EFFECTIVE STRATEGIES FOR FOSTERING MOTIVATION: AN ANALYSIS OF RESEARCH ON CULTIVATING MOTIVATION AND ENGAGEMENT

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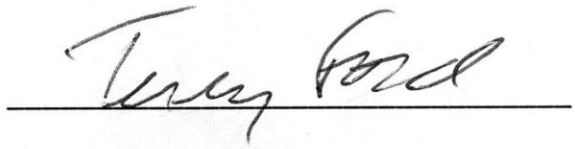

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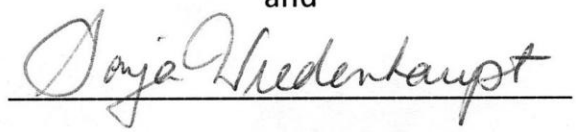

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ABSTRACT

This paper examines effective strategies for cultivating motivation, thereby fostering situations in which students choose to engage themselves in the learning process. An analysis of findings explicates that the following all promote motivation: intrinsic/mastery goal orientation; incremental intelligence theory; programs that incorporate problem-based learning and/or students' needs for challenge, interesting activities, and choice; and appropriate feedback.

TABLE OF CONTENTS

TITLE PAGE i

APPROVAL PAGE ii

ACKNOWLEDGEMENTS iii

ABSTRACT iv

CHAPTER 1: INTRODUCTION 1

Introduction 1

Rationale. 2

Controversies 6

Definitions 7

Limitations 10

Summary 10

CHAPTER 2: HISTORICAL BACKGROUND 11

Introduction 11

Foundational Research 11

Student Focused Education 14

The New Millennium 15

Summary 17

CHAPTER 3: CRITICAL REVIEW OF THE LITERATURE 18

Introduction 18

Goal Orientation 18

Problem-Based Learning 36

Attention to Students' Needs 55

Experimental Programs Employing Multiple Variables 75

Feedback and Communication with Students 82

Summary 91

CHAPTER 4: CONCLUSION 95

Introduction 95

Summary of Findings 96

Implications for Teaching 101

Suggestions for Further Research 117

Conclusion 122

REFERENCES 128

CHAPTER 1: INTRODUCTION

Introduction

What are effective strategies for promoting motivation in classrooms? There must be methods that we, as teachers, can use to better support our students' motivation to participate in the learning community and engage themselves in the learning process.

My personal draw to this subject is to learn strategies to engage students and encourage intrinsic motivation. In my future middle school science classrooms, my personal ideal engagement will involve participation in activities, thinking analytically about every assignment and activity, and possessing an internal locus of control in the feedback they seek for their effort. This idealized situation is based on my values as both a student and an educator. How I foster intrinsic motivation will be influenced by the results of my literature review.

Of the many debatably effective strategies, this paper will focus on five: 1) supporting mastery goal-orientation; 2) problem-based learning projects (PBL); 3) students' needs; 4) alternatives related to problem-based learning; and 5) feedback and communication.

By strategies, I mean methods and tactics that teachers can do in the classroom, via specific lessons, instructional styles, didactic tools, attitudes and practices, etc. The effective strategies that I compile can be used by other educators as well. Many teachers and educational staff struggle with students' lack of motivation to do the assigned work and/or to engage on a deeper level. When we know what methods work

most successfully, we can stop wasting our time and energy on less constructive methods.

Rationale

It is commonly understood that learning is influenced by motivation (Loyens, Rikers, & Schmidt, 2006). Many professional educators and psychologists describe motivation as a processes mediating behavior. It can arouse/instigate behavior, give it direction/purpose, or encourage it to continue (Wlodkowski, 1984). Motivation is also the process that prompts and sustains goal-directed activity (Pintrich & Schunk. 1996). Motivation to learn is having a mind to study, willingness to spend time studying, and interest in one's studies (Loyens, Rikers, & Schmidt, 2006). When they are motivated, students will be more likely to embrace and continue though challenging activities, as well as enjoy their accomplishments (Liu, 2006). Motivated learners persist when faced with a challenging task (Vogler & Bakken, 2007) and so motivation substantially impacts both learning and achievement (Liu, 2006).

Stimulating interest for secondary students can seem nearly impossible (Gehlbach, Brown, Ioannou, Boyer, Hudson, Niv-Solomon, Maneggia, Janik, et al., 2008). Some studies tightly tie interest to motivation, while other studies say that interest is an actual component of motivation (Gehlbach et al., 2008). Hidi and Renninger stated (as cited in Gehlbach et al., 2008) that interest was a psychological state in which one engages with objects/events/ideas over a given time period. This connects to my lens for this paper, saying that engagement demonstrates motivation.

Engagement is both an aspect of, and the context of, the relationship between a person and their activities through the perspective of that person. An example is someone and their societal framework or the media they are using (Azevedo, 2006). Vygotsky would likely agree with this definition based in social context. Engagement is dependent on students' necessity for self-expression and competence development. High engagement refers to circumstances in which someone: is given other options but still chooses to begin, persist, invest, and positively affect an activity (Azevedo, 2006). Clearly, high engagement is an external manifestation of internal motivation. Even with all that we have learned about engagement, its lack is still a rampant epidemic in our school systems (Azevedo, 2006).

Middle school is a particularly important time for motivational development. Extensive research shows that students are extremely likely to lose scholastic motivation and interest as they progress through and beyond middle school grades. This dramatic degeneration in motivation is consistent throughout the USA and other western countries, as well as across subject matter (Gehlbach et al., 2008). According to Dweck (2000), this is when they become exceedingly vulnerable to negative motivational variables. She stated that in elementary school, teachers often create low-stakes environments where students are safe from failure. Then in middle school, work becomes more difficult, less personalized, and more focused on grades. She claimed that this change can lead to lower achievement for performance-oriented students, but that mastery-oriented students are more likely to step up to the challenge and apply the extra effort. This argument inspires me to use whatever methods are available to

nurture a mastery-oriented environment in my classroom. Middle school students are commonly acknowledged to be a challenge to engage in scientific inquiry in particular (Harmer and Cates, 2007).

Reported by the 2002 National Center for Educational Statistics, even though 92.7% of students demonstrated understanding of the basic scientific principles, still, 42.1% were not able to apply those concepts, and less than 11% was able to actually analyze information (Harmer and Cates, 2007).

> "According to the National Science Board's report 'Science and Engineering Indicators 2006,' American students perform among the lowest internationally in the fields of science, technology, engineering, and mathematics (STEM). As the need for educated professionals in these areas skyrockets, some observers say schools do not adequately prepare students for careers in these fields, resulting in a significant lack of student interest" (Bernard, 2009).

One goal behind encouraging interest in middle school science is that if students enjoy it, they may be more likely to choose a scientific career in the future (Liu, 2006).

> Obama addressed our country, saying that "a half century ago, this nation made a commitment to lead the world in scientific and technological innovation . . . and I'm challenging states to dramatically improve achievement in math and science by raising standards, modernizing science labs, upgrading curriculum, and forging partnerships to improve the use of science and technology in our classrooms. I'm challenging states, as well, to enhance teacher preparation and

training, and to attract new and qualified math and science teachers to better engage students and reinvigorate those subjects in our schools" (Revkin, 2009).

This is why motivation in science is so important, not just achievement. We want our students to be prepared to consider future jobs in the science field, not simply to pass classes. We want them to be interested, engaged and intrinsically motivated to keep learning and creating. After age 11, students can experience a deteriorating attitude toward science, which may be in part, due to *how* science is taught (Liu, 2006). That is why I am making a making motivation a priority in my science classes for this critical age.

I am aware of my assumptions in the importance of motivation, based on my own experiences working with today's youth, and as a youth myself. I believe that motivation will help students to learn and think using higher order thinking skills (Bloom's taxonomy), as well reach more advanced levels of achievement. I also assume that both environment and teachers can impact students' motivation in the learning process. I feel that intrinsic motivation, as opposed to extrinsic, will lore students away from disconnection (manifested through lack of participation, not completing assignments, or simply doing the work to receive a pleasing grade) into engaged learning. Lastly, I am biased that higher order thinking resulting from motivation, is more valuable than pleasing grades.

Intrinsic motivation is when an activity is interesting and fulfilling in and of itself (Deci & Ryan, 1985). Intrinsically motivated activities serve as the reward themselves, rather than a means to an satisfying end (Deci, 1975) and the reason for doing the

activity is the activity itself instead of gains external to the activity (Schaffner & Schiefele, 2007). If we can reinforce intrinsic motivation for the process of learning, then our students will receive the most valuable lesson of all: passion for learning. They will be more likely to naturally engage in higher order thinking skills. Affecting students' behavior this way is certainly advantageous for maintaining an orderly learning environment or for encouraging students to complete their work, but can it help them learn?

Controversies

There are multiple controversies within this subject. Some studies use slight differences in definitions of terms, as I have shown in my definition section of chapter one. Some show benefits from external rewards and praise, or debate the effectiveness of intrinsic vs. extrinsic motivation. There are also the questions of how to measure effectiveness of motivation or if motivation is even directly relevant to bettering academic achievement. Extrinsic motivation is the intention to do the activity because it leads to positive consequences, such as praise. Amabile, 1983; Deci & Ryan, 1985; Pintrich & Schunk, 2002; and Schaffner & Schiefele, 2007, state that extrinsic motivation may have negative effects on deeper or complex learning because learners are more focused on intentional results rather than the content or process of learning. Yet these negative effects may not occur for simple learning such as memorizing facts (Butler, 2006). Deci & Ryan, 1985; Pintrich & Schunk, 2002; and Schiefele & Schreyer, 1994, state that intrinsically motivated learners use learning strategies more frequently and put-forth more effort than extrinsically motivated learners.

There is some debate over the relationships between interest and motivation. Some believe that that situational and individual interest always lead to motivation. Eccles-Parsons (as cited in Gehlbach et al., 2008), stated that someone can be interested in a domain without actually being motivated to pursue that topic. Intrinsic motivation is the intention to read a given test because its content is interesting, personally relevant, challenging, or enjoyable. So the reason for doing the activity is the activity itself instead of gains external to the activity (Schaffner & Schiefele, 2007). A long standing disagreement over the benefits of extrinsic motivation exists.

Definitions

Mastery goals are a part of intrinsic motivation to learn, whereas performance goals lead to extrinsic motivation. According to Dweck (as cited in Azevedo, 2006), sustained engagement is a product of mastery goals, and disengagement is a product of performance goals. Goal orientation is a result of intelligence theory. Dweck (1986) said that how students define intelligence is part of their motivational process. The two theories of intelligence are entity and instrumental-incremental theory. Entity theory sees intelligence as uncontrollable, stable (consistent) and global (inability crosses domains and subject matter). Incremental theory says that intelligence is unstable, controllable, and subject to effort.

Problem-based learning (PBL) is a learning process that gives students specific real-world-case-like problems that require reason, questions, critical thinking, research, organizing information, and explanation. The thinking process and cooperative group work are more important than the solution (Cerezo, 2004). Students may be more

motivated if their instructional materials encourage self-determination, autonomy, choice, and challenge (Liu, 2006), all of which are woven into the structure of PBL lessons. PBL prepares students for the skills needed to solve problems in their future working worlds (Tarhan and Acar, 2007). Self-determination is having the freedom to choose one's own path and actions, and is considered a valuable aspect of engagement and motivation (Azevedo, 2006). It is also a valuable aspect of PBL. Constructivism, ill-structured problems, authentic task, and other strategies are related to the concepts founding problem based learning, and are later discussion topics. There have been several concerns with the outcomes or practicalities of PBL, and these controversies are addressed in chapter three.

Constructivism is one of the founding principles of Problem-Based Learning. Constructivism is a philosophy based theory of how people learn, and concentrates on learners actively engaging to create meaning. It is a knowledge construct because interpreted information builds upon prior knowledge. For the cooperation aspect, the process of learning is the embodiment of the thought line one's knowledge acquisition process is scaffolded by social interaction and negotiation (Loyens, Rikers, & Schmidt, 2008). The broad term constructivist learning encompasses multiple teaching applications, such as PBL. All of these applications are based on four ideas: knowledge construction, self-regulated learning, cooperative learning, and the employment of authentic, educational problems. Some argue that a constructivist learning environment promotes motivation (Loyens, Rikers, & Schmidt, 2008).

Self-regulation is the degree to which students metacognitively , motivationally, and behaviorally participate in their learning process. Also, it is the process that students use to activate and sustain their thoughts, behaviors, and emotions to reach their goals. According to Zimmerman (as cited in Sungur & Tekkaya, 2006), self-regulated students set goals effectively, plan and use strategies to achieve their goals, manage resources, and monitor their progress. This goal managing can be directly related to motivation (Sungur & Tekkaya, 2006). In terms of self-regulated learning, self-efficacy (a variable of motivation) is strongly correlated to PBL (Cerezo, 2004). This ties into self-efficacy, which is a students' beliefs about their capability to learn or to perform effectively (Sungur & Tekkaya, 2006).

Authentic work creates connections between the real world concerns and the students, while imparting a sense of ownership over the finished product (Azevedo, 2006). It is also a potentially important aspect for successfully implementing many alternative lesson styles such as Problem-Based Learning and constructivist assignments. "Student autonomy is an important condition for active self-regulated learning. Learning environments that do not allow students to make decisions have a negative impact on motivation. Opportunities for autonomy direct students' learning processes and promote their interest in learning and mastery of skills and therefore imply an allocation of responsibility" (van Grinsven & Tillema, 2006). This is a quality that constructivist lessons can promote.

The final section of chapter three discusses feedback and communication. This encompasses instructional wording, verbal responses, and praise. All of these topics,

but especially praise, are practices that have been debated for some time, and varied perspectives of these will be addressed in the third chapter.

Limitations

The main limitation of this paper is the current inability to conduct official, scientific, personal research to follow up on the findings discussed in chapter three. Although the body of research in this area is growing, every study deals with its own limitations as well. The number of participants and repeated trials, the environmental instability of field research, and even some of the researchers' resources or ability to design statistically valid studies - all affect the growth rate of substantiated knowledge on this subject matter.

Summary

The purpose of this paper is to obtain and analyze effective strategies for promoting motivation in the classroom. My personal draw to this subject is to learn strategies to engage students and encourage intrinsic motivation. What are these methods for better supporting students' motivation to participate in the learning community and engage themselves in the learning process? Next, chapter two will cover a brief history of this field. Then chapter three will summarize and analyze 30 research studies on motivational strategies. Finally, chapter four will recap the entire paper and answer, 'so what . . . why does any of this matter in the real-world classroom?'

CHAPTER 2: HISTORICAL BACKGROUND

Introduction

Research shows that there was no clear distinction in time when student motivation became commonly recognized as correlated or causally related to student success in the classroom. The sheer number of articles dealing with motivation in education in the last half century show that motivation has become a popular topic in the academic field. This history chapter will review various views on scholastic motivation, beginning with foundational research, moving to student focused education, and closing with research of the new millennium.

Foundational Research

In the early 1980's, Wlodkowski defined motivation by saying, "Most psychologists and educators use motivation as a word to describe those processes that can a) arouse and instigate behavior; b) give direction and purpose to behavior; c) continue to allow behavior to persist; and d) lead to choosing or preferring a particular behavior" (Ray, 1992, p. 3). Before that, Alfred Adler, in the field of Individual Psychology in the early 1900's, thought that motivation was based in social goals, such as attempting superiority over themselves and other people, and escaping inferiority (Ray, 1992). Much of the research conducted on engagement has been through the field of psychology rather than education (Azevedo, 2006). Some of the psychological constructs of motivation that people have studied include goals, intrinsic vs. extrinsic, interests, and engagement. It has become customary to measure these motivational

variables via questionnaires, which usually ranks participants' responses using a Likert-scale (Azevedo, 2006).

Anxiety can affect motivation according to Karen Horney's ideas in the 1930's and 1940's. She believed that there are three categories of needs that motivate different behaviors. We may have a need for power (moving against people), a need for love (moving toward people), or a need for isolation (moving away from people). These are all behaviors that we see in our students. If people are well-adjusted, they will move between these various strategies to meet their needs; however, people with neuroses will have focused motivational strategies and will only use one method no matter the situation (Ray, 1992). Being mindful of the relationships between these behaviors and their motivations (moving against, toward, or away from people in an attempt for power, love, or isolation) may help us to utilize the methods discussed in the next chapter with our students in real life conditions.

Since at least the early 1900s with John Dewey's research, educators have been wanting to understand student engagement (Azevedo, 2006). He brought motivational ideas into the context of scholastics and concentrated on institutional goals. Dewey recognized that children's needs and experiences were of great consequence. He also delineated the need for individualized education, allowing students to have a say in their focus of study (Dewey, 1938). Even if he did not use the word 'motivation,' he was still one of the first researchers to encourage these motivational strategies.

Both Dewey and Maria Montessori, during the same time period, pushed for awareness of the learning environment and the individual student's needs. Montessori

was a strong believer in supporting the child's personal interests and motivations in terms of subject matter and speed of progression. She pioneered an international school system based on such principles, introducing these ideas to the masses (Montessori, 1967).

Hull was a behaviorist who, unlike Skinner, believed in inner processes such as motivations beyond mere instincts (Ray, 1992). Behaviorism has had such a significant impact on educational philosophies, so having Skinner dismiss the importance of motivational inquiry may have hindered the draw for research done on links between motivation and learning.

Maslow was a humanistic psychologist whose hierarchy of needs has been quoted in countless papers on motivation, or really any topic related to learning or behavior. He believed that all of our motivations are based on striving to meet our five levels of needs. Our basic needs are, from lowest to highest: physiological, safety, love, esteem, self-actualization (Maslow, 1965).

Our physiological needs, our most basic, must be met before we can move to higher levels (Ray, 1992), or before we can focus on anything more psychologically complex, such as learning. This ties into what Wlodkowski says about needing appropriately timed bathroom and recess breaks to support students' continued motivation (Ray, 1992).

According to Maslow (1965), intrinsic motivation is required for self-actualization, and without it, people develop pathologies. He described self-actualization as "experiencing fully, vividly, selflessly, with full concentration and total

absorption. It means experiencing without the self-consciousness of the adolescent" (p. 75). He also says that to be self actualized is to think for yourself, to discover what you enjoy, and to be motivated to work hard toward your goals.

