal items formed separate factors for the challenge-mastery and learning items, these subscales formed one factor in the project-level goal items. However, there was crossloading between the learning and challenge-mastery factors for the course-level items and these two factors were strongly correlated (.663). These results suggest course- and project-level goal orientation variables share a common three-factor structure so I sought to confirm this with confirmatory factor analysis.

Confirmatory factor analysis results. I ran a confirmatory factor analysis (CFA) on both course-level and project-level goal orientation scales, aiming to confirm the three-factor model for the data. Using Lisrel verison 9.1, I entered the model with three factors: (1) mastery (challenge-mastery and learning), (2) outcome, and (3) validation (Brophy, 2005; ability, normative ability, and normative outcome). I chose to use Brophy's (2005) classification term, as these goal orientations involve a need to validate one's ability/competence to one's self or to others, encompassing ability and normative goals. For the course-level goal data, the Satorra-Bentler Scaled Chi-squared value was 385.59 (P=.000), normative fit index (NFI) = 0.918, non-normed fit index (NNFI/TLI) = 0.945, comparative fit index (CFI) = 0.951, and the standardized root mean square residual (SRMR) = 0.0985. For the project-level goal data, the Satorra-Bentler Scaled Chi-squared value was 387.50 (P=.000), normative fit index (NFI) =

0.938, non-normed fit index (NNFI/TLI) = 0.958, comparative fit index (CFI) = 0.963, and the standardized root mean square residual (SRMR) = 0.0816. According to an article by Schreiber, Stage, King, Nora, and Barlow (2006), these numbers would indicate the data comes close to fitting the model, with some values on the border of acceptable. For example, the fit indices (NFI and CFI) should be higher than 0.95, but the NFI in the course-level goal data was 0.918. However, other measures, such as the CFI in both the course-level and project-level goal data, falls into the acceptable range. Overall, the fit statistics suggest that while the three-factor model does not fit the course-level and project-level goal items in the same way, they both fit well enough to suggest the same goal structure. The difference in how the course-level and project-level items fit the same model suggests each is a unique construct, helping answer research question one.

Goal orientation category decisions. For a number of reasons, I chose to utilize three factors to group the course-level and project-level goal orientation items for subsequent analyses. First, the exploratory factor analyses suggested at least a three or four factor solution for the data based on scree plots and eigenvalues. Since I want to use the same categories in both the course-level and project-level goal orientation scales, it made the most sense to collapse the items down into three factors, as compared to breaking one scale down into more categories than the EFA suggested. Second, as stated in the section above, the correlations for the two categories of mastery goals (challenge-mastery and learning) were high in both the course-level goal orientation (r=.663)

and project-level goal orientation (r=.844) items, suggesting they are measuring similar constructs.

Finally, the Cronbach's alpha reliability levels (see Table 4) suggest stronger reliability for the combined scale (mastery α for course-level goal = 0.855; mastery α for project-level goal = 0.923) than it was for either of the subcategories (challenge-mastery α for course-level goal = 0.838, challenge-mastery α for project-level goal = 0.869; learning α for course-level goal = 0.793, learning α for project-level goal = 0.895). For all these reasons, I chose to complete subsequent analyses with the three categories of goal items (mastery, outcome, validation).

Table 4

Reliability Coefficients (α) for Scales and Subscales

Scale	α
Course-Level Mastery	0.855
Course-Level Outcome	0.827
Course-Level Validation	0.897
Need for Closure	0.879
Project-Level Mastery	0.923
Project-Level Outcome	0.841
Project-Level Validation	0.938
Project Interest	0.908

Reliability. A common method to initially assess if the data are appropriate to use in subsequent analysis is through measuring reliability. Reliability measures assess how likely it would be for the same population to produce the same results when utilizing the same scale. Reliability can be assessed through running analyses assessing Cronbach's alpha. According to Cortina (1993), alpha values over 0.8 are considered good, alpha values over 0.7

may be considered acceptable, and alpha values below 0.7 are considered questionable. The alpha results for scales to be used for subsequent analyses are located in Table 4.

Descriptive Statistics

Prior to running more advanced forms of analyses, I investigated the descriptive statistics including correlations between a number of predictor variables (goal subscales, need for closure, GPA) and the outcomes of engagement (transformative experience and project interest) and learning (recognition learning and transfer). The means, standard deviations, and correlations for course-level goals are listed in Table 5 and the same for project-level goals are listed in Table 6.

Table 5

Means, Standard Deviations, and Correlations for Course-Level Goals (CL), NFC, Engagement, Learning, and GPA

Variable	*M*	*SD*	Correlations								
			1	2	3	4	5	6	7	8	9
1. Mastery CL[1]	5.84	0.82	--								
2. Outcome CL[1]	6.4	0.91	.52**	--							
3. Validation CL[1]	4.8	1.09	.10	.41**	--						
4. Need for Closure (NFC) [2]	3.13	0.70	.02	.30**	.30**	--					
5. Transformative Experience (TE) [3]	1.2	1.55	.19*	.09	.05	.02	--				
6. Project Interest (PI) [4]	4.63	0.79	.12	.10	-.01	-.07	.63**	--			
7. Recognition Learning (MC) [5]	7.43	2.05	.01	.04	.15	.05	-.01	.04	--		
8. Transfer (open-response) [6]	10.39	3.97	.10	.01	.07	.10	.01	.09	.55**	--	
9. GPA[7]	3.28	0.46	-.05	.09	.07	.30**	.06	.08	.31**	.44**	--

Note: [1]Responses were on a 7-point Likert scale (1 = strongly disagree; 7 = strongly agree). [2] Responses were on a 5-point Likert scale (1 = strongly disagree; 5 = strongly agree). [3] Rasch transformed logit score. [4] Responses were on a 6-point Likert scale (1 = strongly disagree; 6 = strongly agree). [5] 10 points possible. [6] 30 points possible. [7] Out of 4.0 GPA. *p < .05. **p < .01.

Table 6

Means, Standard Deviations, and Correlations for Project-Level Goals (PL), NFC, Engagement, Learning, and GPA

Variable	*M*	*SD*	Correlations			
			1	2	3	4
1. Mastery PL[1]	5.38	1.21	--			
2. Outcome PL[1]	6.17	1.23	.68**	--		
3. Validation PL[1]	4.62	1.23	.17*	.40**	--	
4. Need for Closure (NFC) [2]	3.13	0.70	.01	.18*	.34**	--
5. Transformative Experience (TE) [3]	1.20	1.55	.29**	.07	.08	.02
6. Project Interest (PI) [4]	4.63	0.79	.27**	.08	-.01	-.07
7. Recognition Learning (MC) [5]	7.43	2.05	-.08	.00	.03	.05
8. Transfer (open-response) [6]	10.39	3.97	.09	.13	.01	.10
9. GPA[7]	3.28	0.46	-.01	.11	.09	.30**

Note: [1]Responses were on a 7-point Likert scale (1 = strongly disagree; 7 = strongly agree). [2] Responses were on a 5-point Likert scale (1 = strongly disagree; 5 = strongly agree). [3] Rasch transformed logit score. [4] Responses were on a 6-point Likert scale (1 = strongly disagree; 6 = strongly agree). [5] 10 points possible. [6] 30 points possible. [7] Out of 4.0 GPA. *p < .05. **p < .01. Columns 5-9 were not included as they are represented in Table 5.

To summarize the descriptive statistics I will briefly describe the means for each variable and give some indication of what each value represents. In addition, I will note whether the variable's skew and/or kurtosis measures fell outside of the acceptable ranges (±1 for skew, -1 to +2 for kurtosis). For course-level goal orientation, the mean for the mastery category was 5.84 out of 7, meaning that on average student responses fell between "somewhat agree" and "moderately agree" on the Likert-type scale. The course-level mastery goal category had skewness (-2.42) and kurtosis (15.04) statistic issues, which may suggest a ceiling effect. For course-level outcome goals, the mean was 6.4 out of 7, so on average student responses fell between "moderately agree" and "strongly agree" for outcome goal questions. The category of course-level outcome goals exhibited the characteristics of a ceiling effect; it had a high mean of 6.4 out of 7, a low skewness statistic of -3.33 and a high kurtosis statistic of 17.17. For course-level validation goals, the mean was 4.8 out of 7, placing the average student response to these items between "neither [agree nor disagree]" and "somewhat agree." Skewness and kurtosis statistics were within the acceptable range. The project-level goal orientation items yielded similar means across categories (mastery = 5.38, outcome = 6.17, validation = 4.62), and the average responses would fall into the same categories as described above in relation to course-level goals. The project-level mastery goal category had skewness (-2.24) and kurtosis (7.94) statistic issues. The category of project-level outcome goals also exhibited the characteristics of a ceiling effect; it had a high mean of 6.17 out of 7, a low skewness statistic of -3.27 and a high kurtosis

statistic of 13.47. The project-level validation goals had skewness and kurtosis statistics within the acceptable range. The finding of such similarity between course-level and project level goal orientation means was somewhat surprising as one might expect students to more strongly adopt a mastery goal orientation and less strongly adopt any performance-related orientations in the context of a collaborative, problem-based learning project, however this was not the case.

The other predictor variable, need for closure (NFC), had a mean score of 3.13 out of 5, indicating the average student response fell between “neither [agree nor disagree]” and “agree” to the items. For the outcome variable of project interest, the three negatively worded items (numbers two, six, and eleven) were reverse coded and the resulting mean was 4.63 out of 6. This indicates that on average students were likely to respond between “somewhat agree” and “moderately agree” on the items related to project interest. Both NFC and project interest had skewness and kurtosis statistics within the acceptable range.

The learning outcomes for the current study were recognition learning and transfer. The mean score for recognition learning (measured through multiple choice items) was 7.43 out of 10 which meant, on average, students got 74% of the items correct. The scores for the recognition learning variable slightly violated the acceptable ranges for normality (skewness=-1.38; kurtosis=2.71). For transfer, the open-response items were coded as described in chapter three. When both open-response items were added together, this created the total transfer score. The mean for the transfer score was 10.39. Based on the coding scale this means on average, participants were likely to mention two to three

theories per item, correctly expanding on or giving examples for one of those theories. Skewness and kurtosis statistics were within the acceptable range for transfer.

For the outcome variable of transformative experience (TE), raw data were run through Rasch analysis using WINSTEPS version 3.69.1.8 (Linacre, 2009). The resulting output listed TE scores in logits, or scaled to curve fitting the Rasch model. For the Rasch TE scores, the mean was 1.20. Based on the analysis done in WINSTEPS, an average of 1.20 means that participants were likely to strongly agree with most of the items on the TE scale and even agree with items representing a high level of transformative engagement. On average, students reported genuinely engaging in transformative experiences. That is, they reported they were applying/thinking about the content in their everyday lives (motivated use), perceiving the world through the lens of the content (expansion of perceptions), and valuing this way of perceiving the world (experiential value). For context, other research in a high school context illustrated that only about 10% of the students reported engaging in genuine transformative experiences (Pugh et al., 2010). The high level of transformative engagement was confirmed in the interviews, even though I did not ask questions of that nature. A number of students spontaneously commented about their transformative learning. I present the data here because it helps illustrate the kind of transformative experiences the students underwent.

One student who scored 0.84 on the TE scale stated, “Um, it is useful…I am definitely diagnosing people now. Ugh, my roommate has learned

helplessness. How am I going to reverse this? So it's definitely being implemented as well." This indicates she was thinking about the content outside of class, but does not include much detail. This is in contrast with a student who scored a 2.15 on the TE scale went into much more detail, talking about how he used self-determination theory to help his nephew:

> Now, I've actually kinda used it on my nephew. Like self-determination theory, to motivate him to do his homework and stuff, and like with my sister, when he has to do his homework and stuff, so it's fun to motivate him to do better in class. Cause like, he's…yea, with the math, he's gotten better at it. He's more…about it. He actually sits down and does his homework. Other subjects not so much, but with the math, it's helped.