Student Focused Education

In the last few decades, school systems have begun to give students' needs a central role in the teaching process (Loyens, Rikers, & Schmidt, 2008). Over the last three decades specifically, psychological basis of learning shifted from teacher-centered to student-centered approach (Sungur & Tekkaya, 2006). One of major lines of thought in this sector is about Problem-Based Learning (PBL). Starting as a method to engage students struggling with their study of medicine, in the mid-1960s McMaster Medical School in Canada created PBL so that their students could solve realistic problems in preparation for the ones they would face after graduation (Chung and Chow, 2004; Sanchez, Neriz, & Ramis, 2008). In 1986, Barrows stated that motivation was one of the educational objectives that students could attain while working with PBL (Chung and Chow, 2004). PBL is now used in a wide variety of school systems worldwide in the field of education (Sanchez, Neriz, & Ramis, 2008). More recently, technology has been found helpful in simulating engagement. In the late 1990's, multiple researchers suggested using computers to scaffold students with the process of PBL, for those who were not yet familiar or comfortable with this learning style (Zumbach, Kumpf, and Koch, 2004).

A more recent idea, stemming from internal verses external motivators, is the idea of goal orientation. Dweck (1999), Butler (2006), and other researchers have found

that people had different degrees to which they interpreted their ability and intelligence in terms of being fixed (entity theory) or effort-dependent (incremental theory). Mueller, Dweck, and many others (as cited in Butler, 2006) showed that it is motivationally beneficial to teach students that their success was attributed to effort rather than intelligence.

The New Millennium

A motivational focus does not often go hand in hand with the goals of American public schools, who's main goals are to create workers for our economy who will blend into our social systems. Throughout the history of American schools, children were expected to be submissive and industrious (Spring, 2005). Whether or not they were motivated to learn seems to have not come into play for main stream education. Student-centered classrooms did become trendy in the 1960's but they were not widely accepted or utilized (Spring, 2005). Even in today's elementary classrooms, often times work is encouraged with prizes such as candy or stickers, rather than encouraging work through identifying what students need to be intrinsically motivated.

Our administration's strategy of No Child Left Behind, passed in 2001, focuses on standardized testing and preparation for the work force (Spring, 2005) not leaving much room in the curriculum for attention to what individual students need to be motivated to learn. Stress from standardized testing can leave teachers racing through subject matter with no time to tie lessons to students' lives or interests (Gehlbach et al., 2008). It is important to note that of the many U.S. government websites, very few of them

have any statistics linked to motivation. This may show that motivation is not yet considered significant by governmental agencies.

The Education Resources Information Center (ERIC) is an international database of educational literature. ERIC has 37,161 articles with 'motivation' as a keyword, and 3,325 articles with the word 'motivation' in the title. According to the information presented in Table 1, the number of education articles published each decade seems to be fairly steady since the beginning of the ERIC database in 1966 (these figures were collected mid-April, 2009, via the ERIC Advanced Search). As a comparison, Table 1 includes the temporal trends of total articles with the keyword 'Education' added to ERIC each decade. For the most part, these numbers are fairly steady as well, suggesting that the percentage of all educational articles dealing with motivation has been steady over the last five decades. These figures show that Motivation has remained of consistent importance in the field of educational writing in the last 50 years.

Table 1: Trends in Eric.
(Trends in # of Articles about Motivation:
# of Articles in the ERIC database dealing with 'Motivation')

Decade of Records	# of Articles with 'Motivation' in the Title	# of Articles with 'Motivation' as a keyword	For Comparison: # of Articles with 'Education' as a keyword
1966(Yr. ERIC started)-1969	114	1,841	24,160
1970-1979	810	9,042	221,327
1980-1989	603	8,601	238,318
1990-1999	828	8,802	248,382
2000-2009	964	8,258	179,749

Summary

Motivation is certainly a popular topic in educational research and philosophy, starting as early as the late 1800's or possibly before. Despite the prevalent theories and theorists supporting the importance of motivation, our educational system in America has yet to embrace these ideas in its day to day classes. The following chapter will review current research that suggests methods for incorporating motivational methods in the classroom.

CHAPTER 3: REVIEW OF RESEARCH ON MOTIVATIONAL STRATEGIES

Introduction

Chapter one discussed the purpose of this paper, which is to obtain and analyze effective strategies for promoting motivation in the classroom. It asked, what are these methods for better supporting students' motivation to participate in the learning community and engage themselves in the learning process? Chapter two explained that motivation is a popular topic in educational research and philosophy, but despite the prevalent theories and theorists supporting the importance of motivation, our educational system in America has yet to embrace these ideas in its day to day classes. Chapter three reviews professional literature researching methodology for fostering motivation. Five sections make up the body of chapter three: Goal Orientation, Problem-Based Learning, Attention to Students' Needs, Experimental Programs Employing Multiple Variables, and Feedback and Communication with Students. Each section explores a themed group of the 30 investigated studies. The examination of each study will summarize, evaluate, and discuss the research question, participants, methods, results, and validity, in order to determine effective strategies for promoting motivation.

Goal Orientation

The six studies below review intelligence theories and goal orientation with the lens of fostering motivation in the classroom. These studies include strategies that might impact student motivation, such as lessons teaching about incremental

intelligence theory, and context such as general encouragement of incremental theory and mastery goals or evaluation anticipation.

Dweck (1986) stated that how students define intelligence is part of their motivational process. The two theories of intelligence are entity and incremental theory. Entity theory sees intelligence as uncontrollable, stable (consistent) and global (inability crosses domains and subject matter). In layman's terms, students who hold entity beliefs think that no matter how hard they try, they can never become more intelligent. Incremental theory states that intelligence is unstable, controllable, and subject to effort. In other words, students who hold incremental beliefs think that if they put forth more effort, they are capable of becoming more intelligent. Intelligence theory leads to goal orientation.

Goal orientation is one aspect of motivation, determining whether the motivation is intrinsic or extrinsic. Research in this field utilizes a variety of terminology to reference two types of goals. The difference between the two is when someone is "striving to acquire and improve skills and understanding verses striving to maintain self-worth by demonstrating superior, or masking inferior, ability" (Butler, 2006, p. 596). Terms commonly used to name these two goals are as follows, respective to Butler's two previously stated definitions: learning verses performance goals (Dweck, 1986); mastery verses ability goals (Butler, 2000); intrinsic verses extrinsic goals (Vogler & Bakken, 2007). The first study uses the terms mastery and ability goals.

Vogler and Bakken (2007) asked what motivates students to persist and seek challenges in their learning, and investigated this question through the examination of

students' goals, beliefs about intelligence, and behaviors. They tested four hypotheses that are relevant: entity beliefs would be positively related to performance goals; entity beliefs would be negatively related to learning (mastery/intrinsic) goals; learning goals would be negatively related to avoidant behaviors (showing lack of motivation); motivation variables (beliefs about intelligence, goals, and behaviors) would be domain specific.

Subjects in this study were from four elementary schools from a large, urban district and were specifically chosen as representative of an ethnically and socioeconomically heterogeneous sample. From 16 classrooms, 287 students participated. Two fourth grade and two fifth grade classes from each school participated, which made up 75% of the students from those 16 classes (the other students choose to not participate).

Measurements of entity theory belief were based on Dweck's work, and included questions such as "My intelligence in reading is something about me that I can't change very much." To avoid confusing their young subjects, they only asked about entity theory beliefs, not incremental. The questionnaire statements had high internal reliability, high test-retest reliability, and was a measure of intelligence theory independent of respondents' sex, age, political affiliation and religion. All statements were administered in one sitting.

Domain-specific statements were preceded by a small box with directions to write a few words or draw a picture of themselves in their class of that domain, along with verbally directed visualization technique to help ensure that students were focused

on the appropriate domain. All directions and statements were read aloud to not create a disadvantage for students with low reading proficiency. Surveys covered multiple subscales of motivational variables, including intelligence beliefs and mastery/learning goals. For the relevant variables, this study used paired t-tests to analyze the data.

As hypothesized, this study found a negative trend between entity beliefs and mastery/learning goal-orientation for math, and a significantly negative correlation between entity beliefs and mastery/learning goal-orientation for reading.

This was a quantitative, one shot, correlational study. With no experimental treatment variable, it is challenging to account for internal validity. This study focused on grade school students instead of middle school students, so the possibility of generalizing for older age groups is uncertain. Although the experimenters chose schools with diverse racial and socioeconomic backgrounds, how cultural/locality variables might cause different results is a question. The next study will deepen the exploration of the links between intelligence theory, improved grades, and motivation.

Blackwell, Trzeniewski, and Dweck (2007) conducted a two part quantitative study. The first part of the study has three focuses: to find relationships between students' beliefs that intelligence is malleable (incremental theory) and changes in test scores over two years of junior high school; to find relationships between students' beliefs that intelligence is fixed (entity theory) and changes in test scores; and to explain why those relationships exist using motivational variables.

There were 373 junior high school students who participated over four groups of entering 7th graders. The pupils represented diverse gender and ethnic groups (198

girls). Overall, they were moderately high-achieving in their 6th grade math standardized test scores. The researches controlled for the differences between four cohorts per class.

This was a five year longitudinal study of four waves of junior high school students, measuring correlations between beliefs in implicit theory, motivational variables, and math grades over a two year period (7th and 8th grade) for each student. The researchers chose to focus on math because it is considered a topic challenging enough for students' success to be effected by motivational patterns related to theory of intelligence, whereas these patterns may not affect a less difficult subject.

At the beginning of 7th grade, subjects filled out a motivational profile questionnaire assessing their ideas of intelligence (fixed or malleable), goal orientation, beliefs about efforts, and helplessness response to failure. The five motivational variables measured on the 6-point Likert-type scale questionnaire. Scores ranged from pure entity theory beliefs to pure incremental theory beliefs. The effort beliefs section measured beliefs that effort improves outcomes. Measuring subject's reaction to scholastic challenge, both positive strategies and helplessness responses to failure portion described a hypothetical failure scenario and students said what they would think and do in response to that situation. Their spring quarter, 6th grade math test scores acted as controls for previous mathematical achievement. Teachers used math teaching styles considered typical for public schools. Tests, homework, a project, and class participation for each class determined math grades. The students took four math standardized tests over the two years of junior high, one in both Fall and Spring of both

years. To analyze the data, the researchers created a path model and then used OLS regression and the Sobel test to assess the significance each of the model's mediational pathways.

They found a positive correlation between a belief in incremental theory of intelligence and each of the four motivational variables (effort beliefs, learning goals, low helplessness attributions, and positive strategies), each with an r between 0.34 and 0.54. Each of those variables were positively correlated with each other, each with an r between 0.34 and 0.72. These motivational variables were not correlated with their 6th grade math test scores (each r between -0.09 to 0.09), meaning that a participant's motivational profile didn't relate to these students' grades until they entered junior high school. Students with both incremental and entity theory ideas about intelligence did not significantly differ in their math scores before junior high school, but began to show more and more contrasting levels of success with each test over the two years.

Incremental theory beliefs predicted more positive motivational patterns, which lead to higher math scores. Their model was as follows: "Incremental theory of intelligence lead to positive effort beliefs and learning goals, which in turn lead to fewer ability-based, helpless attributions and more positive strategies, which in turn lead to improved grades" (p. 252). This model has never been tested in full but other research has longitudinally tested parts of this model in real-world environments.

This study has controlled for the factors that affect internal validity. The combination of the large sample size, four years of students being tested, and four cohorts per year, moderated history effects. Maturation is certainly happening over the

two years that these students are observed, but both the incremental and entity theory groups have equal opportunity for maturation. Since this questionnaire is about personal beliefs, not knowledge, there is no concern for students becoming test-wise. They also did a did a test-retest reliability measure over a two week period, using an n of 52 for all four tests, with reliability ranging from 0.63 to 0.85 each time. This study included an explicit description, and the large sample size longitudinally spread over five years helped to control for other variables. Although the strength of both sections of this two-part study is consistent, the second half is a whole new line of research.

The second part of Blackwell, Trzeniewski, and Dweck (2007) conducted was an intervention with lessons on incremental theory. These researchers asked, if students were taught to think about intelligence as being malleable, then would they demonstrate higher levels of motivation and effort in class, and would they scholastically achieve more than peers who were taught useful skills other than incremental theory?

In a New York City class of 99 ethnically diverse students (49 girls), 91 seventh graders voluntarily participated in this study. They were low achieving with their 6th grade standardized math tests and 79% were eligible for free lunch. This study did not draw from the same school as the previous one. The experimental group had 48 students while the control group had 43. Both groups did not significantly differ in their motivational profiles or fall math grades.

Sixth grade math grades determined students' prior achievement, while final grades for Fall and Spring in 7th grade determined growth curves. This study used the

same Likert-scale questionnaire as the previous study to measure motivational profiles (intelligence theory, effort beliefs, learning goals, low helplessness attributions, and positive strategies) for each student at the start of 7th grade.

They taught interventions in 25-minute periods, once a week, over eight weeks, for both groups. Students were randomly assigned to a group of 12-14 students, then each group was randomly assigned to be part of the experimental or control group. Students were told "they had the opportunity to participate in an 8-week workshop in which they would learn about the brain and be given instruction that could help them with their study skills after which they would receive a certificate of completion." Both groups participated in similar workshops.

This intervention was based on theory-altering experimental materials created in previous lab studies. The main message was that "learning changes the brain by forming new connections, and that students are in charge of this process." The information was presented through readings with analogies and examples, and through activities and discussions. These workshops were taught by trained undergraduate assistants, with two teachers per workshop – one was a man and one was a woman, and one was White and one was African American or Hispanic, to reduce variables introduced by the teachers.

Students took non-graded multiple choice quizzes (the same for both groups) on content at the end of each workshop. Students were told that they would received a certificate of completion at the end of the workshop series, independent of their quiz answers. To measure possible changes in motivation profiles at the end of the

workshop series, both groups re-took the questionnaire three weeks after session eight. Their math teacher cited which students showed changes in their motivational behavior over spring term, and described these changes. These were blind observations because this teacher did not know that there were two groups. The researchers used a one-way ANOVA to verify that there were no significant differences between groups. They used a paired sample t test to analyze the data comparing the experimental verses control group lessons, then continued to the significance of their findings by using a 2 x 2 [(experimental vs. control) x (pretest vs. posttest)] ANOVA with the pre-post scores as a repeated measures variable. To test that the experimental intervention was the turning point for the experimental group's grade shift, they created a Level 1 equation using dummy codes for the time segments prior and post knot point (intervention).

Achievement growth curves were determined by three scores: Spring 6th-grade, Fall 7th-grade, and Spring 7th-grade math grades. Scores on the content quizzes were statistically similar between both groups for shared content, and the experimental group scored significantly higher than the control group on incremental theory content. The experimental group participants' more strongly agreed with the theory of intelligence after the intervention, while the control group participants remained the same. The math teacher's reports of students' motivational changes showed that 27% of students in the experimental group showed positive change, where as only 9% of the students in the control group showed positive change. Coders for the math teacher's qualitative observation notes were blind to the condition, and intercoder agreement was 100%. These results show that the theory of intelligence message was successfully

taught to the experimental group, and that shared content was equivalently taught between groups.

There was a significant effect of experimental condition on the change in grades across the intervention. The overall grades declined, as is a common trend in junior high school transitions. This decline was eliminated for those in the experimental condition within a few months of the intervention.

This was a randomly assigned pretest/posttest, control group, true experimental design, which controls for history, maturation, testing, instrumentation, regression, selection, and mortality. This design shows excellent internal validity. By having a control group with equivalent workshops, they controlled for possible Hawthorn effects and novelty. They lessened experimenter effects with their intentional teacher placements. Since the 'testing' scoring was done via regular class grades, there was limited concern for pretest or posttest sensitization. They statistically checked for multiple-treatment interference.

On the less generalizable side, this is a one-time study on a small sample size of less than 200 in one school. If this study can be repeated in other locations, with multiple cultures and scholastically achieving students, then it will have high external validity. This has strong internal validity by design. Although the researchers statistically controlled for many possible interfering variables, they realized that this study needed to be repeated with a larger sample size. None of the following are repeated studies, but the last three studies in this section delve deeper into the links

between motivation and goal orientation by looking at context. These next two examine how goals and context combined affect motivation.

Song and Grabowski (2006) examined the relationship between goal orientations and motivation, and the variables of instruction, choice, and evaluation. The 90 sixth graders participating in this study were volunteers from a single Northeastern US, mostly White middle school. From several science classes, students were randomly assigned to one of four treatment groups, two of which were learning-oriented and two of which were performance-oriented.

All of the classes had access to equal resources, including a computer for each pair of students. Using a web-based, PBL tutorial system adapted for this experiment called Kids as Airborne Mission Scientists, students received a mission request letter asking them to investigate then write a report for NASA. As with other PBL programs, the multiple layers needing to be considered made this an ill-structured problem. It lead students to specify, define, then investigate the problem, and then to propose a group solution and present a final individual solution. The lesson spanned three 45-minute sessions, and then was followed by Likert-scale questionnaires measuring students' intrinsic motivation and goal-orientation. The test scored between 0.78 and 0.89 for internal consistency.

The variables altered for the two treatments were task design, distribution of authority, and evaluation practices. For the learning-oriented group, students received learning-goal oriented instructions accentuating the value of learning and challenge. Second, navigation buttons allowed for students to choose activities that they found

more interesting. Third, students were evaluated privately. For the performance-oriented group, the directions focused on the importance of performance. Second, the activity was structured so that students had no choices. Last, students were evaluated publically and the two best papers were displayed prominently. The researchers used either a 2 x 2 ANOVA or a 2 x 2 MANOVA to examine the relationships in the data between each variable.

Results showed that students in the learning-focused group had significantly higher ratings of motivation than students in the performance-focused group. These findings are consistent with those from other studies that the researcher read, as well as the studies included in this paper.

The internal validity of this quasi-experimental, quantitative study was peer reviewed and used negative case analysis. Although it did not have a control group, the comparison of the two treatments helped to reduce history, maturation, and instrumentation effects. Having two teachers for each treatment slightly moderated experimenter effects caused by the different teachers for each treatment. Both lesson types were so similar that compensatory effects were not likely.

The last two studies in this section investigate how goals and the context of the activities affect intrinsic motivation specifically, starting with the assignment of goal orientation, matching or non-matching the goal orientated environment.