Average participant scores on the TE scale indicate a response that would fall somewhere in between these two qualitative examples of transformative experiences.

Correlations. The results for the correlations including the course-level goal orientation subscales are in Table 4 and the results for the correlations including the project-level goal orientation subscales are in Table 5. Investigating the correlations between variables allows one to see the basic relationships between the variables. In addition, if very high correlations are found between predictor variables, action can be taken to account for and deal with the high similarity between the variables in regression analysis. As can be seen on Tables 4 and 5, there were correlations among variables which reached different levels of significance. The correlations which were significant at the .01 level included: .68 for mastery and project-level outcome goals, .63 for TE and project interest, .55 for recognition learning and transfer, .52 for mastery and course-level outcome goals, .44 for transfer and GPA, .41 for outcome and course-level

validation goals, .40 for project-level goals, .34 for project-level validation goals and NFC, .31 for recognition learning and GPA, .30 for NFC and course-level outcome goals, .30 for NFC and course-level validation goals, .30 for NFC and GPA, .29 for project-level mastery goals and TE, and .27 for project-level mastery goals and project interest. The correlations which were significant at the .05 level included: .19 for course-level mastery goals and TE, .18 for NFC and project-level outcome goals, and .17 for project-level mastery and validation goals. These relationships will be further explored utilizing regression analysis below.

In addition to investigating correlations between goals and outcomes, it is crucial to also look at the correlation between course-level and project-level goal orientation categories to help address research question two (do course-level goals differ from project-level goals?). Prior analysis found that course- and project-level goal orientation scales yield a similar factor structure and have similar mean values. However, the correlations between course- and project-level goals are only moderate for mastery and outcomes goals, with validation goals having a stronger correlation (see the outlined boxes in Table 7). These correlations are not so high as for the categories to represent the same constructs, suggesting that students did not answer the goal orientation and project goal items in the same way. In other words, students' project-level goal orientations differed to a degree from their class-level goal orientations even though the overall means and factor structures were similar. Thus we can conclude the course- and project-level goal orientations are similar in structure,

but they are not necessarily the same for individual students and it is important to look at these goals separately.

Table 7

Means, Standard Deviations, and Correlations for Course-Level (CL) and Project-Level (PL) Goal Orientation Categories

Variable	*M*	*SD*	Correlations					
			1	2	3	4	5	6
1. Mastery CL	5.84[1]	.82	--					
2. Outcome CL	6.40[1]	.91	.51**	--				
3. Validation CL	4.80[1]	1.09	.10	.41**	--			
4. Mastery PL	5.38[1]	1.21	.36**	.21**	.14	--		
5. Outcome PL	6.17[1]	1.23	.11	.37**	.28**	.66**	--	
6. Validation PL	4.62[1]	1.23	-.01	.13	.65**	.17*	.40**	--

Note: [1]Responses were on a 7-point Likert scale (1 = strongly disagree; 7 = strongly agree). *p < .05. **p < .01. Outlined boxes represent correlations of matching categories of CL and PL.

Predicting Learning and Engagement

Regression analysis will be the most helpful method to answer my research questions three and four (RQ3. How do course-level goals and need for closure predict learning and engagement, controlling for prior achievement? RQ4. How do project-level goals and need for closure predict learning and engagement, controlling for prior achievement?). I utilized hierarchical linear regression methods to predict engagement and learning with need for closure, course-level goal orientation, and project-level goal orientation. All variables that I included in the regression analyses were centered, meaning that the average score was subtracted from each individual's score. Centering is a transformation often utilized in regression equations to help account for possible collinearity.

In addressing statistical assumptions in addition to those discussed in the descriptive statistics section, I investigated the Durbin-Watson statistics in the context of the regression equations I ran. In general, the statistic looked good, ranging from 1.707 to 2.224. The Durbin-Watson statistic is considered problematic if it is under 1, with the best values being under 2. Further support for normality of residuals, linearity and homoscedasticity can be obtained by investigating the plots of standardized residuals, looking for even distributions. Absence of measurement error is another assumption of regression, and this can be met by ensuring your measure is as free of error as possible. I utilized the same method of administering all iterations of data collection, and used two raters in order to ensure a more accurate score for the open-response items as compared to simply having one person score these items. One of the last assumptions is inclusion of all important variables. While goal orientation certainly is one variable of importance in an individual's resulting engagement and learning scores, it is certainly not the only factor at work. I will be breaking this assumption for the current research, as there are probably other variables to include. Finally, I recognize that the participants were members of previously intact classes, so the independence of observation assumption is one which this data will break.

To assess the answers to research questions and subquestions three and four, I ran eight total regression equations, and all began by entering GPA on the first step and NFC score in the second step. I chose to enter these variables first, so their influence would be accounted for once I entered the different types of

goals. Entering GPA helps control for prior achievement, and entering the NFC score works to account for differences in need for closure in the regression analyses. There were four outcomes: transformative experience, project interest, recognition learning, and transfer. For each of these four outcomes, I ran two separate regression equations: one for course-level goal orientation categories and one for project-level goal orientation categories. For both course-level and project-level goal orientation scales, I utilized the subscale breakdown that was suggested through the factor analyses: mastery (challenge-mastery + learning), outcome, and validation (ability + normative ability + normative outcome). Below I will describe in detail the findings of each regression analysis, organized by research question.

Question 3a: Do course-level goal orientation and NFC predict recognition learning and transfer, controlling for prior achievement? For the analysis to answer question 3a, I ran two regression analyses with the same variables predicting recognition learning and transfer (see Table 8). For the equation including recognition learning, the only significant predictor variable for all steps was GPA. For the equation predicting transfer, the R^2 change from step two to three was .05 which was significant (p=.017) and represented a small to medium effect size (Cohen's f^2 = 0.07). Controlling for GPA, NFC, and the other course-level goal orientation categories, course-level mastery goals emerge as a statistically significant predictor of transfer, β = .19, p=.018.

Table 8

Regression Analyses Predicting Learning Utilizing Course-Level Goal Orientation (CL)

		Recognition Learning (n=156)					Transfer (n=156)				
Predictor		*B*	*SE B*	β	R^2	Cohen's f^2	*B*	*SE B*	β	R^2	Cohen's f^2
Step 1					.10**					.20**	
	GPA	1.42	0.34	.32**			3.81	0.63	.44**		
Step 2					.10**					.20**	
	GPA	1.49	0.36	.33**			3.84	0.66	.44**		
	NFC	-0.14	0.25	-.05			-0.06	0.46	-.01		
Step 3					.12**	0.02[a]				.25**	0.07[a]
	GPA	1.50	0.36	.34**			3.76	0.65	.44**		
	NFC	-0.23	0.27	-.07			0.18	0.49	.03		
	Mastery CL	0.13	0.25	.04			1.08	0.45	.19*		
	Outcome CL	0.00	0.24	.00			0.57	0.44	.11		
	Validation CL	0.24	0.17	.13			-0.10	0.30	-.03		

Note: [a]Effect size for variables added in step 3; .02 = small, .15 = medium, .35 = large (Cohen, 1988).

* p < .05 and **p<.01.

Question 3b: Do course-level goal orientation and NFC predict transformative experience and project interest, controlling for prior achievement? For the equations dealing with engagement, I ran two regression equations with one predicting transformative experience and one predicting project interest (see Table 9). For transformative experience, neither the equation at step one nor step two was significant. However, once the course-level goal orientation categories were added in step 3, the equation was significant (*p*=.019) and the R^2 change was .081, also significant (*p*=.005) at a small to medium effect size (Cohen's f^2 = 0.09). When controlling for GPA, NFC, and the other course-level goal categories, course-level mastery goals are a significant predictor β = .28, *p*=.001. For predicting project interest, no step of the regression equation was significant, nor were any of the predictor variables.

Table 9

Regression Analyses Predicting Engagement Utilizing Course-Level Goal Orientation (CL)

		Transformative Experience (n=156)					Project Interest (n=150)				
Predictor		*B*	*SE B*	β	R^2	Cohen's f^2	*B*	*SE B*	β	R^2	Cohen's f^2
Step 1					.00					.01	
	GPA	0.21	0.28	.06			0.13	0.14	.08		
Step 2					.01					.01	
	GPA	0.18	0.29	.05			0.18	0.15	.11		
	NFC	0.07	0.20	.03			-0.10	0.10	-.09		
Step 3					.09*	0.09[a]				.06	0.05[a]
	GPA	0.16	0.28	.05			0.16	0.15	.09		
	NFC	0.23	0.21	.10			-0.06	0.11	-.05		
	Mastery CL	0.64	0.20	.28**			0.16	0.10	.14		
	Outcome CL	0.09	0.19	.04			0.17	0.10	.16		
	Validation CL	-0.02	0.13	-.01			-0.06	0.07	-.08		

Note: [a]Effect size for variables added in step 3; .02 = small, .15 = medium, .35 = large (Cohen, 1988).

* p < .05 and **p<.01.

Question 4a: Do project-level goal orientation and NFC predict recognition learning and transfer, controlling for prior achievement? To assess this research question, I again ran two regression equations, one predicting recognition learning and the other predicting transfer (see Table 10). For the equation predicting recognition learning, each step of the equation was significant, as GPA was a significant predictor variable; however, there were no significant R^2 changes when adding NFC in step two nor when adding project-level goal orientation categories in step three. This was also the case when utilizing GPA, NFC, and project-level goal orientation categories to predict transfer. While the equation was significant at each stage, there were no significant changes in R^2 across steps, and GPA was the only significant predictor.

Table 10
Regression Analyses Predicting Learning Utilizing Project-Level Goal Orientation (PL)

		Recognition Learning (n=154)					Transfer (n=154)				
Predictor		*B*	*SE B*	β	R^2	Cohen's f^2	*B*	*SE B*	β	R^2	Cohen's f^2
Step 1					.10**					.19**	
	GPA	1.44	0.34	.32**			3.80	0.64	.43**		
Step 2					.11**					.19**	
	GPA	1.52	0.36	.34**			3.90	0.67	.45**		
	NFC	-0.17	0.24	-.06			-0.23	0.44	-.04		
Step 3					.11**	0.00[a]				.21**	0.03[a]
	GPA	1.49	0.36	.33**			3.91	0.67	.45**		
	NFC	-0.21	0.26	-.07			-0.07	0.47	-.01		
	Mastery PL	-0.19	0.20	-.08			0.49	0.36	.10		
	Outcome PL	0.20	0.25	.07			0.59	0.45	.11		
	Validation PL	-0.02	0.16	-.01			-0.26	0.29	-.08		

Note: [a]Effect size for variables added in step 3; .02 = small, .15 = medium, .35 = large (Cohen, 1988).
* p < .05 and **p<.01.

Question 4b: Do project-level goal orientation and NFC predict transformative experience and project interest, controlling for prior achievement? For the analyses answering question 4b, I ran two regression equations with GPA in the first step, NFC in the second step, and project-level goal categories in the third step predicting transformative experience in one equation and project interest in another (see Table 11). For both equations, the first two steps containing GPA and NFC were not significant. For transformative experience, in the third step when the project-level goal orientation categories are added, there was an R^2 change of .139 which was significant (p=.000) and represented a medium effect size (Cohen's f^2 = 0.16). Controlling for GPA, NFC, and the other project-level goal orientation categories, project-level mastery goals are a significant predictor of transformative experience, β = .38, p=.000. The same general outcome was true of project interest as well. In the third step when the project-level goal orientation categories are added, the R^2 change was

.32, which was a significant change (p=.002) and represented a large effect size (Cohen's f^2 = 0.48). When controlling for GPA, NFC, and the other project-level goal orientation categories, project-level mastery goals were a significant predictor β = .32, p=.000.

Table 11

Regression Analyses Predicting Engagement Utilizing Project-Level Goal Orientation (PL)

		Transformative Experience (n=154)					Project Interest (n=149)				
Predictor		*B*	*SE B*	β	R^2	Cohen's f^2	*B*	*SE B*	β	R^2	Cohen's f^2
Step 1					.00					.01	
	GPA	0.19	0.28	.06			0.13	0.14	.08		
Step 2					.00					.02	
	GPA	0.20	0.29	.06			0.19	0.15	.11		
	NFC	-0.01	0.19	.00			-0.13	0.10	-.12		
Step 3					.14**	0.16[a]				.34**	0.48[a]
	GPA	0.28	0.27	.08			0.21	0.14	.12		
	NFC	0.08	0.19	.03			-0.08	0.10	-.07		
	Mastery PL	0.70	0.15	.38**			0.30	0.08	.32**		
	Outcome PL	-0.26	0.19	-.12			0.00	0.09	.00		
	Validation PL	0.09	0.12	.07			-0.02	0.06	-.03		

Note: [a]Effect size for variables added in step 3; .02 = small, .15 = medium, .35 = large (Cohen, 1988).

* p < .05 and **p<.01.

Summary

Overall, the results from the quantitative analyses suggest that a three factor solution best fits the course-level and project-level goal items and the categories formed were used in subsequent analyses. The hypothesis for research question 1 was mostly confirmed, as the goal items did not factor by approach and avoid items, but in addition to mastery and validation (similar to performance-approach) factors, there was also an outcome goal factor. The hypothesis for research question 2 was confirmed, in that students did respond differently to course-level and project-level goal orientation items. The hypothesis for research question 3a was confirmed for the variable of transfer, as course-

level mastery goal orientation did predict transfer score (but not the recognition learning score). In addition, the hypothesis for question 3b regarding engagement was also partially confirmed, as course-level mastery goal orientation did significantly predict higher levels of transformative experience (but not project interest). For research question 4a, the hypothesis regarding learning outcomes was disconfirmed; project-level goal orientation did not predict recognition learning, nor transfer. Finally, research question 4b dealing with engagement, the hypothesis was fully confirmed, as project-level mastery goal orientation did predict higher levels of both transformative experience and project interest. In the next section I will detail the findings from the qualitative portion of the data.

Qualitative Findings

I utilized qualitative methods to answer research questions five through seven (RQ5. How do students experience the PBL unit? RQ6. How do students explain their goals for the PBL unit and why they set the goals they do? RQ7. How does a student's group impact his or her experience with the PBL unit?). Through the analysis of interviews with selected students, I identified themes to represent the experiences of students within the PBL unit. Fifteen secondary education students completed the interviews, and were selected based on their responses to the course-level goal orientation and need for closure scales.

The themes emerged from the interviews I conducted with students during the first semester of the data collection (see Table 12 for demographic and outcome variable information and Table 13 for predictor variable information on

interviewees, all names are pseudonyms). The students' experiences of the PBL unit can be described through the themes of overall thoughts on the unit, group dynamics, and impact of goals. I will expand on these themes below.

Table 12
Demographic and Outcome Variable Information from Interview Participants

Pseudonym	GPA	Class	Major	Age	Race/ Ethnicity	TE	PI	Recognition Learning	Transfer
Bethany	3.54	3	Music Education	20	White	2.67	5.57	8.00	13.00
Cindy	2.96	3	History Ed	20	White	1.30	5.29	4.00	2.00
Chris	3.10	4	History Ed	23	White	2.81	4.36	9.00	12.00
Don	2.67	4	Social Science Ed	26	White	2.15	4.64	3.00	7.00
Ginny	3.63	3	History Ed	20	White	0.84	3.71	8.00	14.00
Hillary	3.68	4	German	26	White	1.77	5.36	7.00	8.00
Leslie	N/A	3	Special Ed	20	Asian	1.53	4.86	7.00	8.00
Maggie	3.91	3	Theater Ed	20	White	2.02	4.71	9.00	12.00
Martin	2.30	3	Mathematics Ed	22	White	0.40	4.64	5.00	7.00
Olivia	3.40	3	Mathematics Ed	20	White	0.00	0.00	9.00	7.00
Patty	3.25	3	Mathematics Ed	19	White	0.84	4.43	8.00	12.00
Stephanie	3.68	3	Mathematics Ed	20	White	0.40	4.79	9.00	19.00
Taylor	3.07	3	History Ed	19	Mixed	0.96	4.79	7.00	7.00
Tim	2.96	4	History Ed	27	White	3.55	5.21	6.00	9.00
Whitney	4.00	3	Mathematics Ed	20	White	2.95	5.93	10.00	16.00

Note: TE = Transformative Experience, PI = Project Interest, Class: 3 = Junior, 4 = Senior

Table 13
Predictor Variable Information from Interview Participants

Pseudonym	CL Mastery	CL Outcome	CL Validation	NFC	PL Mastery	PL Outcome	PL Validation
Bethany	6.75	7.00	3.56	2.87	6.13	7.00	2.11
Cindy	6.88	6.67	5.11	3.40	5.38	7.00	6.44
Chris	6.63	7.00	5.89	2.33	6.00	6.33	5.44
Don	6.50	7.00	3.78	4.53	6.63	6.67	4.89
Ginny	6.25	6.33	3.44	2.67	4.38	5.67	3.33
Hillary	7.00	7.00	3.33	2.07	6.88	6.33	1.89
Leslie	5.50	5.67	4.11	3.20	5.50	4.33	4.67
Maggie	5.88	6.33	5.78	3.40	5.88	6.33	5.44
Martin	5.38	7.00	5.67	2.87	5.50	7.00	4.78
Olivia	5.88	6.33	5.44	2.80	5.38	6.00	4.67
Patty	5.88	6.00	5.33	3.20	5.63	6.00	5.44
Stephanie	5.50	7.00	4.22	3.53	4.00	7.00	6.00
Taylor	5.63	6.33	5.78	3.07	5.13	6.00	5.00
Tim	6.75	6.67	6.33	3.33	6.50	6.33	6.44
Whitney	6.25	7.00	5.67	4.40	5.50	7.00	4.78

Note: CL = Course-Level Goal Orientation, PL = Project-Level Goal Orientation, NFC = Need for Closure

Reactions to the PBL unit. Throughout the interviews I conducted, students talked quite a bit about their thoughts and feelings about the PBL unit. Students reported both positive and negative thoughts and reactions to the PBL unit. In the section below, I will describe and provide examples of students' overall thoughts on the PBL unit.

The positive reactions students had to the project were related to the usefulness of the information, the product-oriented nature, and the open nature to the PBL unit. In general, most students (13 out of 15 interviewed) had at least one thing positive to say about the PBL unit, with nine having exclusively positive responses. One student, Taylor, mentioned how he enjoyed the usefulness of the project, "It was nice to see that the project was able to get me interested like that, where it was using elements from my life, and because of the theory that I studied, that was very useful." Another student, Hillary, spoke about liking the process and product the PBL unit afforded,

> I liked it because it wasn't just looking at theories and, I don't know, studies, and coming up with things. It was kind of nice to have something so…like, something, a product. You know, a product that says this is what we went through, and this is what we learned. And it was a fun way rather than writing a research paper or something really dull. It was something really practical and it had a product so we could see the nice end result. Products are nice.

Another student mentioned how she appreciated the open nature of the PBL unit. Student Patty stated,

> I liked the freedom we had to kind of…we were just given a topic and we could just run with it. I liked that, because, I mean, it gave you a little more purpose for it. It's not like you're just doing it to complete it, you're doing it cause you kinda like what you're doing with it. To make it your own.

Similarly, student Bethany commented on the creative element to the project, “I guess just like the creativity that got to go into designing the wiki and everything, I liked that. And the presentation at the end, because there were some really creative things there that made it more entertaining.” Students reported that they thought the usefulness of the project, the product at the end, and the open nature of the PBL unit were positive elements.

The negative reactions students had to the project seemed to be related to the group element of the project (further discussed in the group dynamic theme below), the ambiguity and size of the central problem to the project, and the lack of time spent with the other theories. Less than half of the students (six of fifteen) mentioned negative reactions to the PBL unit. Student Chris summed up many students’ feelings about group projects in general, “I always kind of get a little uneasy with group projects, cause there’s so much out of your control.” In addition to general group dynamics, some students voiced a frustration in coming to an understanding of the project across a number of people. One student, Don, stated, “I feel like my interpretation was different compared to other people’s, so that’s why, I think that’s what frustrated me a little bit. We all thought differently.” A few students mentioned how the ambiguous nature of the project frustrated them. For example, Bethany stated, “it seems like you really have nothing to go by at the beginning, because he kind of laid out the theories generally, and then just let us go with them.” In a similar nature, Chris stated,

> I would have liked a little more teacher-led, because it’s kind of hard to tell if we get the full amount of information when we’re doing these kinds of projects because students are supposed to deliver it to the students. So,

> um, I always like kind of a more teacher wrap-up at the end to make sure we have all the information right.

Another student, Ginny, disliked the vague nature of the unit, “I think sometimes…things were a little vague. Directions were a little vague, or questions weren’t directly answered.” Some students voiced mild frustration with not spending more time with the other theories (besides the theory assigned to their group). One student, Bethany, stated, “Maybe we should have been encouraged to take notes or something during other peoples’ presentations? Cause I’m not sure I took away a lot of information from the other theories that we learned about.” Speaking on the same issue of feeling unfamiliar with the other theories, Martin said,

> I would have like to have learned more about the other projects. I felt like I knew a lot about mine already, it was like, this is great, I understand it, and I could see it in other aspects of my life and relate it to other things. But I would have liked to have been able to use the other motivations to be able to collaborate that, not just mine. I feel like I’m an expert at mine, but not everybody else’s.

Students tended to have negative feelings about issues related to working in groups for the project, the ambiguous or vague nature of the unit, and their exposure to and knowledge of the other theories.

One final aspect of the project which nine out of fifteen students interviewed mentioned included the utilization of Calvin (from Calvin and Hobbes) as the main case within the PBL unit. All students who mentioned Calvin or the use of comics in general did so in a positive way. For example, Olivia stated,

> I liked that it was based around Calvin, because it made it a lot more interesting. Instead of just learning about these theories, you actually have

> something to relate it to. And something that probably the majority of us grew up reading anyways, so I liked that.

Another student, Maggie, mentioned how she appreciated the issues were contemplated by individuals besides teachers, “I really liked that it was based off the cartoons. I thought that that was really cool. And it was nice to see that, like a Cartoonist can see these problems too and it’s not just for teachers.” Student Hillary was careful to differentiate between Calvin and real-life, by stating, “Just that we really had to do parts of the project that put us in the perspective of the teacher in real-life, while Calvin’s not real real-life, but a real-life situation. I really liked that about it.” Don mentioned how the PBL unit had made him see the Calvin and Hobbes comics in a new light,

> I really liked connecting it to Calvin, ‘cause I’ve read Calvin before in the past, and I never really connected any of that. The way he acted, you can see it, but I never went into so much depth, so that was kinda cool to look at, analyze a cartoon.

This new appreciation of the comic was echoed by student Cindy,

> It’s really fun (the project), it’s so different than any other, cause you’re focusing on a cartoon character, like Calvin. I think it’s…it brought back memories of my Dad, cause he loves Calvin. We would read Calvin together, I even got like a big comic book of Calvin, so, I was just like really interesting to actually see this aspect of Calvin, cause I’ve never really looked at him that way. I was just reading and thinking, he’s just this funny cute kid. But now, like, oh, no he actually had problems. Oh my gosh, I didn’t even realize that! So definitely, it’s really fun, entertaining, interesting class. It’s really fun to see a fictional character come into play.