Harackiewicz (1998) examined the relationships between mastery- and performance-oriented goals in neutral and performance-oriented purpose goal

contexts. Purpose goals are the 'why' someone does something, whereas target goals are the 'how.'

Investigating how college students' intrinsic motivation for pinball was affected by their target and purpose goals, the 110 participants (56 female)were randomly selected from a pool of college students and blocked on achievement orientation. Participants were randomly assigned to one of the five treatment conditions, consisting of a control, purpose goals in a neutral or performance context, or target goals in a performance or mastery context. Each participant played two games of pinball and experimenter control fudged their scores to be sure that everyone met their assigned goals. Before, between, and after the two games, students reported their process measurements. They measured intrinsic motivation via a free-choice period, and measured task enjoyment through the self-reported Likert-type scale. The same two experimenters (each blind to either the condition or the goal assignment) conducted the sessions for each group, and tape recorded them for standardization. The neutral goal group thought that the research was to gather their opinions of the pinball machines. The performance purpose goal group understood that the research was on how well they played compared to others. The mastery target goal group thought that the research was to help them develop their skills and gauge their progress. To examine the predictor variables' affects on the intrinsic motivation indexes, as well as to test for mediation of these direct effects, researchers used multiple regression analysis.

In a neutral goal environment, participants who were assigned mastery target goals rated more enjoyment and intrinsic motivation than those who were assigned

performance purpose goals. Yet, the performance purpose goals group actually ended with more intrinsic motivation in a performance goal context, relative to mastery target goal or no assigned goal groups.

This study was a quantitative pretest/posttest, control group, true experimental design, which substantially builds its internal validity. In addition, they included negative case analysis, and multiple tests serving as triangulation. The researchers made a blanket assumption that university students enjoy pinball and think that pinball proficiency is advantageous. This assumption was at the foundation of their hypothesis, but is clearly not consistently accurate.

Knowing what these students' initial goal orientation was, prior to partaking in this study would be advantageous. Assigning goals to students does not necessarily mean that those students embraced those goals or allowed their effort to be affected by them. Assigning a performance-oriented person with a target/learning goal may simply lead that person to 'meet' the target goal with the actual purpose-intension of 'looking good' for the experimenters. Perhaps more environmental cues would be necessary to truly effect someone's internal goals. Hopefully this study will be repeated in a way that allows the participants more buy-in to their assigned goals.

It would be helpful to see this study repeated with an additional group placed in a mastery target goal environment to see if the aligned or misaligned goal and goal environment are equivalent for both goal-orientations. As an additional note, the age group of this college-focused study may reduce its generalizablity to middle school students. The final study in this section does deal with 7th and 8th graders, and

continues investigating how context affects motivation. Differing from the previous two studies that use goal orientation as an aspect that creates context which then affect motivation, this one uses goal orientation as a resulting effect of context.

Butler (2006) hypothesized that evaluation anticipation was a strategy that indirectly fostered motivation. Of her many questions, the one relevant to the focus of this paper is: in what specific ways will anticipation of temporal evaluation (a score at the end of each problem, based on improvement of skill use) versus normative evaluation (one final score at the end, based on accuracy of their answers) influence intrinsic motivation and beliefs about ability by influencing students' initial goal orientation?

Butler's 312 participants were secondary students in Jerusalem (160 females) in nine classes from four junior high schools. Their ages were 13-15, with mean age 13.9 years old, grades seven and eight. Students were able to be used only if they and their parents consented. They were randomly assigned one of the three experimental instructional conditions by row.

This study consisted of four basic steps. 1) Experimental instructions were given to all three randomly assigned groups. 2) Students than took a pre-assessment survey measuring their mastery/ability goals. 3) Next the students completed tasks expecting the experimental variable evaluation, meaning that they would expect to receive normative evaluation, temporal evaluation, or no evaluation. 4)Finally students took two additional surveys measuring intrinsic motivation and entity belief.

One of four female college students lead each group procedure. Subjects were given one of three sets of directions, telling them that they would receive normative evaluation (one final score at the end, based on accuracy of their answers), temporal evaluation (a score at the end of each problem, based on improvement of skill use), or no evaluation. Instructions for the normative evaluation group indicated that they would received one overall score for the text, that would show how well they did compared to the other studies. Instructions for the temporal evaluation group said that students would be given scores on each problem, in the order that the problems were presented – showing progress as opposed to one overall score. The directions included an example of raising, stable, or declining scores. Instructions for the no-evaluation group said that the students could keep their work. Likert-scale surveys measured mastery and ability goals after the students received the varied directions, and before they worked on the task. Following the task, students rated their perceived performance, than took additional surveys to measure their intrinsic motivation and entity beliefs. Researchers used post hoc comparisons to analyze the data.

Students who anticipated normative evaluation (final percentile score) were more likely to identify with ability goals than mastery goals, whereas students who anticipated temporal evaluation (scores on each problem) were much more likely to identify with mastery goals than ability goals, and students who anticipated no evaluation were linked to both goals. Scores for early problems were similar in each experimental group, whereas scores for the later problems were highest in the temporal evaluation group. Acquisition of new strategies was marked only in students in the

temporal evaluation anticipation group, linking temporal evaluation anticipation to deeper thinking compared to normative or non-evaluation anticipation. Students anticipating temporal evaluation scored significantly higher intrinsic motivation compared to students who anticipated no evaluation. Students who anticipated no evaluation scored significantly higher interest compared to students who anticipated normative evaluation. Initial (mastery vs. ability) goals significantly correlate with intrinsic motivation and entity beliefs. Students who perceived that they had performed successfully scored significantly higher interest than those who thought that they had performed poorly. Low levels of perceived performance were linked to entity beliefs more than high levels of perceived performance. Anticipation of temporal evaluation was linked to performance improvement more than was anticipation of normative evaluation. Students who anticipated normative evaluation scored significantly higher for entity beliefs, compared to students who anticipated temporal evaluation. For the no evaluation group, entity beliefs scored between the other two groups without a significant difference from either. In summary, more students who anticipated temporal evaluation, compared to no evaluation or normative evaluation, built greater intrinsic motivation and task interest. Also, more endorsed mastery goals, as opposed to ability goals, which reduced their entity beliefs.

This is a control group, pre-test, post-test experimental design. Internal validity, history, experimental mortality, and maturation are controlled. Since this was a one-time manipulation/survey with experimental treatment diffusion, compensatory effects (rivalry of the control group and equalization of treatments) should not be a concern.

By randomly assigning students within each class (as opposed to classes as a whole) into all three experimental groups, Butler controlled for experimenter and environmental difference factors, and therefore, multiple-treatment interference. Comparison groups control for the hawthorn effect, novelty and disruption, instrumentation, testing, and experimenter effects.

The findings of these six studies stated that: entity beliefs lead to performance goals rather than mastery goals; incremental beliefs lead to higher test scores, possibly due to more positive motivational patterns; these incremental beliefs could be taught, leading to higher motivation, effort, and grades; context mattered as a learning focused group was more motivated than a performance focused group; assigned goals and the goal orientation context of an activity interacted to affect participants' levels of intrinsic motivation, as those assigned mastery goals in a neutral goal oriented setting rated higher enjoyment and intrinsic motivation than those assigned performance goal, whereas those assigned performance goals in a performance goal oriented setting actually rated higher intrinsic motivation than those assigned mastery goals in the same setting; and that anticipation of temporal, verses normative, evaluation lead to higher intrinsic motivation and mastery goal orientation.

The overall conclusion was that entity beliefs could lead to mastery goal orientation, which could lead to higher test scores, effort, enjoyment, and/or motivation, especially intrinsic motivation. Another conclusion was that the context of the activity could affect goal orientation and motivation both positively and negatively.

Problem-Based Learning

By analyzing seven studies, this section shows that Problem-Based Learning (PBL) fosters motivation. PBL is a learning process that gives students specific real-world-case-like problems that require reason, questions, critical thinking, research, organizing information, and explanation. The thinking process and cooperative group work are more important than the solution (Cerezo, 2004), which is shown the be successful and effective in ages ranging from public school like many of these studies, to the college level like this next study.

Sanchez, Neriz, and Ramis (2008) studied students' understanding of both content and meaningful learning strategies after PBL activities, and surveyed motivation. Subjects were university students from an engineering economics class required almost universally for North and South American engineering programs. This study provided no data on their ages or backgrounds. Using 70 non-randomly chosen engineering economics college students from the Universidad de Bio-Bio, Chile, evaluations for this study ran during regular class time. These students worked together in groups of four, focusing on one macro problem and typically around seven smaller problems over the course of a semester. To solidify their information in their limited time, groups jigsawed with other teams. To analyze the data, this study used chi-squared tests.

Student surveys illustrated an increase in motivation levels, as well as their satisfaction and commitment to learning. The overall study, including the side-focus about motivation, was a qualitative, pre-experimental descriptive research design.

Although the motivation section was not incorporated into the pre and posttests of the rest of the study, it was a result of two years of research. Without a comparison group, the typical effects of history and maturation arise. The researchers did not report conducting a single method of insuring credibility. The longevity of this study helps to counter balance these lacking aspects of internal validity. As for transferability, the description of the treatment is vague, and novelty may be affecting the results. There is no description of their survey process, nor example responses. It is also important to note that this is a study on university students, which shows that PBL appears to be successful across age groups. However, this study was valuable to show consistency in the relationship between PBL and motivation because it concured with other similar studies revealed below.

Tarhan and Acar (2007) analyzed the effectiveness of PBL in reducing misconceptions in chemistry compared to traditional lectures. These 40 eleventh grade chemistry students (averaging age 17) were from middle class families in a large city in Turkey. With 20 students randomly assigned to each group, there was no significant difference between the experimental and comparison groups. Prior to treatments, all students attended lessons and studied on their own to be sure that they shared the same background knowledge on the subject. Based on a heterogeneous blend of pre-test scores, the researchers divided each groups' 20 students into five subgroups of four.

Both groups learned the same subjects and information, and were lead over three class periods. In the traditional lecture-based group, they were passive learners,

hardly asked any questions, and did not use the library or internet. In the PBL group, they started off by reviewing the goals of PBL, learning their roles as group members and students, and defined their own rules for the project. The teacher carefully monitored the group work and guided discussions as needed. Students worked with guiding questions to scaffold their prior knowledge on the subject. At the end of the first day, groups developed hypotheses and created their research strategy. Before the next class, they collected needed information. On the second day, students shared their information and held discussions on how to revise and test their ideas. Then on the third and final day, groups discussed their ideas before presenting their solutions to the class. After the PBL treatment, the researchers interviewed, and audio-recorded, the teacher to learn her opinions and observations about the differences between the two treatments. They also conducted recorded interviews of the students, but did not specify how they analyzed the responses.

In their post-treatment interviews, students expressed enjoyment of, and interest in, the PBL style relative to their past experience with lectures. The teacher's interview responses substantiated those of the students. She observed more learning motivation in the students participating in the PBL lesson than those given the lecture lesson. It is important to note that she also found that a few students were not motivated to participate because they did not enjoy group work.

The motivational portion of this study is a posttest only control group design. Although most of the study is quantitative and highly valid, the portion about motivation is qualitative and not as well-founded. Examining internal validity, having a

statistically equal comparison group strengthens the reliability of its results. On the other hand, the unsubstantiated nature of the semi-structured interview responses does not. In regarding to the external validity of this study's motivation segment, it explicitly describes the single treatment. The teacher had experience with similar teaching styles, so PBL was not new to her. Although she taught both classes, one doesn't know if she may have consciously or subconsciously wanted one of the treatments to be more successful. There may be substantial novelty effects since these students had never before dealt with PBL. The researchers did not do any of the normal qualitative credibility checks since the interviews about motivation were only one small part of the study. This study is not strong enough to stand alone, but it is in agreement with the other studies. This next one built on the above studies and created a list of methods and tactics for executing PBL activities successfully.

Chung and Chow (2004) collected and used student feedback on their PBL experience, to implement and evaluate a revised PBL program. It provided additional methods for successfully implementing PBL to foster motivation. This course was built around a PBL program and lasted 14 weeks, using 113 college students. Over that time, they used 28 hours to brainstorm, search for resources, hold discussion, and share their findings. Eight hours were designated for lectures to address key concepts or questions. As a way to assemble information on students' experiences with the initial PBL program, students wrote reflective journal entries on their thoughts about the methodology, and then 13 students gave interviews to provide more details about their insights. The researchers measured student motivation via a five-point Likert scale, as part of the

Student Feedback Questionnaire. The first year, 51 students (only 58% of those enrolled) completed the pre and posttest questionnaires. The second year, 62 students (72% of those enrolled) completed both questionnaires. Researchers used the Model of Human Occupation to analyze the qualitative data, and t-tests to analyze the figures.

The feedback from the first year contributed to the design of the following year's revised PBL program. These changes involved: giving fewer cases but having those cases progressively increase in complexity; using real clinical cases; providing key words and concepts, and a coverage checklist as scaffolding; leaving more time for presentations and follow-up discussions; giving immediate performance feedback; posting the best work to encourage and reinforce performance; as well as making the assessment methods directly correspond with the learning objectives.

The change in student motivation scores after completion of the revised, second-year PBL program was significantly higher than after the original, first-year PBL program. The researchers argued that this second version was far more successful because it was based on the expressed needs of the students. They believed that these students' motivation increased because they felt in control of their own learning process.

The internal validity was weaker than expected for a quantitative, pretest/posttest 'control' group design due to several concerns. Rather than simply using the past years' data as a comparison group, this study would be much stronger if they had used a comparison group the same year to reduce the effects of history. Yet, that comparison group still reduced the effects of maturation, testing, and instrumentation. The researchers noted the limitation of sample selection. The

students who enrolled in this PBL class were students who chose PBL (which is known for being more student-controlled) over lecture options. This selection may have lead to statistical regression. The study does not include any information on the participants, so differential selection may be an issue if the two groups are significantly different from one another. The 'control' comparison group did not know that they were going to become a 'control group,' so there would be no problem with compensatory rivalry or other related effects. The external validity for this study was lacking because the day to day methodology was not explicitly described. Although this study focused on college students, this information can still be useful in conjunction with other studies, such as the following, which brought in the topics of science and goal orientation.

Liu (2006) explored effects "of a hypermedia-enhanced problem-based learning environment . . . on sixth-graders' science knowledge, attitude toward learning science, and motivation toward learning" (p. 159). The questions that this study uses to measure attitude are about interest, which is an aspect of motivation.

The 437 sixth-graders were from 22 science classes, taught by four teachers, from four middle schools in a mid-sized urban area in SW USA. Half were female and all were in main-stream classes. Using mixed methods, the researchers used quantitative data for the bulk of this study, and then added qualitative interviews for support and deeper understanding of the quantitative results. Students participated in this program for their 45-minutes class period every day for three full weeks. Alien Rescue is a hypermedia PBL computer program teaching about our solar system. These students worked in groups to solve a complex problem that necessitated synthesizing

information that they learned by navigating through the program. Each group consisted of two or three students who were assigned by their teacher. They worked in a computer lab, and every student had their own computer.

On the first day of the program, students watched a multimedia presentation of the problem they were going to solve. Then the whole class, including the teacher, discussed their primary task. For the following days, they negotiated this ill-structured problem by playing the roles of scientists while working on a hypothetical rescue mission. They needed to actively problem-solve, analyze information, plan accordingly, and learn how to use a given concept database on the solar system (which included visual tutorials). The program scaffolded these students' creating and testing of their hypotheses. At the beginning of all but the first day, students decided their learning tasks for the day, and then participated in a mini-discussion about the previous day's work and questions. Throughout the days' work teachers monitored students' process and answered any questions, while the program itself facilitated the daily lesson time. Most days were wrapped up with a brief discussion on the day's achievements, what questions with which they were left, and what goals they had for the upcoming day.

The day before and the day after this 3-week PBL program, Liu measured students' intrinsic motivation with the Likert-type scale, Motivated Strategies for Learning Questionnaire. On the same timeline, she measured their attitudes toward science with the Likert-scale, Attitude Toward Science Questionnaire which focused on interest levels in science. To back up the quantitative results, she conducted interviews of 30% of the students, randomly selected, from each of the classes. Her purpose was

to learn why they did or did not like the program. She used two-factor 2 x 2 and 2 x 3 mixed ANOVAs to analyze the data after she sorted into categories and subcategories by themes and relationships.

After using their specific PBL computer program, students' intrinsic goal orientation and attitudes toward science both raised significantly. More than 95% of the interviewed students said that they enjoyed the program, citing reasons such as (ordered from most common response) learning with this program was fun, that they were able to use the hypermedia tools within the program, that they enjoyed using the computers, and that they enjoyed working in groups. More specific responses showed that students liked "solving this complex problem where they were in control of their learning process and had to rely on themselves, rather than their teachers" (p. 169).

Liu used a mixed methods, one group, pretest/posttest, pre-experimental design. She observed the classrooms to monitor the teachers' facilitation methods for consistency, and the methods section explicitly described process the steps of this study could be mimicked. However, without a comparison group, I do not know if this program is related to the change in motivation, so it still has no external validity. By itself, this study is not enough to trust their conclusion about the successful motivation increase following this program. Without a comparison group, history or maturation effects may have been the source of the increase, so there is no internal validity. For the qualitative portion, she did not do anything to strengthen her external validity. There is also no comparison to non-hypermedia PBL programs. Was this program successful because it was on the computer, simply because it was a PBL program, or for

another reason all together? This research is only useful as a part of multiple studies with similar results. The following study also dealt with a media-focus.

Zumbach, Kumpf, and Koch (2004) analyzed results of a multimedia-based PBL lesson, in comparison to a traditional lecture-based lesson (LBL). Forty-nine 4th grade students participated in this study. They were in two separate classes in a German elementary school. The class using the PBL lesson had 11 females and 13 males, averaging 10.2 years of age. The class using the traditional lecture lesson had 12 females and 14 males, averaging 10.1 years of age. Using Power Point and storytelling, this PBL program created an interactive learning scenario. In this imaginary situation, the students find an animal and need to research all of this animals needs, and its potential dangers, in order to take care of it.

Prior to starting this program, these children became experienced on computers and with working collaboratively. After learning about the problem via Power Point, each group created their learning objectives. Then students gathered needed information by navigating through the computer program as a group. The program occasionally asked leading questions to verify that students were heading in the right direction. They ended the computer work when they were ready to develop a final solution. Every group had an adult tutor who helped with technical matters and asked stimulating questions about the case and their solution ideas. Including a pre and posttest, the entire lesson lasted 1.5 hours.

The control group learned about the same topic. For the 1.5 hour lesson, they received a pretest, a traditional lecture including a movie, questions and answers, then

a posttest. After this lesson, neither class reviewed or discussed any of this information after the lesson. Then both classes were given a follow-up test five weeks later to see how well they retained the information long-term. The pretest, posttest, and follow-up test all assessed in-class motivation and intrinsic learning motivation, as well as several other variables not relevant to this paper. Assessments consisted of a five-point scale for scoring, with thumbs ranging from thumbs up to thumbs down, and varying angles in between. The researchers measured motivation by how much fun the students said they had while studying with the computers in class. I am asserting that this definition of 'in-class motivation' can be interchanged with the term 'interest.' They measured intrinsic motivation specifically based on how much additional time each student spent on the topic after the lesson had ended. This definition is consistent with other studies in this paper. The researchers used an ANOVA to analyze the data.

The PBL group had a significant increase in motivation, whereas the lecture-based group did not, based on a comparison of the pretest and follow-up test results. Also, in the time between the posttest and the follow-up test five weeks later, the PBL students spent significantly more personal time on the lesson topic than the lecture-based students. The more personal time they spent on the topic, the higher their intrinsic motivation rating. However, the researchers did not clarify what sort of activities constituted 'time with the topic.' These findings are consistent with the findings of previous studies that these researchers found in the meta-analyses conducted by Albanese and Mitchell in 1993, and Vernon and Blake also in 1993.

This study was a quantitative pretest/posttest, control group, true experimental design. Both groups received the same information, both were already experienced with the skills needed for computer-based PBL, and both were active participants, which reduced the chances of the Hawthorn effect or novelty and disruption effects. Motivation variables for both groups were assessed the same way which moderates measurement effects.

As for internal validity, researchers could not randomly assign the subjects because they were already in established classes. The study does not say how these two classes were selected. However, the lecture-based control group was at the same school, and was made up of similar sex/age ratios as the experimental PBL group. Also, they experienced a very similar lesson (the same information, the same timeline, but different presentation style), which reduces history, testing, instrumentation, statistical regression, differential selection, compensatory rivalry or equalization, and maturation effects. There was no experimental mortality. The longevity of five weeks between the lesson and the follow-up test did allow for experimental treatment diffusion. Yet, that would only *reduce* the significance of the difference in results between the groups, so that would not make the PBL experimental factor appear inaccurately more able to increase motivation.

Overall, this study had decent external validity. Zumbach, Kumpf, and Koch explicitly described the single experimental treatment, and the participants were only two grades below middle school. To increase this study's external validity, they could increase their sample size by repeating this study with multiple classrooms in multiple

schools. This repetition would counteract experimenter effects as well. The methodology that the teacher employed in for this PBL lesson is consistent with other studies examined in this paper. The main difference for this lesson is that a single computer program incorporated all of the research that the students needed to do to solve the case problem, and the computer program also took over some of the tutor's roles by presenting the case and asking leading questions. One potential problem area that the researchers noted was that teachers would need considerable support to successfully employ this teaching method. They would need an adult to work with every group, and would need to finances to purchase appropriate software. Since other studies have similar results for middle school, and even high school, that shows that these results may be more generalizable across ages groups. This next study deals with middle school, and added to the trend of PBL success by examining factors that support motivation.

Cerezo (2004) investigated whether or not middle school math and science students find PBL effectively beneficial for their learning process or self-efficacy. All from three schools in an urban Southeastern USA school district, these 14 female students were considered to be at-risk for differing reasons according to their teachers. Each participated voluntarily. The nine classes involved included four 8th grade science, one 8th grade math, two 7th grade math, and two 6th grade science classes. Nine of the 14 students studied were minorities. In this qualitative study based on student interviews on their perceptions of PBL activities, the researcher conducted each interview individually, as well as videotaped and recorded them, within one day to three

weeks after the study's PBL activity. Cerezo observed but did not participate in the study.

These teachers designed their own PBL activities around these following procedures. Throughout the activity, students were to listen to each other and maintain low noise levels for the scenario-sharing portion of the activity. Teachers gave every student in their class (most of whom were not going to be interviewed or included in the study) project guidelines and then a handout with a 'scenario.' These scenarios were one part of the larger case to be solved, and gave differing details and clues. Students sat and worked in groups that they or the teacher had selected. Someone read scenario one aloud. One student acted as the scribe for each group, recording other's comments without editing. They had a central location with taped sheets of paper, where they were able to focus on what was being written. Either the scribe or the teacher called on a student to speak. The scribe wrote their comments about this first scenario on one of two sheets of paper: "what we know (facts)," or "what we need to know." Then someone passed out scenario two and read it aloud. Students could then add to, or remove from, the ideas written on the two pages. They did the same for scenario three, and then recorded hypotheses on a third sheet of paper. From here they began their group work, deciding what to research using printed or digital resources. Noise levels were louder during this time, and students were able to move around as needed. The teachers wandered the room to guide and answer questions. Before the end of the day, students divided the research for homework so they could start the next day with new information. The length of these projects varied. The first day was as described above.

The middle days were for research. The last day was for the individual or group presentations. These final projects included explanations, and could range from displays, to letters, to reports. These activities are graded with rubrics. The researcher analyzed the data by organizing interview responses via main topic of each research question.

Students felt that PBL activities increased their class involvement and interest. In addition, they felt that group work helped them learn and be successful. Interviews showed that group dynamics was very important to these students, as was role-playing, hands-on work, participatory activities, and being able to socialize. In the interviews, students named what factors motivated them to finish their schoolwork. They listed themselves, parents (mentioned by five interviewees), teachers (mentioned twice), peers (mentioned twice), and the desire to attend college (mentioned twice). Nine of them said that they were their own main source of motivation. Students also felt that PBL increased their confidence. All 14 students interviewed said that they liked PBL, giving reasons such as: the problems were interesting, they liked working in groups; they enjoyed the challenge of the case; they liked being challenged to think differently, be supportive, be open to new ideas, and to not be judgmental; the situation was non-threatening; having a timeline kept them on their feet. Students also said that PBL helped them to use what they're learning in real-life situations (which heightened their interest), complete more of their assignments for their other classes, stay on task, and pay attention. Of the 14 interviewees, 13 answered that PBL helped them with their concentration, and one answered and unsure 'no.' Their reasons included, "it makes me

concentrate more," and "you have to listen to your facts, and so it helps you be alert and pay attention to what's going on." Overall, Cerezo thought that these students' answers indicated that PBL increase their self-efficacy, motivation, and general success.

This is a case study using qualitative data from student interviews on their perceptions of PBL activities. All of the teachers used in the study had already been teaching with PBL for two to five years, reducing potential issues that could arise from using a new lesson style. On the other hand, the researcher noted the limitation that she had to choose participating teachers from a limited group of volunteers. She was also aware that teachers may have chosen students who might enjoy PBL, which reduces this study's external validity. Although Cerezo based her study on triangulation with a solid foundation of previous research, she did not incorporate persistent observation, peer debriefing, or negative case analysis. This study alone does not possess enough external validity, but it complements the findings of other studies the other studies in this section. The final study in this section examines goal orientation and a variety of other factors supporting motivation.

Sungur and Tekkaya (2006) investigated whether PBL was more effective than traditional lecture-based instruction on specific aspects of self-regulated learning, such as motivation and learning strategies. The 61 10th-grade students (22 girls) from two classes were all instructed by the same biology teacher. One class was randomly assigned an experimental group (average age of 16 years) and the other became the control (average age 16.6 years). They were from middle- and upper-class families in a large urban district of Ankara, Turkey. The researchers administered the Motivational

Strategies for Learning Questionnaire as both a pre and posttest for both groups of students. Classroom instructions consisted of four 45-minutes sessions on biology per week for six weeks. Both groups received identical syllabus-prescribed learning content. The teacher taught control group with teacher-centered, textbook-oriented traditional instructions. She taught the experimental group with problem-based learning, and students worked with ill-structured problems.

Traditional biology instruction included the following components: lessons with lecture and questions to teach concepts related to the human respiratory and excretory systems; students studied textbooks on their own before class for an hour; the teacher wrote notes on the chalkboard about definitions of concepts, and drew figures of structures related to the organ systems; she described and defined the concepts and then students discussed the concepts with teacher-directed questions; most of the time was spent receiving instruction and engaging in teacher-lead discussion.

In contrast, experimental PBL instruction included the following elements: prior to treatment, they formed five heterogeneous groups of six, focusing on learning styles, academic performance, and gender, to optimize interaction among students with various characteristics; learning styles were determined with Kolb's 1985 Learning Style Inventory; students were categorized as high, middle, or low achievers based on teacher-made biology-exams; each group member held a role as reader, scribe, doctor, and patient to students in each group; during the treatment, groups dealt with ill-structured problems posed to them as cases from real-life patients; the teacher distributed seven pages of patient information to students, one page at a time; the first

page contained brief information on the patient and the following pages gave data including responses to predictable questions of the patients information; the teacher provided additional data over time, which allowed for hypothesis generation and for testing every step; the teacher monitored group process, remained nondirective, and intervened only to the extent necessary.

Problem-based learning students (relative to control group) had higher levels of intrinsic goal orientation, task value, use of elaboration learning strategies, critical thinking, metacognitive self-regulation, effort regulation, and peer learning. PBL in elementary and HS settings revealed that PBL creates an environment in which students actively participate in their learning process and take responsibility for their own learning. Although PBL had a positive influence on students' intrinsic goal orientation and task value, it did not affect control of learning beliefs or self-efficacy for learning and performance. The researchers wondered if the experiment had lasted more than six weeks, if students could have developed beliefs that their efforts to learn would result in positive outcomes. The researchers analyzed the data using MANOVAs and ANOVAs.

This was a quantitative, quasi-experimental, pretest/posttest control group design, which controlled for history, maturation, testing, instrumentation, regression, selection, and mortality. This study has strong internal validity based on its research design. The independent variable was instructional method (PBL vs. traditional lecture-based instruction). The dependent variable was students' scores on each of the subscales for of the Motivational Strategies for Learning Questionnaire. They avoided

multiple-treatment interference by using the same teacher and syllabus for both classes. The question and method had explicit description. There may have been a mild Hawthorne effect because the experimental lessons did receive extra focus – the teacher was trained on how to give these lessons. On the other hand, both treatments received equivalent observation and monitoring. There was certainly a novelty effect for the experimental group, but they avoided pretest and posttest sensitization because both groups took both tests. Based on pretest scores, there were no preexisting differences between the two groups regarding students' self-reported motivation or learning strategies. Their results were consistent with findings that they found in other literature: self-efficacy, learning goal orientation, and the beliefs that the task is interesting and important are positively related to reports of cognitive, metacognitive, and self-regulatory strategies.

The PBL lessons were strongly supported by giving experimental group students a manual with a description of a typical PBL class to familiarize them with their expected roles. This manual was fully discussed with the teacher and students before the implementation of PBL lessons. After the PBL lessons were started, the teacher attended meetings several times a week to be sure that she was conducting the treatments appropriately for both groups. The researchers observed the classrooms to document the fidelity of the treatment.

This study was conducted in Turkey. As with any study from a different culture, the question of how cultural differences might affect how students respond to this teaching strategy is an issue. Students were middle- and upper-class in urban

environments. Will other environments respond to this teaching strategy differently? If this study had lasted more than 6 weeks, would it have had a stronger or weaker affect? Also, could the novelty of the PBL style have effected motivation? So much attention was given to the PBL lessons, could that have affected the resulting motivation more than the actual strategy? Despite the debatable points of generalizablity, this study complements the others to substantiate the link between PBL and increased motivation.

In summary, these studies show that Problem-Based Learning has been successful at fostering motivation. Unlike the Goal Orientation section, the results in this section are more homogenous. All seven studies demonstrate that the researchers' use of PBL methods increased students' motivation, or aspects of motivation. Additional relevant findings in multiple studies included: increased interest in and enjoyment of the subject matter; increased intrinsic/mastery goal orientation; that students enjoyed using media in media-based PBL programs; and overall improvement in students' scholastic success. Individual studies also strongly concluded that PBL lead to improvement in these areas supporting motivation: effort regulation; metacognitive self-regulation; task value; critical thinking; class involvement; confidence; concentration; ownership of individuals' own learning; and attitude towards science. Other individual studies also concluded that the more personal time a student spent on the PBL topic, the higher their motivation rose, as well as that students' valued real life situations, hands on work, role playing, participatory activities, and being able to socialize. Overall, these studies clearly show that PBL activities can foster motivation

both directly and indirectly. The upcoming sections will examine *why* Problem-Based Learning is working to promote motivation.

Attention to Students' Needs

The studies in this section have different findings, showing that individuals became motivated in their own ways. PBL and similar programs can incorporate multiple strategies to attend to students' needs, thereby promoting motivation, as shown in the studies below.

Zion and Slezak (2005) asked what qualities teachers needed to possess in order to foster particular aspects of motivation, and other self-directed characteristics in their students. The 135 student participants were 16-18 years old and in 11th and 12th grade science classes. The students' six science teachers also participated. They held advanced degrees and had extensive experience developing curriculum and teaching. Biomind, the project used for this study, used autonomous learning through authentic inquiry. Working in teams, students submitted a proposal of three questions and had to think logically about the relationships between the questions. Of these, at least one required experimentation, and at least one required field observation. After conducting a study on their proposal, they turned in a summary. Researchers gathered the data through teachers' and students' interviews, journal entries, and questionnaires. Conducted after the completion of the inquiry project, the questionnaires were open ended questions about the process details of learning, teaching, inquiry, and motivation. The interviews were semi-structured and were based on the interviewee's reflections. They were carried out every three months throughout the two years of the study.

Researchers analyzed the data by coded all of the responses into groups, which were based on at least 30 quotations from multiple archives supporting a particular category.

According to the analysis of the combined feedback from both the students and teachers, students seemed more likely to display self-regulation if their "teacher delegate[d] responsibility according to the students' performance and stage of study" (p. 886). Students seemed more likely to demonstrate "personal initiative independent of the teachers' instructions" if their teacher promoted the students' autonomy, and exhibited creativity, originality, and initiative (p. 889). Students also appeared more likely to exhibit perseverance and self-discipline when their teacher supplied inquiry framework and then supervised groups development. Overall, students showed motivation and satisfaction after their teacher encouraged and exhibited confidence in them, as well as gave one-on-one attention to every student.

This was a qualitative action research case study. The quotes given to illustrate the ties the researchers found between the teacher qualities and student responses provide confidence in these qualitative results. In addition, the researchers triangulated the data through the multiple voices of the teachers/researchers/administrators, or by at least three different approaches or sources. An action research group discussed and collaborated on criteria for data analysis. Considering exceptionally detailed descriptions of the methodology and logic behind their research choices, and its longevity of two years, it is surprising that they did not mention any credibility criteria to add to their otherwise solid internal validity mentioned above. In addition, they never mentioned any of their possible biases, while almost all of these other studies

acknowledged their biases in some way. What biases affected which quotes they found important, or the meaning they gave to those quotes? Last of all, much of the responses were written directly by the participants, the researchers did not note how they recorded the interviewees' verbal answers. Switching to lens of external validity, although not from middle school, participants were still from secondary science classes. These results go hand in hand with results from my PBL, constructivism, and inquiry studies.

Harlow, Burkholder, and Morrow (2006) hypothesized that students would improve their attitude toward math after participating in this student-focused program. Participants were volunteers from a university psychology class. Of the 126 participants, 80% were female, 94% White, 61% sophomores, 25% juniors, 11% seniors, 3% post-seniors, and averaged approximately 80% accuracy in the class. The entire class participated. The researchers issued pretest and posttest surveys to measure a change in the students' attitude toward the subject matter. They focused on three aspects of attitude: self-efficacy, anxiety, and perceived hindrances.

> Over the course of this one semester, the researchers implemented these following four tactics. "*Peer mentoring*: Peer mentors who recently completed a course in quantitative psychology readily agreed to serve as LEARN role models during and outside of the classroom throughout the semester, receiving independent study credit for their mentoring. [They] chose mentors for their interest and expertise in the topic as well as their enthusiasm and compassion for helping others get excited about

> learning. *Clear and not (C&N) sessions*: Each week, students took turns collecting information from other students at the end of a lecture. Subsequently, selected students worked outside of class to provide a concise summary on clear lecture points and elucidating unclear concepts by drawing on lecture notes, information from class texts, and even outside reading. The instructor carefully reviewed C&N summaries before sharing them with the class, thereby helping to ensure that the material was accurate as a study guide or reference of the topic. *Consult corners*: During class, small groups of students consulted with each other before each exam, suggesting various ideas from course material to provide a solution to an instructor-generated problem . . . A student representative from each group's solution either in oral or written reports. *Applied projects*: Students conducted their own applied projects outside of class to demonstrate understanding of class concepts. At the end of the semester, students in small classes gave oral reports and provided a brief handout for other students. In large classes, students prepared a desktop poster with a two- to –four-page summary of their project for class perusal" (Harlow, Burkholder, & Morrow, p. 233).

Researchers then used MANCOVAs and ANCOVAs to analyze the data.

Over the course of the treatment semester, the overall attitude scores significantly increased. Students' anxiety scores decreased, self-efficacy scores increased, and perceived hindrance scores did not significantly change.

This was a quantitative, pre- and posttest, quasi-experimental design, controlling for initial skills in this subject matter. They acknowledged the limitations of having neither random selection of participants nor a control group. The lack of a control group brings up issues of history and maturation effects, and the pre/posttest design introduces testing effects. These above points leave the question of internal validity, but the qualitative piece helps to confirm the quantitative findings. Although this study dealt with college rather than middle school, its explicit treatment description will still help with its potential generalizablity. Which strategies actually correlated to the increase in positive attitude towards the subject matter. Would each of these strategies be successful individually? Do they only work in concert with each other? Could any of these strategies actually be hindering attitude improvement?