The students concurred that the addition of the Calvin and Hobbes cartoons enhanced their experience of the project, whether through the connection to a comic they previously knew or being able to appreciate the application of motivation theories to a cartoon.

Overall, students voiced both positive and negative thoughts on the PBL unit. These overall outlooks arose from a number of different experiences the students relayed to me during the interviews. A second theme derived from statements students made in the interviews related to the impact of goals.

Impact of goals. Given that a large focus of the quantitative part of my dissertation is on the impact of goals on student outcomes, in the interviews I asked students questions related to the goals they held within the PBL unit. I asked all students, “What goals (if any) did you set for the motivation project? Did your goals change during the project? Were your goals for the project different than goals you typically set?”

Students responded to these questions differently, reflecting different levels of focus or awareness of goals. Many students (eight of fifteen) responded to the question with ambiguity, such as Patty who stated in response to the question asking about goals, “I don’t think we set goals…but to get it done?” A number of other students responded to the general question about goals by answering goals related to getting tasks done on time. Maggie answered, “We set like, timeline goals. We wanted this to be all, everything sent to me by a certain time, and it was, which was good.” Another student, Whitney, similarly responded with more detail,

> So like, we kind of had either class goals, like what we wanted to get done during that class hour. Or we had like, weekly goals, so like by the end of this week, we should have the first page done. Or we should have these examples on our wiki. So we set periodic goals.

Some of the answers students gave in response to the question about what goals they had set fell into one of the goal categories previously discussed.

For example, three students reported that they had set goals specifically related to a set outcome on the project. Student Chris stated, “My goal was to get a good grade, definitely.” Don stated, “Um, other goals is getting an A. That’s a good goal.” Another student, Stephanie, stated, “My personal goal would be to get a good grade. Get the A, and work hard, yeah.” Each of these students reported that their goal for the unit was to reach a set outcome—either described as a good grade, or more specifically as getting an A.

Other students (four overall) gave answers which indicated they held a more learning or mastery-type of goal for the unit. One student, Bethany, responded to the goal question,

> I guess I wanted to learn as much as I could about all the parts of the theory, because I know that we all did different pages and everything, but, so we tended to focus in on what we were doing and our page. But it was also important to learn about the other parts of our group. In addition, I also wanted to learn more about the other theories that we weren’t even focusing on.

Cindy responded similarly, “…trying to make sure we understood, color coding certain things, cause I think it helps.” Finally, Leslie, a foreign exchange student from Taiwan, stated, “I just wanted to learn more about the motivation in English.” All these responses relate to the desire to master the content or work to develop competence.

There was only one comment throughout all the interviews that could be considered a normative goal. Martin had some conflicts within his group, and he described the experience of working within a group that had fairly poor group dynamics. Martin talked about an element of competition, not between his group and others, but within his group. Martin said:

> It really felt like we were competing against each other. ‘Cause it was like, ooh, I have this much done, oh gosh, I feel like I need to put more in mine. It wasn’t like as a group we were doing things to make it better, it was more individual motivation to get more of it done.

Martin’s response was unique, in that no other interviewee mentioned the element of competition. Martin’s competition was not among the other groups in the class, but rather among the other group members within his group.

In the interviews I conducted with the students, I asked them specifically if their goals had changed across the duration of the project. Two students (of the fifteen I interviewed) replied that their goals did not change across the project. Student Ginny replied, “They (the goals) stayed pretty much the same. Get it done, do well….move on.” Most students (eight of fifteen) responded that the goals they had at the end differed from the goals they held at the beginning of the project, whether the goals were simply modified or actually changed. Students who said their goals had been modified usually referenced time constraints as a reason for the modified goals. For example, student Whitney stated:

> Sometimes we set too big of goals, and we were like, um, we might not make it through that. So then we’d have to like sort of shift our goal to be something more manageable that we could handle. So we definitely had to make alterations during the project.

Similarly, Martin stated, “I had to alter them at points to make sure on time constraints, and um, just didn’t have enough time to make it look too pretty. But I did get some in there.” When I asked the same student if he had to alter his goals or his expectations, he replied, “I had to alter my expectations, not my actual goals.” Finally, in response to asking about whether the goals one set changed

across the unit, one student had a unique response which included the reason her goals had to change. Don replied,

> I guess you could say I kinda started leaving, like, the group mentality, and looking at myself…getting myself to do what I needed to, you know…like, you could work together as a group, but when the group wasn't really working out, then I was like, okay, I'm going to work for myself, at that point. We're not really getting along, so my goal is if I at least get myself a good grade.

Stephanie reported that she did not change the goals she held, but she did add on to her goal as the project progressed. She stated, "I don't think so, I still wanted that A, but I did get more interested in the subject throughout the project, and wanted to learn more about it instead of just the A." This was a particularly illuminating response, as she essentially stated that she started with a fairly solid outcome goal (wanting the A), but as she got more interested during the project, she also formed a goal of wanting to learn more. Nine of fifteen students mentioned goals changing across the PBL unit, including having to modify timing and other elements of goals because of factors such as time or lack of positive group dynamics.

Finally regarding goals, I asked students if the goals they set for the project differed from goals they typically set in other courses. Students differed on their responses to this question. Many students (eight of fifteen) stated that the goals they set for the project were similar to goals they typically set. Olivia stated that her goals were mainly the same, "Nah, I guess for the material, not really. The goal is always to learn it." Similarly, Maggie responded, "I like to set time goals for everything, so no, I don't think they were too different than the kind I would normally set." Yet another student, Hillary, replied, "No, not really. I

typically set goals for time management, and also just being thorough, doing the best I can." Finally, in response to the question about setting similar or different goals for the PBL project, another student Don stated,

> Like my first goal is always in every class, is to get as much information as possible, like to not necessarily get a good grade, but to know that I did a good job, you know, that is my main goal in my classes, yea.

Meanwhile, other students (four of fifteen) stated that the goals set for the PBL unit differed from goals typically set. For example, Patty stated, "Typically I set more, like I set a higher standard for myself, but with a group project I feel like that's harder to do." Taylor responded that goals he set for the PBL unit differed from goals set in courses within his area of concentration,

> With other classes, like history classes, they're more content related, so I do have to focus more on the information than the application of it, but I'm more interested in finding out how I can apply it to my future role as a teacher.

Overall, students had some illuminating responses to questions about goals within the PBL unit. Some were quite aware and could speak to the goals they set, while other students' answers suggested they had not considered goals for the project. The final theme which emerged from the qualitative data revolved around group dynamics.

Group dynamics. The different experiences of students with and within their groups could be the subject of a whole different study. I found the answers students gave to the questions, "How would you describe the dynamics of your group? (clarification if needed: How did your group get along?) Did dynamics impact your work? Did the dynamic of your group impact the outcomes? Did someone take a leadership role in your group? How were decisions made?" quite

illuminating. While PBL might have a certain influence on outcomes like engagement or learning, how a student interacted with his or her group definitely influenced a student's experience of the PBL unit. I coded student responses to the group dynamic questions as mostly positive, mostly negative, or neutral. I found that ten students reported overall positive group experiences, four reported overall negative group experiences, and one student had a fairly neutral description of her experiences with her group.

Some students had solidly negative experiences working within the groups assigned for the PBL unit. One of the most common complaints revolved around students not showing up or pulling their own weight. Chris described his groups' dynamic:

> The dynamics of the group was very individual workers, and so, we kind of divvied up the work, and split up on our own terms. One thing that was a little annoying was we had one student who…she didn't really show up very often. So that kind of got on the group's nerves.

A second student, Patty, also reported difficulties with the low production of a group member, "There were three of us that worked really well together, and the fourth girl, kinda no….didn't really do anything. So that was kinda frustrating. It's like we had to do more work to cover-up what she wasn't doing." Another complaint heard among a few different students included the group simply not getting along. Don in particular described,

> So we kind of bumped heads a little bit like that, we…didn't have the same idea of what we wanted to do with the wiki. It was kind of like, ok, then everybody kind of separated and did their own. We didn't collaborate too well I felt like. Just the dynamics …it was very rocky.

Another student, Martin, also spoke about the difficulty of getting along with his group,

> Then the presentation…it was kind of like the person who dictated said, let's do this…okay. I didn't want to argue with her, but she said, let's do this, oh, that sounds really good. Then everyone jumped on board. So I just went along with it, didn't want to fight the current.

A final complaint a student discussed relating to the group element included dealing with getting together outside of class and the quality of the products that resulted. For example, Whitney stated,

> I feel like the work we did in class was really good and really, complete and thorough. And the work we did outside of class was more rushed and thrown together. So those pieces that we did outside of class were…not as good as the stuff we did in class.

Students voiced a number of negative experiences during the PBL unit in relation to their groups.

Other students reported neutral or positive experiences working with their PBL unit groups. Bethany spoke about how her good relationship with her group impacted the group's production, "I think we were, um, more willing to get our things done, it wasn't, it didn't feel as much of a hassle, because we knew everyone else was pulling their weight too." A second student, Hillary, also voiced the positive impact of a good group dynamic,

> I really thought that each person really cared about it equally, which is really nice, and we all just contributed. Yea, I was lucky. It made me want to work harder. It made (us) wanna really pull our weight when you see other people really doing well.

While a number of students focused on negative elements of working in groups on the PBL unit, some students saw the groups as positive source of encouragement.

The leadership within groups seems to be a centrally polarizing feature; if the leader worked well with the group, good things resulted. If the leader had conflicts with the group, problems may arise. Bethany stated, “I kind of ended up taking the lead a little bit.” She spoke about managing the group’s time and tasks, “if it seemed like we were going to leave without having things delegated, I would make sure that we got together at the end and review what all of our parts were for the next day of class.” Another student, Chris, spoke about appreciating being the one in charge of putting things together,

> I would actually say I took a leadership role in my group. Yea, definitely. I didn’t want—in group projects I always get worried about the final result, and so I made sure I had my hands on it last, making sure it was all put together.

Maggie also voiced a similar attitude toward the leadership role,

> I ended up doing all the, like, putting everything together, so I was kind of, I guess, like the group leader. Which I like to take on, cause I know it’s getting done and it’s getting done efficiently. I’m kinda like that sort of person.

One of the students (Don) who experienced a particularly difficult group dynamic, attributed at least part of the issue to the number of self-appointed leaders in his group. He stated,

> Everybody was just, you know, wanted it their way, and they weren’t accepting of anything that was not their way. We would all put our ideas out there, but it was just, such a hassle to finally choose one idea. So like, everyone would speak, and we would put our ideas all out there, but the

> whole having so many leader personalities, we never really decided on anything.

While students talked about both the positive and negative impacts of working with groups, a number of students seemed to zero in on the particularly crucial role the leader's relationship with the rest of the group had on the group's dynamics.

Overall, I gathered much information about how students experienced the PBL project, including in light of the specific topics of goals and group dynamics. In the following chapter, I will discuss the results and provide an integrated interpretation of the data. In addition, I will also include a discussion of contributions to the literature, limitations, implications, recommendations for future research, and an overall conclusion.

CHAPTER V

DISCUSSION

The results reported in chapter 4 offer new information about how students experienced, engaged, and learned in a problem-based learning environment. In this chapter, I will discuss and interpret the findings reported in chapter 4. I will also discuss limitations to the study, recommendations for future research, and implications of the findings. Finally, I will offer a section on final conclusions for this dissertation as a whole.

Summary and Interpretations of Main Findings

In this section, I will summarize and interpret the main findings from my analyses, organized broadly by research question. Further, a more integrated interpretation will follow.