Garcia and Pintrich (1993) asked about relationships between motivational variables and learning strategies. Participants included 151 7th grade boys and girls (averaging age 12.8) from working class suburb of Midwestern city at end of school yr in 1992. Students filled out Likert-scale written interview questions with each answer ranked. The three questionnaires were “School and school work” (used for defensive pessimism, self-handicapping, learning strategies) and “What I am like” and “What I could be like” (used for measures of present and possible selves). They did this for their English, math, science, and social studies classes. To analyze the data, researchers examined the bivariate relationships among the given constructs (volitional control, motivational strategies, and self-schemas) via zero-order and point-biserial correlations. Then to compare the students identified as self-handicappers, as defensive pessimists,

and as neither (the control group), they used simple one way ANOVAs and post hoc contrasts.

They found that goals & self-scemas (multiple, interacting, intrinsic, extrinsic, and social goals) lead to both motivational strategies (defensive pessimism, self-handicapping) and learning strategies (rehearsal, elaboration, volitional control, etc) and all three lead to the final achievement (exams, final course grade).

This was a quantitative study, one shot case study. History, maturation, mortality are not addressed. One may guess that all the students in the previously assigned class were used meaning that assignment and selection were not random. These middle school students fit this paper's focused age group, and some of the data is directly about science classes.

Shernoff, Csikszentmihalyi, Schneider, and Shernoff (2003) sought to find relationships between student academic engagement and factors such as challenge, control, and relevance. Using three years of data from a national longitudinal study, this study included 13 high schools and 526 students (62% female) from around the USA. The combination of sites represented a diverse racial and economic population. Students were randomly paged eight times throughout each day over the course of a week, at which point they self-reported multiple bits of information. Some using Likert-type scales and some using open-ended questions that were later-coded, a combination of questionnaires measured a variety of factors influencing students experiences of the activity they had been doing at the moment they received the page. Some of these factors were the activities, challenge, perceived skill level, instructional relevance,

control, and intrinsic motivation/engagement variables (concentration, interest, wish to be doing something else, and enjoyment of the activity). These researchers used one way ANOVAs, post hoc tests, t tests, and chi-squared tests to analyze the data.

This study found that student engagement was strongly related to high levels of all of the following variables: challenge, perceived skill level, relevance of the instruction, control, concentration, interest, and enjoyment of the activity. In addition, students reported to be more engaged while doing group or individual work as opposed to watching videos, or listening to lectures.

By examining previously collected data, this mixed methods study avoided the effects of experimental designs. To strengthen its internal validity, the researchers used prolonged, substantial engagement and persistent observation. It found relationships to enhanced engagement for all scholastic subject matters overall, including science. Although this high school age group did not directly generalize to a middle school focus, it was only a few grade levels different. This study is valuable because it showed specific factors that are directly related to moments of engagement. Each of these variables related to increases in engagement is generally incorporated in Problem-Based Learning activities.

Azevedo (2006) investigated students' moments of engagement, and asked these following questions: "What exactly are students doing? What is the object of their actions? How do their actions relate to their behavior in previous computer-based activities and indeed across the course? What is the relationship between students' self-initiated and framed activities."

The 19 students from 7th to 11th grade were evenly proportionate in gender and race (Black, Hispanic, White, Asian), and most had average previous academic success. This was a 6-week, extension summer course in which these students participated in activities similar to PBL projects. They met twice a week for three hour sessions. Each day was split into three 50 minute segments (similar length as a middle school class) with 15 minute breaks between. Generally for the first few weeks the first two segments were classroom work and the final segment was computer lab work. This time allotment was reversed for the later few weeks. Students executed self-directed learning activities where they created representations of phenomenon (with models or even by acting them out, etc). They also worked on computer-based activities and scientific visualization software either individually or in small groups. Researchers videotaped the students while they worked and then analyzed the observations to identify key patterns consistent in students moments of engagement. To substantiate their video notes, the researchers also analyzed their own field/reflection notes, and the students' pretest, posttests, activity files and products. The researcher did not clearly state his methods for analyzing this data.

While these students engaged in the given tasks, they also initiated their own mini-activities that matched their personal agendas. Each student varied drastically in their personal goals and pattern of working towards them. The researcher interpreted some of the ways each student interacted with the proposed tasks: these personal excursions allowed students to express their competence, given adequate time and flexible material/social infrastructures to incorporate the student's interests and goals.

He continued on to posit "that allowing students to take personal excursions positively affects their involvement with classroom material because: (1) by virtue of their highly relevant personal character, personal excursions function as energy generators in the local and global context of a curriculum; and (2) through personal excursions, students build pragmatic, conceptual, and question-generating resources so that more extended, coherent personal pursuits are possible so that more extended, coherent personal pursuits are possible and more likely to take place" (p. 93). These short side tasks allowed the students to incorporate their personal interests into the assigned activity and so may have helped them maintain engagement. Allowing, or even encouraging, these personal excursions seemed like a natural fit to PBL-style lesson plans. By pinpointing this specific step in promoting engagement, this study helped show that these opportunities for personalization within a structured lesson may be partly responsible for PBL's success in fostering motivation.

This case study had strong internal validity. It gave extremely detailed treatment description and was authentic due to its substantial foundation on previous research. It possessed credibility through its persistent observation, prolonged engagement, triangulation, and negative case analysis. However, history and maturation may have been issues without a comparison group.

Kosky and Curtis (2008) asked, does integrating the arts into a social studies classroom increase student participation and motivation? Four periods of 6th grade social studies participated (one period included students with special needs). The school was 95% white, 22% receiving free or reduced lunch, and met all Academic Yearly

Progress regulations with standardized test scores. Lesson plan activities addressed multiple intelligences and integrated art. At the beginning of the study, students were given an informal online multiple intelligences evaluation as a method of identifying their strengths and interests. These results were used to create lessons with the intension of engaging their multiple intelligences. Since a majority of the students possessed strong bodily/kinesthetic or verbal/linguistic intelligence, the teacher designed many lessons around discussion and handling materials. Students took attitude surveys at the start and finish of the study. These surveys asked how the students felt about social studies before and after the art integration lessons. The results of this test were never discussed in the study. When studying about ancient civilization, students used their visual intelligence to create maps, their verbal intelligence to tell stories, read and write with glyphs, and their logical intelligence to problem solve hypothetical issues faced by ancient peoples. Students were required to think for themselves, as well as encouraged to ask questions, participate in class discussions, and related studies to prior experiences. A typical lesson included copying of vocabulary, classroom reading of background information, and an activity integrating art into the curriculum. During their study of Mayan civilization, they read Mayan fables in class. Students were given a long term project to choose a fable and represent it in one of the given methods, or to create their own activity for assessment to be approved by the teacher. Examples of the choices included: draw and illustration, draw a comic strip, write a fable and illustrate it in a book, write a fable as a screenplay or script, create a computer generated picture, prepare a scene from a fable, build a costume for

a fable, write a fable as a song or poem, create a Powerpoint about a fable, or create a diorama that depicts a scene from a fable. As part of the 20 daily lessons, students could choose various activities for three large projects. Data was collected multiple ways. The teacher spoke with the students daily about their feelings on the lessons. She kept a reflective journal recording conversations, daily notes on the success of each activity, and modifications to make for future lessons. Notes on student participation levels for each activity were rated. At the end of each lesson, each student filled out a 'Rate this Lesson' card and add written feedback, both of which would be considered in the planning of following lessons. The researchers are unclear in how they analyzed the data.

Providing students with a choice of activities led to increased motivation and participation scores for the class overall. Lessons that integrated art (pictures, music, drama) were rated higher for interest by the students (M=9.29 out of 10). Lessons that were more traditional like book work, worksheets, readings, or lectures were rated lower (M=5.83 out of 10). Student participation scores were also higher for activities integrating art. Students scored the highest for participation on days that they were assigned long term project, or when they shared those projects with the class. Also, students scored high for participation for these lessons: watching a video, examining ancient art and artifacts, introducing Mayan glyphs and writing, introducing Mayan literature, playing a review game. The lessons what coincided with the highest participation scores also included less common activities and incorporation of multiple

intelligences. This study showed that choice and cross-curriculum activities may encourage active engagement.

This was a quantitative study. The experimental treatment description was semi explicit. There were enough details to repeat the study methodology, but not identical lessons. Each day, the new lesson plan type was the only treatment variable. Of course details within the lesson plan could affect student response beyond the type of lesson plan. This is not studying longitudinal changes. It was comparing day to day responses to lesson plan types, the Hawthorne effect should not come into play. Since all of the compared lessons were new, the novelty and disruption effects would not affect results, except maybe for the first few lessons of the study because the study itself was novel. Again, since the all of the compared lessons were taught by the same teacher, the experimenter effect would not affect results. History effects may have interacted with treatment effects since we do not know if any significant events that could affect student response occurred at that school or community on any of those days. Measurement of the dependent variable was conducted by the teacher who was involved not only in the administration and creation of the lessons, but also the whole study, so she her biases may have influence the scores given. The teacher assigned engagement scores during the lesson, and student completed 'rate this lesson' scales after each lesson, so time of measurement should not have interacted with the treatment effects. Without a pretest, testing issues were negated. The 'rate this lesson' instrumentation was consistent day to day; however, the mood of the teaching assigning engagement scores could have been inconsistent. With no control group or

group comparison, the is no issue with differential selection, treatment diffusion, compensatory rivalry, resentful demoralization, or compensatory equalization. Participation notes were recorded by the teacher while she taught. One may wonder how the teacher taught while simultaneously taking accurate and complete notes, rather than having a blind observer take participation notes. The teacher who ranked the participation via her observations was also the main author of this study. Her biases were sure to affect her scoring. Another aspect to consider in terms of motivation is that grades were determined by tests, quizzes, workbook pages, graphic organizers, and participation. The extrinsic motivator of grades may have played a role in participation scores. External factors for motivation to participate were never mentioned in the study. One might question whether higher order thinking about the curriculum was required for some of these lessons. There is no doubt that designing and making a culturally relevant costumes requires higher order thinking, but is that thinking about design and art (the integrated subject matter) or is it about culture and social studies (the original curriculum intended to be taught). The study never included testing for validity of the scoring methods.

Although this study did not possess strong validity, it can be used to back up other studies with similar findings. This is one example in a list of studies with strategies for fostering motivation.

Harmer and Cates (2007) wanted to create a list of principals to follow to sustain 6th grade science students engagement. They did this by observing how these students engaged with a technology-driven PBL inquiry project. Two suburban Northeaster

United States middle school classes participated because their teacher volunteered for this study. The 55 students (29 female, 26 male, 98% Caucasian) averaged 12 years of age.

This project was focused on two web-based tools: WISE (http://wise.berkeley.edu) or Web-based Inquiry Science Environment, and ImagiNations (http://www.lehigh.edu/~inimagin). They used containment of the West Nile Virus as their authentic problem to be solved. The solution entailed a design, justification, and demonstration as a group final presentation. Students received personal journals, handouts, group folders, and a CD with full-text newspaper articles (so that they would be able to discuss the same resources). They also all had access to a computer, electron microscopy images, and papers introducing nanoscale science. They chose to focus on a community problem, and they used empowering phrases in their paperwork. Students created and named their own teams, which was meant to foster group ownership and teamwork. Students learned about cutting edge technology to give them a sense of working with the same tools as real scientists, and also having access to information not yet open to the public. With each class lasting 45 minutes, this program spanned eight class periods. Most of that time was spent investigating information via the two web tools. For five minutes at the start of every class, the teacher taught using hands-on 'show and tell.' The researchers encouraged students to write their thoughts in their journals daily, as well as to continue problem solving out of class on an online discussion board. The researchers read students' thought journals and before and after the study they conducted a written survey. They also videotaped

their interviews with student groups and the teacher about engagement and interests. The researchers assessed interest based on what the teacher and students said about being "excited, motivated, focused and eager to learn about new topics and be involved in the task" (p. 114). The data was also related to the students' investment of feelings, investment of personal time, and captivation in the inquiry process, all of which are signs of motivation and engagement. The researchers analyzed the data by coding it into categories from themes they found naturally emerging in the variables, and then conducted data-reduction to collapse the variables.

Ultimately, from their findings, the researchers asserted that students are more likely to engage in an inquiry lesson if they are supported in believing that they can truly play a role in solving an authentic problem. Their findings supported that in a class where students are already comfortable with computers, computer-based inquiry may foster student engagement.

For this pilot case study, they strengthened their internal validity by utilizing triangulation, member checks, and peer examination. Every day they observed and videotaped class activities in an attempt to reduce record errors. Despite missing partial data for a few of the students, they experienced no mortality. History and maturation effect likely came into play without a comparison group. Their overall findings matched those of the previous studies they had read. To strengthen their external validity, they reported a substantial chart of direct quotes and narrative. Conversely, they acknowledged that it would be impossible to replicate or generalize this study due to all of the effects that come with this pre-experimental design. By itself this study cannot

be generalized, but in conjunction with the results of similar studies it holds value. This study goes beyond agreeing with other studies saying that PBL, or technology-driven PBL, can foster motivation. It reaches further by deriving specific principles to include in our PBL lessons to continue to foster motivation.

Loyens, Riker, and Schmidt (2006) asked, do initial conceptions differ for students who chose PBL-style classes verses students who choose traditional, individual learning-style? There were 186 students who participated in the PBL group (130 females, 56 males, averaging age 19.94, and making up 74.4% of the total PBL class), and 107 from the lecture-based comparison group (88 females, 19 males, averaging age 19.02, and making up 49.6% of the total lecture class). All were freshman psychology students who were volunteering to partake in the study. They chose their preferred class-style and so were not assigned randomly. Students took the pretest on the first day of their first year in college, to be sure that they were reporting the conceptions they have before starting their tertiary education. This 550-item questionnaire used a Likert scale to measure conceptions of constructivist assumptions, including conceptions on motivation. This test's internal consistency reliability alpha's were between 0.71 and 0.86 according to previous studies. The researchers analyzed the data using a structural equation modeling approach.

They found that prior to taking the class, students who chose the PBL curriculum tended to already consider PBL concepts more important, as compared to students who chose the traditional curriculum. These findings were similar to past studies analyzed by

the researchers. The students who chose the PBL curriculum also assigned less value to the role of motivation, relative to the comparison group.

Despite this study's extensive internal validity statistical testing, as a pre-experimental design with no treatment, it still needs additional research before it can possess strong external validity. Rather than testing the success of PBL on motivation, the researchers used a pretest (prior to students actually do any college classes – PBL or lecture) to quantitatively compare the conception differences between students who chose a PBL version of a class or the traditional lecture version.

Loyens, Riker, and Schmidt (2008) asked, what are the relationships between students' regulation and processing strategies, and their conceptions of constructivist learning, a back bone of PBL? Participants were 3rd and 4th year college students averaging age 22.60. These 79 woman and 19 men were majoring in psychology at a University in the Netherlands. They were chosen for this study because they were enrolled in a PBL class. At the beginning of the school year, these researchers used a 7-point Likert-scale to measured the students' conceptions of both motivation and constructivist learning. These constructivist conceptions looked at knowledge of construction, self-regulated learning, self-regulation, and inability to learn. To analyze the data, the researchers created hypothesized models with ILS and MSLQ regulation and processing variables.

They found that all of the correlations between students' motivation and their constructivist conceptions were significant, meaning the stronger their motivation, the stronger their agreement with constructivist conceptions.

This is a quantitative, pre-experimental design with a questionnaire rather than a treatment. Although participants were not randomly selected, the questionnaires were tested for internal validity. The authors acknowledged limitations of their study. All listed were typical of any study in a real-life situation, such as limited, non-random samples, and self-reported measurements.

Araz and Sungur (2007) examined the relationship between motivational variables, prior knowledge, and several other factors that did not connect to this paper. Unique from the other studies in this paper, these results look into the relationship between prior knowledge and motivational variables. From four urban, middle class, middle school classes, 126 eighth grade students participated in this study. All between ages 13 and 15, 60 were male and 66 were female. Students participated in a PBL project from real-life scientific cases. They worked in heterogeneous small groups to create their game plan, hold discussions, brainstorm hypothesis, revise ideas, etc. The teacher passed out additional information on the cases over the course of the project, monitored and facilitated groups, and offered formative feedback. Students researched more information after class and then the next day they shared what they found. Each group was finished when they felt that they had learned enough science to solve the case. The researchers measured students' motivational beliefs with the Motivated Strategies for Learning Questionnaire using a Likert scale. The subsections of motivational variables included intrinsic goal orientation, task value, control of learning beliefs, and self-efficacy. Reliability scores for each subsection fell between 0.68 and

0.93. To analyze the data, these researchers used a path analysis model and tested the goodness of fit.

Through a path model, they showed that prior knowledge contributed to 30% of the variance for intrinsic goal orientation, 33% for task value, and 75% for learning belief control (which contributed to 47% of the variance for self-efficacy).

For this quantitative case study, researchers never stated when they conducted the questionnaire so one may assume that they did not administer it as a pretest as well, and only used it as a posttest. There was no comparison group to see if traditional lectured-based learning would result in similar relationships, which brings up effects of history and maturation. They never mentioned the longevity of the study. All of these stated factors weaken this study's internal validity. Then looking at external validity, the researchers description of their methodology was not precise enough to replicate their daily routines. These weaknesses heighten the need for additional research before one could make any generalizations about this study. None the less, these results back the broad correlation that other studies are finding between PBL and motivation.