Question 1: What are the underlying structures or factors for the course-level and project-level goal orientation items? After conducting exploratory and confirmatory factor analyses on both the course-level and project-level goal orientation items, I determined that a three factor solution best fit the data across both course-level and project-level goal orientation scales. The three factors included: (1) mastery goals (challenge-mastery + learning), (2) outcome goals, and (3) validation goals (ability + normative outcome + normative ability). Traditionally, achievement goals orientations have been broken down

into mastery and performance types which were further broken down into approach and avoidance categories (Elliot & McGregor, 2001). I attempted to understand the factors from the initial exploratory factor analysis using this framework, however the approach and avoidance items did not come close to forming separate factors.

Some individuals such as Grant and Dweck (2003) and Brophy (2005) have suggested measuring goal orientations with different categories, specifically when breaking down performance-approach goals. Other researchers such as Senko et al. (2011) distinctly separated performance-approach goal orientation into goals focused on demonstrating competence (ability goals) and goals focused on outperforming one's peers (normative goals). While Senko et al. (2011) focused on the importance of this distinction, the results from my analyses suggested that students did not respond to ability and normative goals in different ways, as they factored together and had high correlations. The goal orientation categories that emerged from the factor analyses worked in an exploratory way; not many individuals had attempted to break down performance goals before, and further, no one had broken them down for both course-level and project-level goals. Breaking goals down into more specific types with common focuses might help clarify some of the mixed results that have been reported surrounding performance-approach goals in the past (Linnenbrink-Garcia et al., 2008). I believe my research will help increase the understanding that mastery goals tended to be advantageous to transformative experiences, project interest, and transfer in a PBL environment.

Question 2: Does students' course-level goal orientation differ from their project-level goal orientation? The answer to this research question focused on the similarity between students' course-level and project-level goal orientations. This is a crucial distinction, not only for the results of this dissertation, but also for goal theory as a whole. In the past, the research on goal orientation has revolved around measuring one's general goal orientation and tracking these students across academic programs (Harackiewicz, Barron, Tauer et al., 2002), or encouraging the adaption of a certain type of goal for a specific task and measuring one's performance on that task (Senko & Harackiewicz, 2005). To my knowledge, there has only been one study published that focuses on measuring not only goal orientation, but also goals which one holds for a specific task (Belenky & Nokes-Malach, 2012).

In some areas of educational psychology, there is a focus on fitting the measurement of a construct to the level of interest in the research. Bandura (1997) pointed out this fact in terms of self-efficacy. He emphasized that the only way to really assess the impact of self-efficacy would be to measure it at the level of the task to be measured. It is important to understand how the level of measurement might impact the subsequent analysis and interpretation of data. In terms of goal theory, the most commonly utilized level of measurement is that of achievement goals or asking students what types of goals they typically hold, possibly within the context of a course. While this more trait-type analysis of goals may provide information about what in general motivates an individual in an academic setting, it might provide ill-fitting information in the context of a

specific task. Pintrich (2000a) points out achievement goals tend to represent a middle ground between general goals which explain global valences (like mastery or superiority) which drive the goals one sets, and more specific task-level goals. However, Pintrich also differentiates between achievement goals as measured by goal orientation scales and task-specific goals (also called target goals) which work at a level which does not directly address the reasons one holds the goal. While theoretically these two categories of goals have been differentiated, not many studies have assessed the two levels of goals within the same group of people (the exception being Belenky & Nokes-Malach, 2012). One of the main aims of my dissertation is to gain a better understanding of the relationship between the commonly measured level of achievement goal orientation (which I call course-level goal orientation) and goals specific to the PBL unit (which I call project-level goal orientation). The results of these analyses suggest researchers should carefully and deliberately choose the level of goals they wish to measure. As a field, motivation researchers should start accumulating knowledge about how outcomes from set categories of goals may vary by the level at which the goal is measured. My dissertation will contribute a better understanding of how goals at different levels of one's environment might differ, and may also help clarify how different levels of goal orientation predict different outcomes.

Questions 3 and 4: Do course-level or project-level goal orientation and NFC predict learning (recognition learning and transfer) and engagement (transformative experience and project interest), controlling

for prior achievement? The aim of this set of research questions was to assess the predictive strength of the goal orientation categories and NFC on learning and engagement. My research contributes to the line of research working to understand who benefits from instructional techniques such as PBL. While research has suggested that PBL is effective at encouraging deeper levels of learning (Dochy et al., 2003) this might not be true for everyone. The results of my dissertation expand on prior research that I have been involved with (Russell & Pugh, 2010; Phillips et al., 2012) which aims to investigate what types of students might benefit most from a PBL method of instruction.

Overall, I found that mastery goal orientation consistently predicted higher levels of transformative experience, and inconsistently predicted project interest (with project-level mastery goal orientation) and transfer (with course-level mastery goal orientation). Course-level goal orientation was a significant predictor for transformative experience, and the sole predictor variable that was significant was mastery goal orientation. When utilizing project-level goal orientation, the regression equations for both transformative experience and project interest were significant, and the significant predictor variable for both cases was the project-level mastery goal orientation. For the construct of transformative experience, the finding that both course-level and project-level mastery goal orientation predicted TE is in line with prior research which has also found mastery goals predicted TE (Pugh et al., 2010). In terms of project interest, this finding is not extremely surprising, as other research has found that mastery goals predict interest (Harackiewicz, Barron, Tauer et al., 2002). It is quite

interesting that with project interest specifically, mastery project-level goals predicted project interest, but course-level mastery goals did not significantly predict project interest. This finding also supports research question two, indicating course-level and project level goal orientation represent different forms of motivation. After controlling for GPA, NFC, and other goal orientations, students who had higher levels of course-level mastery goals were more likely to do well on the measure of transfer. The connection between mastery goals and deeper types of learning, including transfer, is not a new finding (e.g., Midgely et al., 2001).

While the mastery goals at both the project and course level were predictive of some of the learning and engagement measures, the outcome and validation goal orientation categories did not seem to make much of a difference on the outcomes. In fact, in all of the regression equations I ran, the outcome and validation categories of course-level and project-level goals never were significant predicting variables of engagement or learning. Both results were somewhat surprising. While I did not make a specific prediction about outcome goals due to the lack of prior research, logic holds that students with higher outcome goals would typically perform better. It is possible that a ceiling effect was coming into played a role with these results. That is, the lowered variability for the outcome variable due to a ceiling effect may have reduced the predictability of the variable. The validation goal results went against findings from previous research which suggested students holding performance-approach goals may be perform worse on learning measures compared to students who

did not hold performance-approach goals in a PBL context (Russell & Pugh, 2010; Phillips et al., 2012). However, a broader look at the literature reveals that performance-approach goals (goals most closely related to validation goals) often yield inconsistent results in predicting achievement (Linnenbrink-Garcia et al., 2008). In this sense, the results of this study, paired with those of the prior study, fit within the larger literature.

The addition of need for closure to this project was to try to better explain why some students succeed or engage more than others in a PBL environment. However, the quantitative data yielded only non-significant findings related to need for closure. Need for closure is described as the desire to quickly and permanently seek answers to questions posed (Webster & Kruglanski, 1994). One possible reason why need for closure was not a significant predictor of learning or engagement might be due to the fact that the PBL unit featured a large amount of instructor scaffolding and structure. While students high in need for closure may not prefer a PBL-type learning environment, the structural elements provided by instructors may mitigate any negative effects which may have arisen in students high in need for closure. The results add to this line of research, and help further understand characteristics which might be beneficial to engagement and learning in a PBL setting.

Questions 5, 6, & 7: How do students experience the PBL unit, explain their goals, and describe the impact of group dynamics? From my qualitative investigations into the PBL unit, I found that students voiced both positive and negative experiences with the PBL unit. Many positive comments

were made about how they enjoyed and could see the PBL unit as effective. Students also talked about how they could relate and use the content they were learning to the real world, and some specifically mentioned relating the information to their future careers. These findings were similar to the qualitative findings from a study also on teacher candidates, but in the context of learning technology skills. Gulsecen and Kubat (2006) described students as viewing PBL as an effective and motivational instructional tool. A number of students in my study also voiced displeasure with the group elements of the project, citing social loafing (when students leave tasks for others to complete) and lack of control when working in a group as reasons for this discontent. Overall, while students had positive and negative views of the PBL unit, a number were vocal in their ability to connect the motivation material learned to their lives and future teaching careers.

In terms of goals, there was a range of responses, representing different levels of focus or notice of goals, both in general and specific to the PBL unit. Some students were not too vocal about the goals they set, or seemed a bit confused by the question about goals. At the same time, there were other students who talked about their goals in ways which we could generally categorize as mastery or outcome goals. Some students talked about how their main goal was to learn about their theory for the purpose of using the information. Other students stated that their goal for the project was to get an A. These findings support other studies which have found that students do not tend to report normative or ability goals when asked what their goals are (Lemos,

1996). Overall, students seemed to have more difficulty talking about their goals for the project compared to talking about the project in general.

One theme that emerged throughout the qualitative analysis of interviews was the impact of a student's group on his or her experience of the PBL unit. Students reported both positive and negative reactions to the group element of the PBL unit. Some students talked about how their group's positive rapport helped encourage and motivate them to do good work on the project. Past research on group work within a PBL context had a similar finding. Willis et al., (2002) reported that medical students experienced the highest levels of motivation within the PBL environment when they were members of groups which cooperated and worked effectively together. Other students had much more negative reactions to the group element of the project. Tipping, Freeman, and Rachlis (1995) reported similar findings in a qualitative observational study focusing on students perceptions of group dynamics in the context of PBL. They found that students tended to have low awareness of effective group dynamics. In addition, in groups which students reported as generally going well, observations of the groups reported several negative elements impacting group productivity (Tipping et al., 1995). Through the interviews, I learned about how the dynamics of the groups solidly impacted the students' experiences with the PBL unit.

Integrated Interpretations

Given the quantitative and qualitative portions of the data collection and analysis had different aims, these two sources of information answer to different

aspects of the study. The focus of the qualitative data was to help understand the students' experience with the PBL unit, including elements that pleased and frustrated them, how goals impacted their experience, and the influence of group dynamics on the students' experience of the PBL unit. I utilized the initial measures of course-level goals and need for closure to choose my interview participants; students with particularly high or low scores in goal or need for closure categories were invited to participate in the interviews. Of the 20 students I invited, I conducted interviews with 15 to better understand their experiences of the PBL unit.

Meanwhile, the focus of the quantitative data was to investigate the relationships between the selected variables. I collected all elements of the quantitative data prior to conducting the qualitative interviews. I completed the data collection in this order to reduce the likelihood of the interview to impact students' responses on the surveys or learning measures. One area over which the qualitative and quantitative data overlapped was on the topic of goals.

As discussed in the qualitative findings in Chapter 4, in the interviews students did talk about goals which fit into the mastery, outcome, and one somewhat from a normative category. I found this interesting, and it did fit with some prior research. Brophy (2005) wrote about how one of the problems with focusing on performance-approach goals was that students rarely generate such goals when asked what their goals were in open-ended fashion. In fact, in a study Lemos (1996) interviewed sixth graders to ask about the goals they held in the context of a specific classroom task. She then categorized the responses

from students into a number of goal categories that she created. While the typical mastery or learning-type goals were a category and she created a category of "evaluation goals" which were essentially like outcome goals (e.g. desire to get a good grade), there were no responses which represented competition or the normative element of performance-approach goals. The responses I investigated to the interview questions about goals resulted in a similar finding; while students would talk about outcome or mastery-type goals, only one student mentioned competition, and it was not in the context of his group (but rather in the context of negative group dynamics). If students are not responding to questions about the goals they hold with a high frequency of performance-approach or normative-type goals, how might this impact the findings from studies regarding these types of goals? It is intriguing that much time is spent by goal researchers and theorists on a category of goals which do not seem to appear too often when individuals are simply asked what goals they hold. My findings fall in line with previous research when students are asked to talk about goals outside the confines of self-report goal measures.

One additional area where quantitative and qualitative data intersected was on the topic of need for closure. In the qualitative data, there were some suggestions that sound indicative of need for closure (e.g. students talking about how they didn't like the non-specific nature of the problem, how they just wanted their questions answered in a straightforward way, or how they wish there was less ambiguity). I tried to match up comments that sounded indicative of need for closure with those participants' levels on the need for closure scale, but this

resulted in not much consistency, as the students who made the comments did not have particularly high levels of need for closure.

Limitations

As with any research project, the dissertation had some limitations because of the methodology utilized and how it may have impacted the outcome. One possible limitation and strength lies in the fact that three different instructors taught the students from which the participants were selected. The ANOVAs I performed suggest there were few significant differences between the instructors on the variables of interest. The exceptions was on the measure of project interest in which instructor 3's courses was statistically significantly lower than instructor 1's courses, and instructor 1's courses were lower (but not significantly so) than instructor 2's courses. These differences in project interest could have impacted analyses where project interest was an included variable, but it is unclear how these differences may impact analyses. However, including multiple instructors in the study strengthens the generalizability of the results. It is clear that the results are not limited to the unique practices and interactions of a single instructor.

A second limitation would be the high proportion of females within the sample for this project. The sample was 21.7% male and 78.3% female. While the breakdown of gender is fairly representative of a sample consisting of education majors, there is a high possibility that the results may not be similar to other student populations. For example, it is possible that this sample of elementary and secondary education majors may be more likely to adapt specific

types of goals, or that a category of goals may be particularly adaptive for this group. There is some research suggesting performance-approach goals are more beneficial for males (Bouffard, Vezeau, & Bordeleau, 1998; Butler, 1993), which may be part of the reason for the results I obtained. I think it would be illuminating and helpful if a similar study was implemented with a population of students who were not education majors, and a population which represented a more equal division of gender.

Another limitation within the methodology was the lack of a control group. All participants in this research took part in the PBL instructional method, meaning that I cannot compare any of the findings from this dissertation to instructional techniques besides PBL. In addition, all quantitative data are essentially of the correlational nature. Since there is only one group, essentially I am investigating the relationships between the predictor and outcome variables. This was an intentional choice—it was not my desire to compare engagement or learning outcomes from the PBL to other instructional methods; however, it is important to realize that the limitation on causality exists and must be taken into consideration.

An additional limitation to this study lies in the method used to gather all of the quantitative data: self-report. While many studies in the area of psychology utilize self-report data, it does come with a set of strengths and limitations. With self-report data, one depends on the participants to not only be aware of what the items are asking of them, but also the data depends on participants answering the items truthfully. It should be noted that the content of the PBL unit was the

topic of motivation, including theories such as goal orientation and interest theory. The possibility exists that students may have answered the self-report scales related to these topics differently having learned about them through the PBL unit. With the goal orientation items, particularly the project-level goal orientation items, students had already started to learn a bit about goal theory, as the topic the PBL unit covered was motivation. This knowledge about what types of goals are seen as most beneficial may have influenced how some students responded to items, particularly to normative items. Additionally, the need for closure scale touched on some areas of one's being which may be sensitive for some students. The likelihood that participants were fully aware and responded validly to the NFC scale may be a limitation to the results of the study.

Finally, there were a few anomalies in the data and results that should be addressed, as they may present limitations to interpretation. First, there were a few variables (particularly outcome goals) which had some fit statistics which suggested possible ceiling effects of the variables. One of the issues related to ceiling effects is the reduced variance in the variables, which can impact how the category functions in subsequent analyses. While I did have results that came out of another variable which was bordering on ceiling effects (e.g. mastery goals), the high skew and kurtosis statistics related to outcome goals may have limited the possibility of significant findings for the outcome goal categories. An additional anomaly in the findings was related to the transfer outcome. While course-level mastery goals were significantly predictive of transfer, project-level mastery goals were not. This might be a function of the borderline non-normal

descriptive statistics, or it could possibly indicate that transfer is more related to one's course-level motivation than one's project-level motivation. Regardless, it may limit the interpretation of the data, as may the other points which were discussed in the section above.

Implications

The implications of this research include a better understating about the students' perspective and experience of PBL, and understanding that PBL environments might impact individual students differently. Broadly, this research adds to the body of knowledge about constructivist and student-centered teaching techniques. From the results described above, it is clear that certain qualities (particularly mastery goals) that students either bring to the classroom or develop within the classroom may give that student an advantage in the areas of engagement and deep learning. Given these results, it might be helpful for teachers to recognize that some students may be more likely to benefit from a PBL setting in terms of transfer/deep learning and transformative experience compared to other students. In addition, teachers may be able to increase learning and engagement in a PBL context by creating a mastery-oriented environment. Teachers can utilize a number of strategies to foster a mastery oriented environment, such as de-emphasizing social comparison, treating mistakes as part of the learning environment, and avoiding public evaluation (Ames, 1992). Given the data, it might be particularly useful for teachers utilizing PBL to integrate some of these strategies into the classroom to increase the incidence of mastery goals.

The qualitative analysis of the interviews I conducted definitely works to provide a better understanding of the student perspective and experience of PBL. There are a number of implications that can be derived from this understanding. Students overall enjoyed and could see the benefits from the PBL unit, and some even suggested that the unit continue to be used. They thought that the problem of Calvin was a good way to convey motivational issues and to relate the motivation theories to a character with which many of them were familiar. Finally, the students did voice some frustrations with the PBL unit, many of which dealt with negative group dynamics. The complaints revolved around issues such as having one individual self-appoint him or herself as the leader, having more than one individual act as a leader, or the group members simply not getting along. One implication from this finding might be a suggestion to teachers who aim to successfully implement group projects to address not only time management skills, but also skills related to working successfully in a group. Ultimately, I hope that reading my research in the area of PBL will encourage teachers to recognize some of the aspects of students which may work to impact their perspectives and experiences of a PBL unit.

Recommendations for Future Research

There are a number of areas of this dissertation research project which could work to spawn new areas of research in the future. From my perspective, one of the most promising findings for future research would be further investigating the differences and similarities between goal orientation and goals students hold for particular educational activities. Research to further address

similarities and differences in goal orientation and task goals might help clarify some of the confusion currently in the literature about the connection between goal orientation and performance. When assessing outcomes such as engagement and learning, measuring goals at the level of the task (instead of at the trait or course level—as goal orientation does) affords a more specific understanding of these relationships.

The issue of level of measurement applies not only to the goal items, but also to the need for closure scale. The NFC scale was definitely designed to be a global measure, with vague questions like, “I don’t like situations that are uncertain.” With items such as these, the NFC measure necessarily gives a more global, trait-like version of NFC. I wonder if the results related to NFC might have been more informing and interesting if I had utilized an NFC measure aimed to assess a more specific or limited version of NFC. After I had completed the data collection, I did find a version of NFC items purposefully written to be more situated in a classroom environment (DeBacker & Crowson, 2008). I believe utilizing this scale in the future might provide more fruitful results in terms of the need for closure variable.

Another area of this research which might provide for some fruitful further research would be the conception of how to measure goals. I believe that further research into the influence of the normative element of the goals, and possibly exploring outcomes of more specific types of goals would provide a fruitful exploration in the future. If specific types or qualities of goals work to predict certain types of engagement or learning outcomes, this information might help

further the understanding of who benefits from PBL (or any other specific instructional method).

Additionally, while the whole sample was taking part in the PBL type of instruction, it would be quite illuminating to utilize the techniques described above related to the specificity of the goals measured and the division of categories measured to compare students in PBL to a more traditional form of instruction. I have worked on research projects comparing PBL to traditional instruction in the past, however without measuring goals at multiple times and with items derived directly from traditional goal orientation measures (e.g. the PALS). One issue with comparing instructional techniques would be having different instructors utilize the different types of instructional techniques. If this limitation could be dealt with (possibly by having one instructor teach multiple techniques), then it might be a good area to expand this research.

Conclusion

The results of this study support the results from other studies, which indicate PBL is particularly effective for encouraging the development of real-world application skills, greater engagement, and deeper learning. Given the nature of the participants being pre-service teachers, learning how to apply course material to real-world problems should be an important aspect of the students' studies. Students voiced this understanding in the interviews, and the quantitative data also supported this finding.

It is likely impractical to make all-encompassing statements about what types of goal orientations are most common and beneficial to students on the

whole. Instead, the focus should be on understanding which goal orientations are beneficial in which environments for which students. This study contributes to such an understanding by describing how students experience the PBL environment and suggesting that mastery goal orientation is advantageous to engagement and learning outcomes in a PBL environment.

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APPENDIX A

DEFINITION OF TERMS

Problem-based Learning – an instructional technique in which students are posed with a problem, and through solving the problem, they learn course content.

Mastery Goals – goals where individuals aim to develop competence.

Performance Goals – goals where individuals aim to demonstrate competence.

Performance-Approach Goals – goals in which individuals aim to outperform other students or achieve a specified end.

Performance-Avoidance Goals – goals in which individuals aim to avoid failing compared to other students.

Ability Goals – a specific type of performance goal, in which an individual validates his or her own ability by doing well on assessments.

Normative Ability Goals (aka Appearance Goals) - a specific type of performance goal, in which an individual focuses on demonstrating he or she can outperform his or her peers for the purpose of appearing smart.

Outcome Goals - a specific type of performance goal, in which an individual focuses on meeting some outcome, such as getting good grades or high test scores.

Normative Outcome Goals (aka Normative Goals) – a specific type of performance goal, in which an individual focuses on the outperformance of one's peers.

Need for Closure – a trait (that can be impacted by the environment) in which an individual seeks a solid answer to a question, as opposed to experiencing uncertainty and ambiguity.

Engagement – being focused on and invested in content being taught.

Interest – wanting to know or learn about something.

Transformative Experience – seeing the world through the perspective of the learned content and one's world-view being influenced through the application of recently obtained knowledge.

Transfer – applying knowledge learned in one context to another context.

APPENDIX B

INSTRUCTIONS TO STUDENTS FOR PBL UNIT

Your response team will create a wiki that (a) describes your motivational perspective and (b) analyzes Calvin and identifies solutions.

Description of your motivational perspective
The goal here is to explain your motivational perspective in a way that other teams can understand. Your description should address the following four questions:

1. *What are the main **motivational patterns** described by your perspective?* Identify these patterns and describe them in detail. For example*, Learned Helplessness* is one of the main patterns described by Attribution Theory.

2. *How do these patterns **influence learning and achievement**?* For each pattern you identify, describe the consequences. For example, a performance-avoidance goal orientation has a number of negative impacts on learning and school performance.

3. *What is the **cause** of these motivational patterns (i.e., why do students adopt these particular motivational patterns?)?* For each pattern, identify and describe the factors or conditions that influence students to adopt the patterns. For example, an autonomy supportive environment is one of the factors that influences students to be intrinsically motivated.

4. *What **teaching methods** are effective at fostering productive motivation patterns?* Identify and describe methods for fostering the positive motivation patterns related to your motivational perspective. Also, explain why these methods are effective. For example, using reflective journals is one strategy that helps foster self-regulated learning because they help students develop metacognition.

As part of this description, include at least one **figure, chart, or diagram**. Be sure to focus on *your motivational perspective* in addressing the above questions and back up your statements by *making references to the research*. *Cite* the sources of all the information you use. APA format is best.

Analysis of Calvin's motivational problems and suggestions for solutions
We're counting on your team to help us out with Calvin. Your report should thoroughly and thoughtfully address the following three questions:

1. *What is Calvin's motivational pattern?* In part 1 of the description, you identified the main motivational patterns described by your perspective. Now we need you to identify which of these patterns Calvin displays. Be

sure to refer to specific actions that illustrate which pattern(s) Calvin displays.