In summary, these studies demonstrated that attention to students' needs can promote motivation. The results of these various programs were diverse, providing diverse methodology. Students seemed more likely to display self-regulation if their teacher allocated responsibility based on a student's performance and current status. If a teacher promoted students' autonomy, as well as exhibited creativity, originality, and initiative, then students seemed more likely to demonstrate initiative. Students also appeared more likely to exhibit perseverance and self-discipline when their teacher

supplied inquiry framework and then supervised groups development. Students showed motivation and satisfaction after their teacher encouraged and exhibited confidence in them, as well as gave one-on-one attention to every student. Attitude and self-efficacy scores significantly increased, while anxiety scores decreased, after participating in a student-focused program. Goals & self-scemas lead to both motivational strategies (defensive pessimism, self-handicapping) and learning strategies (rehearsal, elaboration, volitional control, etc), and all lead to final achievement (exams, final course grade). Student engagement was strongly related to high levels of all of the following variables: challenge, perceived skill level, relevance of the instruction, control, concentration, interest, and enjoyment of the activity. These same students reported to be more engaged while doing group or individual work as opposed to watching videos, or listening to lectures. While students engaged in given tasks, they also initiated their own mini-activities that matched their personal agendas. Personal excursions may have allowed students to express their competence and incorporate their interests and goals, which may have helped them maintain engagement. Providing students with a choice of activities led to increased motivation and participation scores for the class overall. Lessons what coincided with the highest participation scores also included less common activities and incorporation of multiple intelligences. Students rated interest in lessons that integrated art (pictures, music, drama) almost twice as high as more traditional lessons (book work, worksheets, readings, lectures). Students were more likely to engage in an inquiry lesson if they were supported in believing that they could truly play a role in solving an authentic problem. Also, in a class where students were already

comfortable with computers, computer-based inquiry could foster student engagement. As compared to students who chose traditional curriculum, students who chose the PBL curriculum tended to already consider PBL concepts more important, also assigning less value to the role of motivation. There were significant correlations between students' motivation and their constructivist conceptions, meaning the stronger their motivation, the stronger their agreement with constructivist conceptions. Prior knowledge contributed to approximately a third of the variance for both intrinsic goal orientation and task value, while also contributing to three quarters of the variance for learning belief control which contributed to nearly half of the variance for self-efficacy. These various findings exemplify how individuals became motivated in their own ways.

Experimental Programs Employing Multiple Variables

Each of these three studies examined experimental programs that exhibited and utilized many of the variables consistent with Problem-Based Learning programs, and all positively impacted student motivation.

Gehlbach, Brown, Ioannou, Boyer, Hudson, Niv-Solomon, et al. (2008) asked, does the web-based GlobalEd simulation have an influence on middle school students' interest in their topic of study, and why? The 305 student who participated in this study were from 19 schools across the USA (49% female, 73% White, 61% 8th graders, 27% 7th graders, 9% 6th graders, 3% 5th graders). The schools had similar socio-economic status and demographics. They were academically ranked mostly around the national average, and all of the teachers volunteered to partake in the study. Although this web-based simulation ran for five weeks, the whole of the program actually spaned approximately

one semester of a social studies course. Students "negotiate treaties involving current world issues while taking the perspective of the country they are representing" (p. 898). Starting in the weeks preceding the simulation, all of the school's social studies students researched the real country that their class represented, and groups within each class concentrated on one of five real-life current event topics (global environment, world health, human rights, U.N. security reform, international conflict and cooperation). These five varied year to year based on teacher-feedback and current hot topics. Each group had members from each country(classroom), and they interacted through synchronous live chat conferences over their computers, and asynchronous emails. The simulation's controller monitored negotiations to be sure than students were thinking out their agreements and sticking to their roles. The focus was less on the final agreements between countries, and more on the actual engagement in negotiation. No student played the role of the USA. Instead, it was played by a research assistant so that every student had to take on a foreign perspective. Teachers served as facilitators for their countries by asking probing questions and encouraging critical thinking and research. A pretest and posttest determined the change in interest after this treatment by having students rank their class subjects (science, math, etc) from most to least interesting.

They found that students' interest in social studies, the topic of study, significantly increased between the pre and posttest scores. This increase occurred across gender, race, and grade level. To summarize their findings, the researchers created a path model that showed the following. Grade level was inversely correlated

to pretest interest and was responsible for 25% of the pretest variance. This inverse relationship is consistent with countless other studies, many of which are named in pervious chapters. 'Social perspective taking' added to 23% of the posttest variance despite their ambiguous findings regarding the correlation between perspective taking increased interest. Not surprisingly, pretest interested contributed to 71% of the variance for posttest interest.

This is a one group quantitative, pretest/posttest, pre-experimental design. These researchers showed authenticity by examining the conflicting findings of previous studies that they used to create their hypothesis. They provided a very detailed description of the treatment and of the logic behind their analysis. Also having a wide variety of teachers and schools participating reduced the experimenter and history effects, bolstering internal validity. Yet it was then decrease because novelty may have been behind the increased motivation, rather than this specific program. Ideally, students could do a similar project for part of every school year. Then after several years, they could test if the programs continued to end with higher levels of motivation. The authors recognize the added decrease in internal validity due to study's design and non-randomly selected participants. They fully acknowledged the controversy over the validity of ranking scores (as opposed to rating scores) and change scores. Also, the test they used had no reliability estimate. Since students' interest scores for social studies were relative to their interest in other classes, it is possible they simply became *less* interested in their *other* classes over the semester. How stable are students' interest rankings for their classes, independent of a treatment? The researchers were correct in

saying that this study needs to be repeated with a comparison group that maintains the traditional lesson style used prior to this program's implementation. Yet these results are still very worth considering. The fact that these students reported an increase in motivation, even a relative increase, is greatly significant due to the rampant decline in motivation for this age group. It is important to note that mediators may not require additional funding. Since the computer system was monitoring the students' work, the teacher could be free to scaffold the groups through questioning.

What aspect of these sorts of programs are responsible for their correlation with increase motivation? Is it the constructivism, the inquiry, the simulation, the perspective taking, the technology, or something else entirely? Something about these programs is working.

van Grinsven and Tillema (2006) asked, are there functional relationships between features of learning environment design, student motivation and self-regulation strategies? The 623 secondary student participants were from five vocational schools, each utilizing differing teaching methods, in the Netherlands. Their ages ranged from between 16 and 18 years. Sample size for each learning environment was as follows: traditional education =72, open learning center =69, independent group work =344, problem-oriented learning =72, project-based learning =66. All students in these scholastic programs participated in the study. They looked at five aspects of learning environments: interaction between teacher and learner; grading and assessment; types of task; degree of autonomy; and attention for learning. Data collection included two parts: inventory of learning environments, and questionnaires of perceptions of learning

environments. There were five learning environments, one for each vocational school studied: traditional education, open learning center, independent group work, problem-oriented learning, project-based learning.

They found that student perceptions of learning environments were related to their motivation and learning strategies used for their self-regulation. Traditional teaching and individualized open learning center environments had the lowest scores for students' perception of autonomy. Independent group work, problem-oriented learning, and project-based learning instructional formats seemed to have a positive effect on perceived support from the teacher. Perceived support for self-regulated learning could be predicted from perceived task value of the students and their degree of autonomy. Students who experience a greater autonomy had a more positive perception of teacher behavior. "Students in self-regulated learning environments are more motivated to learn, report more enjoyment of the material and are more actively involved in their learning than those who study in more restrictive environments" (p. 87).

For this quantitative study questionnaires measured motivation, perceived teacher's behavior, and self-regulation strategies. This one shot case study did not address history or maturation. It never defines the specific actions that determine each teaching style. What future researchers consider to constitute each instructional format may be completely different than the specific formats/styles/assignments/word-usage that these test teachers used. They use previous research as a method of peer review,

and their results matched those previous. These researchers could look deeper into learning strategies, teaching methods, and self management.

Tubin, Likritz, and Chen (2004) wanted to find out if experimental school graduates would have higher achievements in test scores, skills, self-efficacy, and motivation compared to graduates of regular school. Also, they wanted to see if all types of graduates (slow, average, excellent) from the experimental school had equally benefited from, and improved their educational achievements, compared to graduates of regular school. The 213 participants were 13 years old and in 7th grade. Of that, 82 were graduates from the experimental elementary school, and 131 were from a "regular" elementary school. The alternative school was based on the following principals and models: personal, individual knowledge; collective, public knowledge; complex knowledge model, linear model; dynamic curriculum instead of contextual/static/factual and takes student's interpretations into account; and the goal of creating autonomous decision makers and life-long learners who know how to search for information and manage knowledge and work in groups. Input included budget, training, and teachers. Output included grades, mastery, and knowledge. Tests were based on Bloom's Taxonomy. Motivation was assessed based on a reflective questionnaire.

They found that educational achievements (test scores, skills, self-efficacy, and motivation) were higher at the experimental school. At the experimental school, the 'average and slow' students developed a greater increase of motivation.

This was a mixed methods, quasi-experimental, static group comparison. They dealt with maturation by comparing a "regular school." They stated assumptions behind the study showing awareness of bias. Statistically there was no significant difference in social-economic status of the schools. Two expert researchers conducted reliability tests as a peer review. Given cultural and language differences between main-stream America, and the city in Israel where this study took place, the external validity is unclear. These researchers did not state how they implemented any of these practices, or what the principals and models are for the Israeli main-stream schools to which they were being compared. This specific combination of factors (possibly affected by team teaching, large class size, access to technology, classroom layout/structure, mixed grade levels, etc) seemed to increase motivation, but there are so many factors that it is unsure which ones caused the effect. These researchers need to conduct another study done at the same school between several classes, some with one variable on motivation, some with another method/variable. The ultimate question is *why* did this experimental school increase motivation relative to "regular" school?

In summary, these three alternative programs all incorporated PBL strategies and philosophies, and all positively impacted student motivation. A web-based simulation (focused on real world problems, global/social perspective taking, role playing, and interacting and relying on students both within and beyond one's own class) did result in the increase in middle school students' interest in their topic of study. Student perceptions of learning environments were related to their motivation and learning strategies used for their self-regulation. In self-regulated environments,

students were more actively involved in their learning process, felt more enjoyment in the activities, and experience higher motivation to learn, than students in traditional environments. Students at an experimental school (founded on: complex personal and public knowledge; dynamic curriculum taking on student's interpretations into account instead of a contextual/static/factual focus; and the goal of creating autonomous decision makers and life-long learners who know how to search for information, manage knowledge, and work in groups) experienced higher educational achievements (test scores, skills, self-efficacy, and motivation) than a traditional school, and the 'average and slow' students developed a greater increase of motivation. These three alternative programs not only created environments able to foster motivation, but also incorporated some of the qualities examined in the following section.

Feedback and Communication with Students

Since extrinsic motivation is the intention to do the activity because it leads to positive consequences, such as praise (Schaffner & Schiefele, 2007) it is clear to see how feedback can directly effect, or even provoke, extrinsic motivation. Referring back to the studies covered in previous sections, internal motivators are generally more beneficial than extrinsic, so one needs to be aware of how communication can affect students' motivation. Strategy (process) praise may lead to higher master-orientation than does person- or intelligence-praise (Dweck, 2000). When children were told that 'I'm proud of you' or that they were 'smart' or 'good,' then they were less likely to continue working through challenges (Dweck, 2000).

The comprehensive body of research has mixed conclusions on the effectiveness of praise due to varying methods and styles of delivery. Past research shows that compared to males, females are more likely to lose motivation from praise that specifically weakens perceived autonomy. On the other hand, other research also shows that males are more likely to ignore praise, or even boost their motivation even after hearing the same comments that can be detrimental to females. Females may be more likely to internalize feedback while males may be more likely to rely on their own judgments of themselves. Teachers may be more likely to give boys more negative feedback, and so boys may learn to filter negative comments (Henderlong & Lepper, 2007). Most research on praise includes cofounding variables so it is challenging to know that the data are not resulting from teacher attention, special privileges, etc (Henderlong & Lepper, 2007). The studies presented in this section delve deeper into this realm.

Schaffner and Schiefele (2007) asked two questions regarding motivational instruction. Does internally motivational instruction lead to higher internal motivation compared to externally motivational or neutral instruction? These effects are supposedly to be caused by directing students' attention towards intrinsic incentives, thereby reducing concerns about post-reading test performance. Does externally motivational (EM) instruction lead to lower internal motivation (IM)? These effects are expected due to emphasis on post-reading assessment that reduces the effect of internal motivation. For this study, intrinsic motivation refers to the intention to read a given test because its content is interesting, personally relevant, challenging, or

enjoyable. So the reason for doing the activity is the activity itself instead of gains external to the activity. Extrinsic motivation refers to the intention to do the activity because it leads to positive consequences, such as praise.

Of the 375 ninth-graders (171 girls), 182 were high achievement track students, and 193 low achievement track students. Mean age was 15.5 years old, and equivalent between groups. Students were randomly assigned into instructional groups. The three groups were fairly equal in composition for school track, but less so for gender as a result of random assignment.

Students were randomly assigned into three groups to receive instructions intended to facilitate either intrinsic motivation, extrinsic motivation, or neither – neutral instructions. Intrinsic motivation instructions intended to inspire students about the content of the text. Extrinsic motivation instruction intended to describe the content as uninteresting with a focus on the post-reading test performance on the content to determine how well students are learning. Neutral instruction was the control with no focus on content or testing.

Text content was taken from a commonly used math book, “Once Upon a Number,” and illustrated laws of probability for a popular card trick. A pilot study determined it to be neither too hard or easy for both high and low achieving track students. Students were tested within one 45 minute lesson. Before reading the instructions, students were given a pretest to assess intrinsic motivation. After reading the instructions from one of the three groups, students rated their levels of interest in

the topic (posttest-1). Then after 10 minutes of reading, they were asked to stop and rate their actual levels of topic interest (posttest-2).

After adjusting for pretest interest, participants who had received the intrinsic motivational instruction showed significantly higher interest scores on the first posttest than subjects in the control group or the external motivational group. Posttest-1 interest did not differ between students in the EM and control groups. With observed values taken into account, the data says that the IM instruction may prevent students from losing interest. Gender, migration background, and school track did not moderate the affects of instruction on interest. Counter intuitively, these students indicated a drop in interest between posttest-1 and posttest-2 for the IM group. Interest between posttests was stable for students in the EM and control groups. IM instruction enhanced the performance of high intrinsically motivated students, as opposed to EM instruction which tended to negatively affect high IM students. IM instruction has no significant positive effect on low intrinsically motivated students and EM has a slight, but not significant, positive effect on text learning in this study. The goal congruence model may partially explain the gender-by-instruction interaction that was observed in this study. It seemed that girls' goal structure was congruent with the IM instruction but incongruent with the EM instruction. The opposite seemed to be the case for boys. The take home message of this study was that the instructional wording mattered, and could affect student motivation.

This quantitative study was a pretest/posttest, control group, true experimental design. In regards to internal validity, instructional wording was the only treatment on

these randomly assigned students. By using a control group that was given a neutrally worded activity, this research design has accounted for the Hawthorn effect, novelty and disruption effects, pre or posttest sensitization, maturation, and history/treatment interactions. Participants took the test immediately after reading the intentionally worded directions, and again 10 minutes into reading the assigned work, and this time of measurement strengthens validity. Because this is non-longitudinal study was conducted over one 45 minute lesson, and because the control group participated in the same activity as the two comparison groups, experimental treatment diffusion, compensatory rivalry or equalization, and resentful demoralization would not affect the results.

Since this study was conducted in Germany, there is a question if the results would have been different if done with American students. Many of the findings needed to be statistically controlled for the difference in gender between the groups. Since gender did make a small but significant difference in IM, repeating this study with gender divvied evenly before students are randomly assigned instructional groups would be helpful.

Deci (1973) authored two studies that examined the results of positive and negative feedback on intrinsic motivation. Male and female undergrad college students participated in the experiment as part of a course requirement. With 32 control subjects and 32 experimental subjects, there were eight subjects in each of the following groups:

	Female Subjects		Male Subjects	
	Female Experimenter	Male Experimenter	Female Experimenter	Male Experimenter
Pos. feedback	n=8	n=8	n=8	n=8
control	n=8	n=8	n=8	n=8

Subjects played with puzzles [some with positive verbal feedback("That's very good, it's the fastest that one has been solved."), some with no feedback] and then they were left alone in puzzle room to wait. The time they then spend playing with the puzzles on their own showed their intrinsic motivation.

This first study found that female intrinsic motivation dropped after positive feedback (especially if it was given by a male experimenter), where as male intrinsic motivation rose with positive verbal feedback (especially from a female experimenter). A more detailed discussion of this study is combined with the discussion of the next study.

Deci's (1973) second study also examined the results of positive and negative feedback on intrinsic motivation. There were 96 undergrad participants.

	males	females
control	n=16	n=24
Neg Verbal Feedback	n=8	n=16
Neg Feedback via Failure	n=9	n=2

The second test was similar to the first, but with negative verbal feedback ("Although you did solve that, your time was below average.") or the naturally self-

administered negative feedback of failing the puzzle. He measured intrinsic motivation by the number of seconds each participant played with the puzzles on their own time.

He found that female intrinsic motivation dropped after positive feedback (especially if it had been given by a male experimenter), where as a male intrinsic motivation rose with positive verbal feedback (especially from a female experimenter). Negative verbal feedback lowered intrinsic motivation for both males and females, but self-administered negative feedback through failure lowered intrinsic motivation even more substantially. Concisely stated, this study shows that complements may not be the best way to encourage intrinsic motivation.

For these two quantitative experiments, the static group comparison counteracted maturation, history, testing, and instrumentation, which strengthens their internal validity. He uses previous studies as a form of peer review. This is a very small sample size which makes it challenging to draw any conclusions from the results. Subjects were not randomly selected and it doesn't mention how they were assigned. It doesn't mention the mannerisms or attitudes of the experimenters. Previous studies (Henderlong & Lepper, 2007) showed the same result that they received here for males, but they hadn't taken sex differences into account. It is also less generalizable to middle school students since the participants were in college.

Corpus and Lepper (2007) compared students' motivation differences after person, product, or process praise. Of the 4th- and 5th-grade students non-randomly selected from two San Francisco area elementary schools, 93 (44 females, mostly White,

Asian, and Latino) volunteered to participate. Then they were randomly assigned, within sex, to one of the four treatment groups.

While working on a tangram puzzle, students received one of the three types of praises, or neutral comments as part of a carefully constructed situated one-on-one experience. For this first round, students were assured success. Then during a second round, students were not given any praise and were assured failure. After each round, and then again several weeks later, researchers measured the students' motivation with both behavioral and self-reported measures. The researchers acknowledged that behavioral measures tend to hold more external validity than self-reported measures. Using Likert scales, students rated how much they liked the task, their desire to continue, and their perceived competence. Free-choice time (five minutes of playing with toys of their choice) and gift choices (ranking which toys, including a tangram, they would like to take home with them) gauged behavioral and longitudinal motivation. To measure longitudinally, the researcher returned after about approximately three weeks to obtain the participants' current gift choice rankings (having pretended to lose the original versions). All of the experimenters were female, who may have less negative effect on motivation than males according to a previous study (Deci, 1973).

Product and process praise groups both showed an increase in motivation for girls. The person praise group showed lowered motivation for girls. Praise feedback explained 22% of the variance for girls tangram ranked gift choice. Boys motivation was not significantly affected in any of the three praise groups as compared to the no praise group. Both immediate and belated results were the same.

This quantitative, true experimental, four-group design has strong internal validity, further strengthened by triangulation with previous studies and negative case analysis. Each of the experimenters was blind to either the hypothesis or the conditions, depending on their role with the randomly assigned students. Since students did not know that they were even assigned a group, they would not have had any compensatory issues. Also, the researches worked to nullify experimenter effects. One would imagine that the self-reports acted as a member check. To aid with external validity, the methods section included an extremely detailed treatment description, and the age group is very close to middle school. Although it was never specified, this study is clearly dealing with task-specific motivation.

Each of the studies in this final section illustrated that feedback played a significant role in the promotion or demotion of motivation. The results from all four studies complemented one another. Students who received intrinsically motivational instruction showed significantly higher interest scores than students who received neutral or externally motivational instruction. IM instruction enhanced the performance of high intrinsically motivated students, as opposed to EM instruction, which tended to negatively affect high IM students. It seemed that girls' goal structure was congruent with the IM instruction but incongruent with the EM instruction. The opposite seems to be the case for boys. Instructional wording mattered, and could affect student motivation. Female intrinsic motivation dropped after positive feedback (especially if it was given by a male experimenter), where as male intrinsic motivation rose with positive verbal feedback (especially from a female experimenter). Negative

verbal feedback lowered intrinsic motivation for both males and females, but self-administered negative feedback through failure lowered intrinsic motivation even more substantially. Product and process praise showed to increase motivation for girls, while person praise showed to lower motivation for girls. One the other hand, boys motivation was not significantly affected in any of the three praise types as compared to no praise. Overall, females experienced less motivation after receiving person praise or positive verbal feedback, especially coming from a male, but higher motivation after receiving product or process praise. Males goal structure was more congruent with extrinsic motivation and not significantly affected by praise types. They also showed more intrinsic motivation after receiving positive verbal feedback, especially from a female. Both males and females experienced lowered intrinsic motivation from negative verbal feedback or failure, and heightened intrinsic motivation after receiving intrinsically motivating instruction. Feedback type significantly affected motivation.

Summary

Chapter three was a review of literature focused on effective strategies for fostering motivation. Each section of this chapter analyzed and summarized a particular topic within this field. The first section, Goal Orientation, addresses intelligence theory and goal orientation, both of which are tied to motivation in the classroom. The overall conclusion was that entity beliefs could lead to mastery goal orientation, which could lead to higher test scores, effort, enjoyment, and/or motivation, especially intrinsic motivation. Another conclusion was that the context of the activity could affect goal orientation and motivation both positively and negatively.

The second section, Problem-Based Learning, shows that Problem-Based Learning has been successful at fostering motivation. All seven studies demonstrated that the researchers' use of PBL methods increased students' motivation, or aspects of motivation. Additional relevant findings included: value of real life situations, hands on work, role playing, participatory activities, and being able to socialize; enjoyment of media use in media-based PBL programs; overall improvement in scholastic success; and increases in intrinsic/mastery goal orientation, interest in and enjoyment of the subject matter, effort regulation, metacognitive self-regulation, task value, critical thinking, class involvement, confidence, concentration, ownership of one's own learning, and attitude towards science. Overall, these studies clearly showed that PBL activities can foster motivation both directly and indirectly.

The third section, Attention to Students' Needs, demonstrated that attention to students' needs can promote motivation. The following factors directly or indirectly influenced motivation positively: allocation of responsibility based on a student's performance and current status; promotion of students' autonomy, creativity, originality, and initiative; challenge; perception of high skill level; relevant instruction; student control; ability to concentrate; interest and enjoyment of the activity; inquiry framework and supervision of groups' development; encouragement and exhibition of confidence in students; one-on-one attention to every student; student-focused programs; group or individual work as opposed to watching videos or listening to lectures; room to initiated one's own mini-activities matching one's personal agendas; choice of activities; activities that were less common, integrated art, computer-based

inquiry, or incorporated multiple intelligences; and support in believing that one could truly play a role in solving an authentic problem. Other significant findings were that: goals & self-schemas lead to both motivational and learning strategies; the stronger a student's motivation, the stronger their agreement with constructivist conceptions; students who chose the PBL curriculum tended to already consider PBL concepts more important, also assigning less value to the role of motivation; and that prior knowledge strongly impacted task value, learning belief control, self-efficacy, intrinsic goal orientation. These various findings exemplify how individuals became motivated in their own ways.

The forth section, Experimental Programs Employing Multiple Variables, reviewed three alternative programs that all incorporated PBL strategies and philosophies, and all positively impacted student motivation and/or interest. One or more of these programs included a focus on: web-based simulation; real world problems; global/social perspective taking; role playing; interacting and relying on students both within and beyond one's own class; complex personal and public knowledge; dynamic curriculum taking on student's interpretations into account instead of a contextual/static/factual focus; and the goal of creating autonomous decision makers and life-long learners who know how to search for information, manage knowledge, and work in groups. In addition, in self-regulated environments, students were more actively involved in their learning process, felt more enjoyment in the activities, and experience higher motivation to learn, than students in traditional

environments. These three alternative programs created environments able to foster motivation.

In the fifth section, Feedback and Communication with Students, students who were already more intrinsically motivated continued to become more motivated after receiving intrinsically motivating instructions, and became less motivated after receiving extrinsically motivating instructions. Females experienced less motivation after receiving person praise or positive verbal feedback, especially coming from a male, but higher motivation after receiving product or process praise. Males goal structure was more congruent with extrinsic motivation and not significantly affected by praise types. They also showed more intrinsic motivation after receiving positive verbal feedback, especially from a female. Both males and females experienced lowered intrinsic motivation from negative verbal feedback or failure, and heightened intrinsic motivation after receiving intrinsically motivating instruction. Feedback played a significant role in the promotion or demotion of motivation.

In summary, intrinsic/mastery goal orientation, incremental intelligence theory, programs that incorporate PBL and students' needs for challenge, interesting activities, choice, and appropriate feedback all foster motivation. Next, chapter four reviews the previous chapters, summarizes the findings from the 30 studies, links those results to implications for teaching, suggests future research areas, and finally, recaps the essential points of this paper.

CHAPTER 4: CONCLUSION

Introduction

Chapter one discussed the purpose of this paper, which is to obtain and analyze effective strategies for promoting motivation in the classroom. It asked, what are these methods for better supporting students' motivation to participate in the learning community and engage themselves in the learning process? Chapter two explained that motivation is a popular topic in educational research and philosophy, but despite the prevalent theories and theorists supporting the importance of motivation, our educational system in America has yet to embrace these ideas in its day to day classes.

Chapter three reviewed professional literature researching methodology for fostering motivation. Five sections made up the body of chapter three: Goal Orientation, Problem-Based Learning, Attention to Students' Needs, Experimental Programs Employing Multiple Variables, and Feedback and Communication with Students. Each section explored a themed group of the 30 investigated studies. The examination of each study summarized, evaluated, and discussed the research question, participants, methods, results, and validity, in order to determine effective strategies for promoting motivation.

Chapter four is the final chapter of this paper. Its initial purpose is to review the previous chapters, summarize the findings from the 30 studies, and link those results to implications for teaching. Then it will state suggestions for future research studies and areas that need to be more deeply examined within the field of motivational education, and finally, once again recap the essential points for motivational strategies.

Summary of the Findings

Five sections divided the 30 examined studies to better explore essential topics affecting student motivation: Goal Orientation; Problem-Based Learning; Attention to Students' Needs; Experimental Programs Employing Multiple Variables; and Feedback and Communication with Students. The research found that the following are all factors for increasing motivation: intrinsic/mastery goal orientation and incremental intelligence theory; programs that incorporate Problem-Based Learning and students' needs for challenge, interesting activities, and choice; and appropriate feedback.

The first section, Goal Orientation, dealt with intelligence theory and goal orientation, both of which are tied to motivation. These six studies included strategies that impacted student motivation, such as lessons teaching about incremental intelligence theory, and context such as general encouragement of incremental theory and mastery goals or evaluation anticipation. The findings of these six studies stated that: entity beliefs lead to performance goals rather than mastery goals; incremental beliefs lead to higher test scores, possibly due to more positive motivational patterns; these incremental beliefs could be taught, leading to higher motivation, effort, and grades; context mattered as a learning focused group was more motivated than a performance focused group; assigned goals and the goal orientation context of an activity interacted to affect participants' levels of intrinsic motivation, as those assigned mastery goals in a neutral goal oriented setting rated higher enjoyment and intrinsic motivation than those assigned performance goal, whereas those assigned performance goals in a performance goal oriented setting actually rated higher intrinsic motivation

than those assigned mastery goals in the same setting; and that anticipation of temporal, verses normative, evaluation lead to higher intrinsic motivation and mastery goal orientation. The overall conclusion was that entity beliefs could lead to mastery goal orientation, which could lead to higher test scores, effort, enjoyment, and/or motivation, especially intrinsic motivation. Another conclusion was that the context of the activity could affect goal orientation and motivation both positively and negatively.

The second section, Problem-Based Learning, showed that Problem-Based Learning had been successful at fostering motivation. All seven studies demonstrated that the researchers' use of PBL methods increased students' motivation, or aspects of students' motivation. Additional relevant findings in multiple studies included: increased interest in and enjoyment of the subject matter; increased intrinsic/mastery goal orientation; that students enjoyed using media in media-based PBL programs; and overall improvement in students' scholastic success. Individual studies also strongly concluded that PBL lead to improvement in these areas supporting motivation: effort regulation; metacognitive self-regulation; task value; critical thinking; class involvement; confidence; concentration; ownership of individuals' own learning; and attitude towards science. Other individual studies also concluded that the more personal time a student spent on the PBL topic, the higher their motivation rose, as well as that students' valued real life situations, hands on work, role playing, participatory activities, and being able to socialize. Overall, these studies clearly showed that PBL activities can foster motivation both directly and indirectly.

The third section, Attention to Students' Needs, demonstrated that attention to students' needs promoted motivation. The 10 studies in this section had different findings, showing that individuals became motivated in their own ways, and providing diverse methodology. PBL and similar programs incorporated multiple strategies to attend to students' needs, thereby promoting motivation, as shown in these studies. Students seemed more likely to display self-regulation if their teacher allocated responsibility based on a student's performance and current status. If a teacher promoted students' autonomy, as well as exhibited creativity, originality, and initiative, then students seemed more likely to demonstrate initiative. Students also appeared more likely to exhibit perseverance and self-discipline when their teacher supplied inquiry framework and then supervised group development. Students showed motivation and satisfaction after their teacher encouraged and exhibited confidence in them, as well as gave one-on-one attention to every student. Attitude and self-efficacy scores significantly increased, while anxiety scores decreased, after participating in a student-focused program. Goals & self-schemas lead to both motivational strategies (defensive pessimism, self-handicapping) and learning strategies (rehearsal, elaboration, volitional control, etc), and all lead to final achievement (exams, final course grade). Student engagement was strongly related to high levels of all of the following variables: challenge, perceived skill level, relevance of the instruction, control, concentration, interest, and enjoyment of the activity. These same students reported to be more engaged while doing group or individual work as opposed to watching videos, or listening to lectures. While students engaged in given tasks, they also initiated their

own mini-activities that matched their personal agendas. Personal excursions may have allowed students to express their competence and incorporate their interests and goals, which may have helped them maintain engagement. Providing students with a choice of activities led to increased motivation and participation scores for the class overall. Lessons what coincided with the highest participation scores also included less common activities and incorporation of multiple intelligences. Students rated interest in lessons that integrated art (pictures, music, drama) almost twice as high as more traditional lessons (book work, worksheets, readings, lectures). Students were more likely to engage in an inquiry lesson if they were supported in believing that they could truly play a role in solving an authentic problem, and in a class where students were already comfortable with computers, computer-based inquiry could foster student engagement. As compared to students who chose traditional curriculum, students who chose the PBL curriculum tended to already consider PBL concepts more important, also assigning less value to the role of motivation. There were significant correlations between students' motivation and their constructivist conceptions, meaning the stronger their motivation, the stronger their agreement with constructivist conceptions. Prior knowledge contributed to approximately a third of the variance for both intrinsic goal orientation and task value, while also contributing to three quarters of the variance for learning belief control which contributed to nearly half of the variance for self-efficacy. These various findings exemplify how individuals became motivated in their own ways.

The fourth section, Experimental Programs Employing Multiple Variables, reviewed three alternative programs that all incorporated PBL strategies and

philosophies, and all positively impacted student motivation and/or interest. A web-based simulation (focused on real world problems, global/social perspective taking, role playing, and interacting and relying on students both within and beyond one's own class) did result in the increase in middle school students' interest in their topic of study. Student perceptions of learning environments were related to their motivation and learning strategies used for their self-regulation. In self-regulated environments, students were more actively involved in their learning process, felt more enjoyment in the activities, and experience higher motivation to learn, than students in traditional environments. Students at an experimental school (founded on: complex personal and public knowledge; dynamic curriculum taking on student's interpretations into account instead of a contextual/static/factual focus; and the goal of creating autonomous decision makers and life-long learners who know how to search for information, manage knowledge, and work in groups) experienced higher educational achievements (test scores, skills, self-efficacy, and motivation) than a traditional school, and the 'average and slow' students developed a greater increase of motivation. These three alternative programs created environments able to foster motivation.

In the fifth section, Feedback and Communication with Students, each of the studies illustrated that feedback played a significant role in the promotion or demotion of motivation. The results from all four studies complemented one another. Students who had received intrinsically motivational instruction showed significantly higher interest scores than students who had received neutral or externally motivational instruction. IM instruction enhanced the performance of highly intrinsically motivated

students, as opposed to EM instruction, which tended to negatively affect highly IM students. It seemed that girls' goal structure was congruent with the IM instruction but incongruent with the EM instruction. The opposite seems to be the case for boys. Instructional wording mattered, and could affect student motivation. Female intrinsic motivation dropped after positive feedback (especially if it was given by a male experimenter), where as male intrinsic motivation rose with positive verbal feedback (especially from a female experimenter). Negative verbal feedback lowered intrinsic motivation for both males and females, but self-administered negative feedback through failure lowered intrinsic motivation even more substantially. Feedback type significantly affected motivation.

In summary, intrinsic/mastery goal orientation, incremental intelligence theory, programs that incorporate Problem-Based Learning and students' needs for challenge, interesting activities, and choice, and appropriate feedback all foster motivation.

Implications for Teaching

The motivational strategies that I have gleaned from these studies include normalizing frequent, learning-based assessment, teaching specific lessons on incremental theory as well as its link with grade improvement, and finally, maintaining a general attitude supporting incremental theory. My objective is to build my students' beliefs in incremental theory, which may help strengthen their master/learning/intrinsic goals and foster their intrinsic motivation, hopefully leading to their improved scholastics. By teaching our students that intelligence is malleable, they are more likely to engage in the learning process (Blackwell, Trzeniewski, and Dweck, 2007;

Harackiewicz, 1998; Vogler and Bakken, 2007). The main message of the intervention in the Blackwell, Trzeniewski, and Dweck (2007) study was that learning actually alters the brain by creating new connections, and that ultimately, students are responsible for this process. Taking this message, I plan to incorporate lessons on incremental theories into my curriculum. Each year before teaching these lessons, I can search for newer research suggestions on lesson styles and information to cover. I can combine these suggested methods and then do my own personal longitudinal series of case studies on the motivational improvement for each of my classes. I plan to incorporate prominent lessons into my unit plans, similar to the effective examples in these studies, then frequently refer back to these concepts during other lessons throughout the year.

Sustained engagement is a product of learning goals, and disengagement is a product of performance goals (Azevedo, 2006). In Vogler & Bakken (2007), learning (mastery) goals lead to higher levels of effort by the students, which is in part, the definition of intrinsic motivation. One method of building mastery-goal orientation is by manipulating environmental cues (Song & Grabowski, 2006). We can promote learning goals through our evaluation styles. Students who expect to be graded are more likely to put forth effort. Then by evaluating their progress, rather than just their outcomes or answers, we can encourage learning goals instead of performance goals (Butler, 2006). This is a tool I will use almost daily. Also, highlighting the value of the learning process might encourage learning goals, whereas accentuating performance may add promote performance goals (Song & Grabowski, 2006). I can choose what

messages I emphasize as one method of influencing the goal-environment in my classroom.

When giving instructions, we need to be sure that our words promote learning goals (Song & Grabowski, 2006). I can use specific phrases to promote learning-orientation, such as, "Please remember that the most important thing will be for you to try to understand the problem. This is very important because if you try your best to understand the problem, it will help you define the problem and you will be one step closer to finding the best solution." In addition to never bragging about the 'best' grades or comparing people's work, I can avoid saying lines like, "Remember that the most important thing will be for you to try your best to [be correct]. This is very important because if you try your best . . . without failure or making any mistakes, you will be able to show how well you can do compared to others in your classroom" (Song & Grabowski, 2006, p. 452). I need to be aware of my wording not only for oral directions, but also on my handouts, worksheets, and individual tutoring, etc. I can also give my students choices to promote learning-goals. On that same line, I can be sure to keep their evaluations private. For example, if I post scores and comments online, then each student can password protect their accounts (Song & Grabowski, 2006). There are many opportunities to create an idealized learning-orientated context. With time and consistency, I hope to normalize this orientation in my classroom.

Our society indoctrinates us that we are only smart if tasks are easy, and that if we actually work hard or dare to make a mistake then we must not be very intelligent (Dweck, 2000). Dweck advises that if students await praise because their work was

easy, we can apologize for wasting their time and guide them to a more challenging task. By doing this, she states that we are teaching them that "a meaningful success requires effort" (Dweck, 2000, p. 43). I am not sure that the harsh term 'wasting time' is necessary, but this concept appears to be a valid spin off of the research presented in this paper. She clarifies that we can still acknowledge performance-achievements, but that we should emphasis the value of effort so that our students might have the motivation to overcome obstacles.