2. *Why does Calvin have this motivational pattern?* In part 3 of the description, you described factors that influence students' motivational patterns. Now use this information to figure out what is causing Calvin to display his particular motivational pattern.

3. *How can Ms. Wormwood foster a more productive motivational pattern?* In part 4 of the description, you identified teaching methods that foster productive patterns. Now explain how Ms. Wormwood could apply these methods to help Calvin. Provide specific examples and thorough explanations. Clarify how the methods will solve the cause of the problem (which you just identified in part 2).

As with the description, be sure you focus on *your motivational perspective* in addressing the above questions.

APPENDIX C

COURSE-LEVEL GOAL ORIENTATION ITEMS

Challenge-Mastery Items

1. I seek out courses that I will find challenging.
2. I really enjoy facing challenges, and I seek out opportunities to do so in my courses.
3. It is very important for me to feel that my coursework offers me real challenges.

Learning Items

1. I strive to constantly learn and improve in my courses.
2. One of my goals in class is to learn as much as I can.
3. It's important to me that I learn a lot of new concepts this year.
4. It's important to me that I thoroughly understand my class work.
5. In my classes I focus on developing my abilities and acquiring new ones.

Outcome Items

1. It is very important for me to get good scores on assignments and tests in my courses.
2. I really want to get good grades in my classes.
3. A major goal I have in my courses is to perform really well.

Outcome Avoid Items

1. It is important for me to keep from scoring poorly on assignments and tests in my courses.
2. I really want to avoid getting bad grades in my classes.
3. A major goal I have in my courses is to avoid performing badly.

Ability Items

1. It is important to me to confirm my intelligence through my schoolwork.
2. In school I am focused on demonstrating my intellectual ability.
3. One of my important goals is to validate my intelligence through my schoolwork.

Ability Avoid Items

1. It is important to me to avoid disconfirming my intelligence through my schoolwork.
2. In school I am focused on avoiding demonstrating my lack of intellectual ability.
3. One important goal of mine is to avoid validating my lack of intelligence through my schoolwork.

Normative Outcome Items

1. It is very important for me to do well in my courses compared to others.
2. A major goal I have in my courses is to get higher grades than the other students.
3. I try to do better in my classes than other students.

Normative Outcome Avoid Items

1. It is very important for me to avoid doing badly in my courses compared to others.
2. I try not to do worse in my classes than other students.

3. A major goal I have in my courses is to avoid getting lower grades than other students.

Normative Ability Items

1. One of my goals is to show others that I'm good at my class work.

2. It's important to me that other students in my class think I am good at my class work.

3. One of my goals is to look smart in comparison to the other students in my class.

Normative Ability Avoid Items

1. It's important to me that my teacher doesn't think that I know less than others in class.

2. One of my goals is to keep others from thinking I'm not smart in class.

3. One of my goals in class is to avoid looking like I have trouble doing the work.

APPENDIX D

PROJECT-LEVEL GOAL ORIENTATION ITEMS

Challenge-Mastery Items

1. I plan to seek out elements of this project that I will find challenging.
2. I really enjoy facing challenges, and I plan to seek out opportunities to do so during this project.
3. It is very important for me to feel that my work on this project offers me real challenges.

Learning Items

1. I plan to strive to constantly learn and improve during this project.
2. One of my goals for this project is to learn as much as I can.
3. It's important to me that I learn a lot of new concepts during this project.
4. It's important to me that I thoroughly understand my work during this project.
5. During this project, I will focus on developing my abilities and acquiring new ones.

Outcome Items

1. It is very important for me to get good scores on this project.
2. I really want to get a good grade on this project.
3. A major goal I have for this project is to perform really well.

Outcome Avoid Items

1. It is important for me to keep from scoring poorly on this project.
2. I really want to avoid getting a bad grade on this project.
3. A major goal I have for this project is to avoid performing badly.

Ability Items

1. It is important for me to confirm my intelligence through my work on this project.
2. During this project, I will be focused on demonstrating my intellectual ability.
3. One of my important goals for this project is to validate my intelligence through my work.

Ability Avoid Items

1. It is important for me to avoid disconfirming my intelligence through this project.
2. On this project, I will focus on avoiding demonstrating my lack of intellectual ability.
3. One of my important goals for this project is to avoid validating my lack of intelligence through my work.

Normative Outcome Items

1. It is very important for me to do well on this project compared to others.
2. A major goal I have for this project is to get higher grades than the other students.
3. I will try to do better on this project than other students.

Normative Outcome Avoid Items

1. It is very important for me to avoid doing badly on this project compared to other students.

2. I will try not to do worse on this project than other students.

3. A major goal I have for this project is to avoid getting a lower grade than other students.

Normative Ability Items

1. One of my goals for this project is to show others that I'm good at my work.

2. During this project, it's important to me that other students in my class think I do good work.

3. One of my goals for this project is to look smart in comparison to the other students in my class.

Normative Ability Avoid Items

1. It's important to me that during this project, my teacher doesn't think that I know less than others.

2. One of my goals for this project is to keep others from thinking I'm not smart.

3. One of my goals for this project is to avoid looking like I have trouble doing the work.

APPENDIX E

NEED FOR CLOSURE SCALE

1. I don’t like situations that are uncertain.
2. I dislike questions which could be answered in many different ways.
3. I find that a well ordered life with regular hours suits my temperament.
4. I feel uncomfortable when I don’t understand the reason why an event occurred in my life.
5. I feel irritated when one person disagrees with what everyone else in a group believes.
6. I don’t like to go into a situation without knowing what I can expect from it.
7. When I have made a decision, I feel relieved.
8. When I am confronted with a problem, I’m dying to reach a solution very quickly.
9. I would quickly become impatient and irritated if I would not find a solution to a problem immediately.
10. I don’t like to be with people who are capable of unexpected actions.
11. I dislike it when a person’s statement could mean many different things.
12. I find that establishing a consistent routine enables me to enjoy life more.
13. I enjoy having a clear and structured mode of life.
14. I do not usually consult many different opinions before forming my own view.
15. I dislike unpredictable situations.

APPENDIX F

TRANSFORMATIVE EXPERIENCE MEASURE

1. During class time, I thought about how motivation applies to real-world situations.
2. I thought about my own behavior in terms of the motivation ideas we learned about in class.
3. I thought about the motivation ideas we learned when attending or studying for other college classes.
4. I found myself thinking about the motivation ideas we learned in class even when I was not in class.
5. I used the motivation ideas we learned in class outside of school.
6. I used the motivation ideas we learned in class even when I didn't have to.
7. I sought out opportunities to use the motivation ideas we learned.
8. I talked about the motivation ideas we learned in class even when I was not in class.
9. I talked about the motivation ideas learned in class just for the fun of it.
10. During class, I thought about student behavior in terms of the motivation ideas we learned.
11. I think about student behavior differently now that I have learned these motivation ideas.
12. I think about people differently now that I have learned these motivation ideas.
13. When observing classrooms, I noticed examples of the motivational problems we learned about in class.

14. When I observed abnormal behaviors in real-life, on TV, or in books, I thought about these behaviors in terms of the motivation ideas we learned in class.

15. I noticed examples of motivational problems in my everyday life that I would not have noticed before.

16. The motivation ideas we learned changed the way I see people even when I am not in class.

17. I can't help but see people in terms of the motivation ideas we learned.

18. I found it interesting to learn about motivation ideas in class.

19. I found it exciting to think about the motivation ideas we learned in class even when I was not in class.

20. The motivation ideas we learned in class are useful for my future studies or work.

21. The motivation ideas we learned in class were useful in my everyday life.

22. The motivation ideas we learned in class made my current interactions with other people more meaningful.

23. The motivation ideas we learned in class made people's behavior much more interesting.

APPENDIX G

PROJECT INTEREST MEASURE

1. I enjoyed what we learned from this project.
2. To be honest, I didn't find this project very interesting.
3. I would like to share the information I received from this project with others.
4. I found the content for this project interesting.
5. The material covered for this project grabbed my attention.
6. This project was boring.
7. The information from this project was new to me.
8. I found this project to be relevant for me.
9. What we learned from this project is important for me to know.
10. Overall, I found this project to be engaging.
11. The information I learned from this project is irrelevant to my future goals.
12. What we learned from this project is fascinating to me.
13. What we learned from this project can be applied to real life.
14. I found this project to be meaningful to me.

APPENDIX H

MOTIVATION LEARNING ASSESSMENT

1. Three of the following students are showing signs of self-regulated learning. Which student does *not* show any evidence of self-regulated learning?

a. As Adam studies his German vocabulary words, he occasionally stops to check himself to see which words he needs to study further.
b. Blake knows that for purposes of college admission, his performance in math class is more important than his performance in drama class, so he works harder in the first class than in the second.
c. Craig beams with pleasure when his teacher praises his English essay, because her opinion of his work is very important to him.
d. Drew thinks to himself, "I really don't understand this section on quadratic equations. Tomorrow I'll ask my teacher if she can help me make sense of it."

2. Three of the following teachers are using strategies that should promote self-regulated learning. Which teacher, while almost certainly helping students learn more effectively, is probably *not* promoting *self-regulated* learning?

a. Ms. Henry recruits several parents to provide one-on-one tutoring for students who are having difficulty in a particular subject area.
b. Mr. Isaacs gives his students several criteria they can use to evaluate their own research papers.
c. Mr. Jankowski has his students work in small groups to study various endangered species.
d. Ms. Lin requires all her students to do projects for the school science fair, but she lets them make their own decisions about the nature of their projects.

3. Which one of the following students is displaying *intrinsic motivation*?

a. Annette loves to play the viola and so practices for at least an hour every day.
b. Bob works hard in his classes because his parents have promised to buy him a car if he gets at least a 3.5 grade-point-average this year.
c. Cassie does her math homework faithfully every night because she likes her teacher and wants to please him.
d. Dennis takes physics because he wants to become an engineer and make a lot of money.

4.You're teaching the times tables to your third-grade class. Today you plan to give a timed test of multiplication facts. Your goal is to promote *intrinsic motivation*. Given what we know about intrinsic motivation, which one of the following strategies should be most effective?

a. Promise five minutes of free time to students who get a certain number of items correct.
b. Tell students that you expect them to get a certain number of items correct.
c. Encourage students to see if they can do better on the test than they did last time.
d. Put a shiny gold star on every perfect test paper.

5. Three of the following strategies should engage students' *interest* in class material. Which one is *least* likely to do so?

a. Have each student dress up and act as a different character's lines when the class is reading the play *Our Town*.
b. Ask students to imagine what it must have been like to live in medieval England.
c. Show students a scientific phenomenon that isn't what they'd expect to happen given their existing beliefs about the world.
d. Tell students if they will be rewarded with a piece of candy for answers they give in class.

6. Which one of the following illustrates *personal (or individual) interest* rather than situational interest?

a. Jennifer is puzzled when a peeled hardboiled egg is suddenly sucked into a bottle after the teacher lights a fire inside the bottle.
b. Trent gets totally wrapped up in the new adventure novel he reads during free time.
c. Victoria loves ballet and wants to become a ballerina when she grows up.
d. Riley can't wait to find out what's in the big cardboard box his teacher has brought to school today.

7. Which one of these students most clearly has a *performance-approach goal*?

a. Frank finds a homework assignment too easy to waste his time with.
b. Herb frequently asks questions in class in order to understand the information better.
c. Selena decides to enter the school science fair in hopes of impressing her teacher, classmates, and parents.
d. Rita was somewhat disappointed about her last test score in math. Realizing that people learn from their mistakes, she decides to study harder for the next test using different study strategies.

8. Identify the student who appears to have a *mastery goal* rather than a performance goal.

a. When Abby gets a new assignment, she likes to set it aside for a day or so before she actually begins to work on it.
b. Bonnie is a perfectionist who gets upset when her test performance is anything but A+.
c. Cora is easily distracted by the many stimuli competing for her attention in the classroom.
d. When given the choice between taking an easy class or a more challenging one, Dana chooses the challenging one.

9.Which one of the following students is attributing success or failure on a geology test to an *internal* source and thinks the cause is *unstable* and *controllable*?

a. Jane said she failed the test because it was too difficult.
b. Duncan said he did well on the test because he studied hard.
c. Emily said she did well on her test because she is smart in science.
d. Joe said he studied hard, but he failed because he is just not good in geology.

10.A student who has developed *Mastery Beliefs* about his or her spelling ability is most likely to say which of the following?

a. “I have to work harder than my friends to learn to spell.”
b. “I can learn how to spell words correctly if I put forth the effort.”
c. “How well I do depends on how hard the words are.”
d. “I would learn to spell eventually, but it’s not worth the time it would take to do so.”

Dave is in fifth grade and is one of the worst students in his class. He feels that regardless of what he does, the result will be poor performance. Dave avoids setting goals for himself or planning how to study. Instead, he utilizes strategies which he believes will keep his teacher and classmates from concluding that he lacks ability, but unfortunately these same strategies prevent him from getting smart. Dave will do things like ask the teacher many questions, but when it comes to actually completing assignments, Dave will copy his neighbor’s work or ask other classmates for the answers. When he is supposed to be working on assignments or tests, he will complete many unrelated and unnecessary tasks, such as sharpening his pencils and tying his shoelaces. Dave uses these distractions to avoid looking incompetent and to make it look like he’s not even

trying. Dave is convinced that he will fail even if he does try. He believes that he lacks the ability to do well in school.

Analyze this student's motivation as completely as possible in terms of the applicable motivational theories you have learned in PSY 347 this semester.

Sally is a straight-A student in her senior year of high school. In many ways Sally is considered a perfect student; she is well behaved, dependable, and highly motivated. Sally is motivated, but only to achieve high grades and the subsequent respect of her teachers. She avoids any situation that might result in a grade lower than an A (she has withdrawn from several classes after receiving Cs on quizzes early in the semester). Sally follows directions on assignments perfectly, is careful to set goals for her courses, manages her time well, and follows all rules set out by authority figures. Unfortunately, Sally does not allow herself to be challenged, and in fact has dropped courses in which she had interest simply because the course seemed too hard. For Sally, learning is what you do in school; it brings As, but no joy or excitement. She sometimes shows interest in class when a teacher does a creative demonstration or when she works on a collaborative project, but she has not developed an interest in any of the school subjects.

Analyze this student's motivation as completely as possible in terms of the applicable motivational theories you have learned in PSY 347 this semester.

APPENDIX I

TRANSFER ITEM SCORING RUBRIC

For coding the open-ended items on the learning assessment, addressing each theory is scored on a 0-4 scale (students were not expected to address each theory). The scores are then totaled for each of the two items. After coding has been done by 2 individuals, the scores should be compared and any disagreements remedied (talk about and decide on the final score). Report all scores (both of the initial decisions, as well as the agreed-upon final version).

Self-Regulation Theory Answer	Score
No mention of self-regulated learning (planning, goal setting, emotional regulation, self-monitoring, self-evaluation, self-reflection, effective strategy use; or mention SRL stages: (1) Forethought/Prior to Task, (2) Performance/During Task, (3) Reflection/After task).	0
Referenced the theory, but did so incorrectly OR a weak response (it's not clear whether they are referencing the theory or not). Sample responses: • Dave doesn't plan well	1
Mentioned and accurately labeled self-regulation theory or components. Sample responses: • Sally is self-regulated and uses self-monitoring behaviors. • Dave is not self-regulated and he does not use effective strategies.	2
Mentioned self-regulation theory or components, accurately labeled behavior, and provided some accurate explanation or elaboration. Sample responses: • Sally is very self-regulated. She uses self-monitoring behaviors such as finishing her assignments on time and manages her time well.	3
Answer basically focused on self-regulation theory, completely analyzing the situation in terms of self-regulation theory. Basically, 4s are reserved for the best examples of elaboration. Sample responses: • Sally is a great example of a self-regulated learner. She exhibits activity in all the stages of self-regulated learning, including the forethought (carefully selecting the courses she takes), performance (she gets high grades), and reflection (she resolves to make good decisions in the future). Etc…	4

Self-Determination Theory Answer	Score
No mention of self-determination theory (intrinsic vs. extrinsic motivation; 3 basic needs: competency, autonomy, relatedness; or the regulation continuum: external regulation -> introjected regulation -> identified regulation -> integrated regulation -> intrinsic motivation).	0

Referenced the theory, but did so incorrectly OR a weak response (it's not clear whether they are referencing the theory or not). Sample responses: • Sally is competent. • Dave is not intrinsically motivated.	1
Mentioned and accurately labeled self-determination theory or components. Sample responses: • Sally is only extrinsically motivated. • Dave lacks self-determination.	2
Mentioned self-determination theory or components, accurately labeled behavior, and provided some accurate explanation or elaboration. Sample responses: • Sally has a great amount of extrinsic motivation. She wants to appear to be so smart and motivated to everyone around her. • Dave needs to be intrinsically motivated at and outside of school in order to adjust his thinking and hopefully change his behavior and attitude about learning.	3
Answer basically focused on self-determination theory, completely analyzing the situation in terms of self-determination theory. Basically, 4s are reserved for the best examples of elaboration. Sample responses: • Sally displays extrinsic motivation and some introjected regulation. She only cares about…Like other extrinsically motivated people she avoids challenges. The teacher's use of rewards may have undermined her intrinsic motivation.	4

Attribution Theory Answer	**Score**
No mention of attribution theory (3 factors: stability (stable/unstable), locus (internal or external), and controllability (controllable/uncontrollable); including learned helplessness or mastery beliefs*)	0
Referenced the theory, but did so incorrectly OR a weak response (it's not clear whether they are referencing the theory or not). Sample responses: • Sally feels her success is uncontrollable. • Dave uses many attributions to explain his failure.	1
Mentioned and accurately labeled attribution theory or components. Sample responses: • Dave shows learned helplessness. • Dave blames his failure on external (or internal) and uncontrollable factors.	2
Mentioned attribution theory or components, accurately labeled behavior, and provided some accurate explanation or elaboration. Sample responses:	3

• Dave is attributing his failures to many factors outside of himself, including distractions and unnecessary tasks. This leads Dave to learned helplessness, where he feels that no matter what he does, he will fail.	
Answer basically focused on attribution theory, completely analyzing the situation in terms of attribution theory. Basically, 4s are reserved for the best examples. Sample responses: • According to attribution theory, Dave explains his performance in school as internal, stable, and uncontrollable. He feels he is not smart, and that this fact is not going to change, so it really impacts how he thinks about school. He does not feel competent, this lack of confidence occurs most of the time in school, and he feels like it is something he cannot control. This might lead to…	4

*Learned helplessness = attribute failure to uncontrollable causes. Uncontrollable, stable, internal causes are the worst (e.g., I just can't do math). Mastery beliefs – attribute failure to internal, controllable causes such as effort, strategy, accumulated knowledge/skill.

Interest Theory Answer	**Score**
No mention of interest theory (situational vs. individual/personal interest, catch/triggered, hold/maintained, emerging individual interest, well-developed individual interest).	0
Referenced the theory, but did so incorrectly OR a weak response (it's not clear whether they are referencing the theory or not). Sample responses: • The teacher is not creating interest. • Sally is not interested.	1
Mentioned and accurately labeled interest theory or components. Sample responses: • Sally shows situational interest in some cases, like demonstrations. • Sally shows lack of personal interest, which decreases her motivation.	2
Mentioned interest theory or components, accurately labeled behavior, and provided some accurate explanation or elaboration. Sample responses: • Sally lacks individual interest in her courses at school, and even if she does show interest in a topic, that interest is not strong enough to override her desire to get straight As.	3
Answer basically focused on interest theory, completely analyzing the situation in terms of interest theory. Basically, 4s are reserved for the best examples. Sample responses:	4

• In light of interest theory, while Sally shows a general lack of personal interest in the school courses, she sometimes shows situational interest. For example, Sally is generally not interested in the classes she takes, but she does find demonstrations the teacher does of interest. In fact, Sally has actually avoided situations where she could take classes within her personal interest, choosing instead to go for the classes in which she knows she could get good grades. This might lead to…	

Goal Theory Answer	**Score**
No mention of goal theory (performance-approach, performance-avoidance, mastery goals, self-handicapping).	0
Referenced the theory, but did so incorrectly OR a weak response (it's not clear whether they are referencing the theory or not). Sample responses: • Sally has goals. • Dave avoids his work. (unless it seems they're referencing work-avoidance orientation)	1
Mentioned and accurately labeled goal theory or components Sample responses: • Sally is good at setting goals, although the goals are more performance goals and not mastery goals. • Dave lacks goals and shows self-handicapping behaviors	2
Mentioned goal theory or components, accurately labeled behavior, and provided some accurate explanation or elaboration. Sample responses: • Dave's goals fall into the performance-avoidance category, because he tries to avoid looking stupid in class and when it comes time to do work, Dave avoids it by doing things that are off task. • Goal theorists would say that Dave is only worried about performance goals and how he looks in front of others instead of mastery goals and trying to really excel at a subject.	3
Answer basically focused on goal theory, completely analyzing the situation in terms of goal theory. Basically, 4s are reserved for the best examples. Sample responses: • David is a great example of someone who holds performance-approach goals. Since David feels that he isn't smart, he focuses on trying to avoid actually looking unsmart, by focusing the teacher's (and other students') attention on his misbehavior, as opposed to his perceived lack of ability. David solidly does not hold mastery goals, since he doesn't	4

APPENDIX J

INTERVIEW QUESTIONS

1. Did the motivation project interest you?
    a. Did you see it as novel? Did you see it as useful?
2. How would you describe the dynamics of your group? (How did your group get along?)
    a. Did this impact your work? Outcome?
    b. [Did someone take a leadership role in your group?]
    c. How were decisions made?
3. What goals (if any) did you set for the motivation project?
4. Did your goals change during the project?
5. Were your goals for the project different than goals you typically set?
6. [How did you assess whether or not you had met your goals?]
7. If you had a friend who was going to take this class next semester, what would you tell them about this project?
8. Overall, what did you think of the project?
    a. [Frustrations? Things you really liked?]

APPENDIX K

IRB APPROVAL

Email correspondence indicating IRB approval:

Hi Cassie,

Please go ahead and give two copies of this to IRB with the following additions changes.

1. Add how many participants approx.
2. Say you will erase recordings three years after the study. They are god to keep to back up transcripts.
3. Add all the information to the consent form on how you will guard the recordings and when you will erase the recordings.

Nice job with your IRB. As soon as you submit you may start the study.

Best Wishes,

Maria

From: <Russell>, Cassendra <Cassendra.Russell@unco.edu>
Date: Thursday, June 28, 2012 12:14 AM
To: Maria Lahman <maria.lahman@unco.edu>
Subject: IRB for dissertation

Hi Maria-
I hope your summer has been going well! I took a bit of time off (I definitely needed the down time), and have been working on stats consulting and proposal revisions.
I have a good draft of my IRB that I have run by Dr. Pugh, and I was wondering if you wouldn't mind taking a look at it. I have a meeting with Dr. Pugh set for Friday, and I should have the signed cover letter at that point.
Thank you for taking a look at the IRB application, and I look forward to any comments you might have on it.
Take care, Cassie