Middle school is a particularly important time for motivational development. I am keeping in mind that the grades I have examined in these studies are 4/5th, 6th,7th, another 7th, 7/8th, and college. As mentioned in the examination of the second half of the Blackwell, Trzeniewski, and Dweck (2007) study, intelligence theory began to strongly impact math grades for the 373 students. Incremental theory beliefs predicted more positive motivational patterns, which lead to higher math scores. These middle grade levels are essential times for maintaining motivation. Chapter one gave evidence that middle school is a common period for students to fall behind and even drop out of school. If these proposed strategies can foster motivation, then these middle years are an essential time to focus on incremental theory and mastery goals. According to Dweck (2000), middle school is when students become exceedingly vulnerable to negative motivational variables. She says that in elementary school, teachers often create low-stakes environments where students are safe from failure. Then in middle school, work becomes more difficult, less personalized, and more focused on grades. She claims that this change can lead to lower achievement for performance-oriented

students, but that mastery-oriented students are more likely to step up to the challenge and apply the extra effort.

> In one study, "students who endorsed more of an entity theory at the beginning of seventh grade reaped the most benefit from the incremental theory intervention. Their declining grade trajectory was reversed following the intervention, while the grades of students in the control group who endorsed more of an entity theory continued to decline. This finding supports the contention that it was the incremental theory message in particular that was responsible for the achievement benefit, . . . and confirms that even a brief targeted intervention, focusing on a key belief, can have a significant effect on motivation and achievement" (Blackwell, Trzeniewski, and Dweck, 2007, p258).

This argument inspires me to use whatever methods are available to nurture a mastery-oriented environment in my classroom.

Other studies referenced by Vogler & Bakken (2007) showed a strong correlation in entity or incremental theory for goal-orientation across domains, meaning that participants did not show differentiated beliefs about intelligence across subject matter. When I teach incremental theories, my lessons may affect student beliefs, and therefore effort, in other non-science classes as well. The corollary is that if my team of fellow teachers (my students' instructors for English, Math, etc) buys into the benefits of teaching incremental theories, then the results of their lessons can bolster my class as well.

Whenever a motivational context matches someone's goal orientation, their IM is positively affected. People with high achievement motivation show more interest in an activity when it involved competition than people with low achievement motivation. Instructional effects on situation models can also vary as functions of initial motivation (Schaffner & Schiefele, 2007). Intrinsically motivated learners use learning strategies more frequently and put-forth more effect than extrinsically motivated learners (Schaffner & Schiefele, 2007). Extrinsic motivation may have negative effects on deeper or complex learning because learners are more focused on intentional results rather than the content or process of learning. Yet these negative effects may not occur for simple learning such as memorizing facts (Amabile, 1983; Deci and Ryan, 1985; Pintrich and Schunk, 2002; Schaffner & Schiefele, 2007). Although I plan to encourage intrinsic motivation and master goals as often as possible, it is worth noting that there are times that I may want to play the psychological game of using an extrinsically focused activity to help students accomplish lower order learning.

Trends show that students with mastery-orientation will be more likely to give up 'looking smart' in order to learn more (Dweck, 2000, p. 3). Even if they don't consider themselves very smart, they are still more likely to challenge themselves, and stick with arduous activities (Dweck, 2000). As a stereotype, these same students feel more intelligent when "engaging fully with new tasks, exerting effort to master something, stretching their skills, and putting their knowledge to good use, for example to help other students learn" (Dweck, 2000, p. 4). These actions are manifested forms of motivation. These actions are also encouraged by, and necessary for, PBL. Perhaps

PBL can create a beneficial cycle, fostering motivation to engage, engaging to enhance motivation, etc. Goal orientation and PBL complement and strengthen one another, one reason being that mastery goals may lead to higher-order thinking.

> "Mastery goals, which encourage students to learn and acquire worthwhile skills and understandings, also prompt them to search for new and better ways to address and solve problems. In contrast, ability goals, which focus attention on the level of one's ability, encourage students to rely on familiar knowledge and strategies. Thus, the kind of tasks that are supported by mastery goals require heuristic divergent thinking that necessarily involves the acquisition of new ways of addressing problems. However, those that are supported by ability goals, including, in many cases, graded performance on school tests, rest more on the recall and application of familiar knowledge and algorithms" (Butler, 2006, p. 597).

This quote epitomized the added bonuses of mastery goals, and helps justify why promoting mastery vs. ability goals is essential in our classrooms. Higher order thinking is one of the main goals of PBL, so fostering mastery goals will strongly benefit my PBL lessons.

Also directly related to PBL, students often have stronger solution development skills if they have stronger learning-goal orientation (Song & Grabowski, 2006). Purpose goals are the 'why' someone does something, whereas target goals are the 'how.' Higher level purpose goals and task-specific target goals are two of the most important

factors that play into someone's performance on, and motivation for, an activity at a given time. Lower level task goals can constitute the steps toward a larger mastery goal (Harackiewicz, 1998). This process of smaller goals accumulating towards an overall goal is mirrored in PBL, furthering the argument for the benefit of teaching PBL with the aid of a master goal focus.

If we incorporate Problem-Based Learning activities and programs into our regular curricula, our students may be more inclined to engage in classroom learning experiences (Cerezo, 2004; Chung and Chow, 2004; Liu, 2006; Sanchez, Neriz, and Ramis, 2008; Sungur and Tekkaya, 2006; Tarhan and Acar, 2007; Zumbach, Kumpf, and Koch, 2004).

A main aspect of PBL is that the focus is on learning rather than teaching, as well as connecting to prior knowledge (Sanchez, Neriz, & Ramis, 2008). It is a curriculum style formulated around small group case-investigation. These cases are open-ended and ill-designed problems, intended to facilitate the group problem-solving *process*. Typically, "students discuss the problem, identifying sub-problems, sub-goals, their prior knowledge, the problem's background, strategies to solve it, and so forth. Such problems may be presented in paper-based format, by audio-visual media, or by peer-actors" (Zumbach, Kumpf, and Koch, 2004, p26). Students must research and utilize a wide variety of skills and knowledge domains. Teachers (sometimes called tutors for this teaching style) facilitate discussions and mentor these small groups. After their initial group discussion of the case, students research the information they need via library resources, databases, and experts. Then the groups meet again to go over any

issues they've found and possible points of view, to help them solve the case. Different forms of PBL used various group size, case presentation, facilitator styles, and informational resources (Zumbach, Kumpf, and Koch, 2004). This process provides many opportunities for applying the motivational strategies that this paper discusses.

Many experts in the field stated that relevant, authentic problems can engage students in scientific inquiry, as can allowing students to create solutions (Harmer and Cates, 2007). According to Newmann (1986), students who are engaged in PBL lessons will be committed to their schoolwork and care about it because it has significance outside of the classroom as well as within (Harmer and Cates, 2007). PBL prepares students for the skills needed to solve problems in their future working worlds (Tarhan and Acar, 2007). Supporting students in being able to apply scientific ideas to real situations is one our education's main objectives. Students need more than just unrelated information. They need to discover the relationships between the concepts and data. This is deep, meaningful learning (Araz and Sungur, 2007). PBL's inquiry activities exercise the cognitive processes that scientists use. So teaching with PBL lessons can help educators to meet their goals to teach students to be able to successfully think scientifically (Araz and Sungur, 2007).

Middle school students are commonly acknowledged to be a challenge to engage in scientific inquiry (Harmer and Cates, 2007). For an ill-structured problem solving assignment, such as inquiry, to be successful, the students must actually choose to keep working on the problem (Song & Grabowski, 2006). A possible issue for PBL is that students can be uncomfortable, or unsure how to proceed with this, if they are only

accustom to teacher-lead learning. It is essential to teach students *how* to self-regulate, problem-solve, and collaborate, if they are to be able to learn successfully with this new style (Zumbach, Kumpf, and Koch, 2004). Middle school students are developing from concrete thinking, into abstract, so it seems natural that they would resist the uncertainty and depth of ill-structured activities (Song & Grabowski, 2006). Yet, problem solving is an extremely important skill for students to practice, because as adults, students will deal with ill-structured problems on a daily basis (Song & Grabowski, 2006) whether it be for jobs, relationships, or any other aspects of life. Ford's 1992 theory of motivation says that "motivation is maximized under conditions of 'optimal challenge' – that is, conditions in which standards for goal attainment are difficult given the person's current level of expertise, but still attainable with vigorous or persistent effort" (Gehlbach et al., 2008, p. 900). If we are fully assured that we will succeed perfectly at a task, then we have nothing to learn and no reason to put forth any effort. Challenge can boost interest (Gehlbach et al., 2008). This is why it is so essential for middle grades to teach with PBL and other similar programs, and for me to build my students' motivation to persist through possible frustration with these ill-structured problems.

According to several meta-analyses discussed by Zumbach, Kumpf, and Koch (2004), PBL has been shown to possibly have a minor disadvantage for the amount of information students retain in the short term, compared to traditional lecture teaching styles. In contrast, these same studies, and others discussed by Liu (2006), also show that PBL lessons can foster significant long-term information retention, over weeks or

even years, compared to traditional lectures. One empirically proven explanation is that students of the PBL lessons were significantly more motivated to continue learning and thinking about the subject outside of class (Zumbach, Kumpf, and Koch, 2004).

Of the commonly practiced inductive teaching methods, PBL is the most challenging to execute effectively (Sanchez, Neriz, & Ramis, 2008). PBL consumes more time and resources than traditional lecture style, and teachers will likely need training to successfully implement PBL lessons in their classrooms (Tarhan and Acar, 2007). Although I may not easily solve the time and resource constraints, there are tips for improving PBL execution. Derived from their findings, Harmer and Cates (2007) recommended these 10 principles for implementing PBL activities:

1. "Choose a problem that is authentic and allows for many possible solutions.
2. Look for problems that have broader societal impact and whose solution would have immediate value.
3. As much as possible, emphasize how the problem may affect students, their friends and families.
4. Look for ways to utilize cutting-edge problems and to connect with those who are working on solutions to such problems.
5. Provide students with many options and choices as a way to encourage their commitment.
6. Use technology to enrich data sources, resources, and opportunities to connect with the world outside the classroom.

7. Employ collaboration where possible to encourage students to engage both socially and intellectually.
8. Use language in materials and in class that emphasizes students' ability to accomplish something important if they try (the vocabulary of empowerment).
9. Enable students to work on their own outside of school on solutions.
10. Emphasize that student solutions will be shared with those outside the school who are working on solutions to the problem under study."

Problem-Based Learning allocates students control over their experience, allowing them to tie their interests to the lesson. Although a main idea behind PBL is that students have the power of choice on what they *choose* to focus their research, this choice is still constrained by the learning objectives of my subject matter, my school, and my community. Also, not all principals or team teachers allow for this student-controlled learning style (Chung and Chow, 2004).

We must give students variety and choice (Kosky and Curtis, 2008). Choice was a significant factor in student motivation for studies in on intelligence theory, Problem-Based Learning, and other alternative teaching methods described in this paper. If students are given authority and allowed to make choices, then they are likely to experience more interest in the lesson (Song & Grabowski, 2006).

The studies in this paper present differing findings, showing that individual become motivated in their own ways. So we as teachers need to use multiple methods to reach more students. PBL incorporates multiple strategies, but when I teach with PBL, I need to keep in mind the varied conceptual needs of all of my students, and not

assume that PBL will work for everyone. Some students prefer to work alone, as noted in several of the other studies in this section. Loyens, Riker, and Schmidt (2006) remind us that not all students value or have interest in PBL concepts. I will need to find ways to support my students who prefer independent work and lectures, to help them engage in our PBL lessons. PBL allows for both small and large group interaction. Some students only feel comfortable speaking out in one of these settings, so it is important to change between large and small groups to encourage more students to engage (Cerezo, 2004). PBL also gives students chances to switch the roles they play within a group. Constructivist learning (which includes PBL) puts the responsibility on the student, which may empower some students, but also may lead to anxiety and uncertainty in others (Loyens, Rikers, & Schmidt, 2008). In several studies, some students have not been motivated by PBL activities. The less systematic process may lead students to internalize the blame when they struggle, thereby reducing their motivation (Loyens, Rikers, & Schmidt, 2006).

There are also many other ways to modify or add to curriculum to accommodate varied student needs. Art and technology are both methods for engaging additional students (Kosky and Curtis, 2008; Harmer and Cates, 2007). In the Harmer and Cates (2007) study, managing all of the students' technology-related questions, in addition to the task-related, was much more time-consuming than the researchers had expected. This reminds me that although technology may do some of the facilitating for teachers, it can also bring with it a whole new set of issues with which to deal, potentially counteracting its time/energy-saving potential.

We need to pay attention to our students' expressed needs (Chung and Chow, 2004; Harlow, Burkholder, and Morrow, 2006) as well as their unexpressed needs, keeping in mind their differences in conceptual foundations (Loyens, Rikers, and Schmidt, 2006; Loyens, Rikers, and Schmidt, 2008; Shernoff, et al., 2003). Furthermore, instructors who successfully engage their students are most likely adapting their lessons to the students' individual skill levels and interests (Shernoff, et al., 2003). One technique is to increase student motivation by aligning class work with students' individual interests with PBL (Sanchez, Neriz, and Ramis, 2008). Yet, I must remember that interest is not stagnant. It can range from low to high levels. At the lower levels, students have a positive attitude and are focused on the task. At the middle levels, students will invest their feeling (I love this part; I was frustrated when; etc). When interest reaches the higher levels of passion, they will invest their energy and personal time, as well as wish for addition inquiries (Harmer and Cates, 2007). One challenge for teachers to the find the balance of assigning tasks that are slightly above each students' skill level, but that can be achieved by learning new skills (Shernoff, et al., 2003). We also need to provide opportunities for self-regulation and autonomy (Azevedo, 2006; Shernoff, et al., 2003; van Grinsven and Tillema, 2006; Zion and Slezak, 2005). Research has found that lectures reduce the opportunities that students could use to become engaged and work autonomously (Shernoff, et al., 2003). Our topics and tasks need to be authentic if we want our students to consider them worth their time and effort (Gehlbach et al., 2008; Shernoff, et al., 2003). Middle school students have a need to impact the world more than other ages, and this same age group does well with real-life

tasks. It seems that involving real-life tasks in class activities can utilizing students' desire to impact the greater world (Harmer and Cates, 2007).

No matter what teaching styles we choose, we still need to install a solid foundation of knowledge for their future activities, because students with more prior knowledge may be more motivated in that subject matter (Araz and Sungur, 2007). Araz and Sungur's (2007) found that PBL can lead to higher long term retention of information. If my PBL lessons can help my students retain more, then they will have greater prior knowledge, and then maybe higher motivation for future activities both in my class and later in life. Ultimately, my students may be more motivated if their instructional materials encourage self-determination, autonomy, choice, and challenge (Liu, 2006).

When we present instructions, we need to choose words that encourage intrinsic motivation (Schaffner & Schiefele, 2007). Female students' motivation may be particularly sensitive to feedback (Deci, 1973), so we can choose to give product and process praise in place of person praise (Henderlong & Lepper, 2007), and avoid negative feedback all together (Deci, 1973). Past research shows that compared to males, females are more likely to lose motivation from praise that specifically weakens perceived autonomy. On the other hand, other research also shows that males are more likely to ignore praise, or even boost their motivation even after hearing the same comments that can be detrimental to females. Females may be more likely to internalize feedback while males may be more likely to rely on their own judgments of themselves. Teachers may be more likely to give boys more negative feedback, and so

boys may learn to filter negative comments (Henderlong & Lepper, 2007). I need to watch for trends and differences in the comments I make to both sexes as well as to individual students at large. As a female, I need to be aware of how boys and girls may respond to me differently, both as a factor of their sex, and also as a factor of their individuality.

Praising a person ('you're talented') is often so general that it is easy for the student to disagree with the statement. Praising a process ('you're working so hard') or a product ('that's correct') is more specific and may be easier for the student to accept (Henderlong & Lepper, 2007). Also, person praise may lead students to tie task success to their personal value (Henderlong & Lepper, 2007). I do not want to inadvertently teach my students that their worth as an individual is based on their specific performances. Even more so, I do not want my students to think that if they fail at something, that they are unworthy or failures.

Process praise may benefit my female students' motivation: "'you're really thinking!'; 'You're using good puzzle-solving strategies!'; 'You must be concentrating hard!'; and 'You must be working hard!'." Product praise may have the same benefit: "'Nice job on that one!'; 'You're really arranging the pieces the right way!'; You're solving a lot of these!'; and That's the right solution again!'" I should avoid person praise such as: "'You're really good at this!'; 'You must be good at puzzles!'; 'What a good puzzle-solver you are!'" (Henderlong & Lepper, 2007, p. 493).

Strategy (process) praise seems to lead to higher master-orientation than does person- or intelligence-praise (Dweck, 2000). When children were told that 'I'm proud

of you' or that they were 'smart' or 'good,' then they were less likely to continue working through challenges (Dweck, 2000). The comprehensive body of research has mixed conclusions on the effectiveness of praise due to varying methods and styles of delivery (Henderlong & Lepper, 2007).

Our society indoctrinates us that we are only smart if tasks are easy, and that if we actually work hard or dare to make a mistake then we must not be very intelligent (Dweck, 2000). Dweck advises that if students await praise because their work was easy, we can apologize for wasting their time and guide them to a more challenging task. By doing this, she states that we are teaching them that "a meaningful success requires effort" (Dweck, 2000, p. 43). I am not sure that the harsh term 'wasting time' is necessary, but this concept appears to be a valid spin off of the research presented in this paper. She clarifies that we can still acknowledge performance-achievements, but that we should emphasis the value of effort so that our students might have the motivation to overcome obstacles.

Suggestions for Further Research

This paper included lesson details from the 30 main studies so that readers can use these ideas from successful programs. Researchers do not yet know for certain that all of these specific aspects of the lessons contributed to the increase in motivation, but one must use what is available until research can isolate the specifics that are making these programs successful. This section of chapter four is a call to action, for researchers to strengthen, deepen, and/or begin fresh exploration in these areas so essential for fostering scholastic motivation in the youth of our communities.

In the Blackwell, Trzeniewski, and Dweck (2007) study, one wonders how the overarching culture at this school might have fit with the lesson styles taught, where as a differing culture (economic, geographic, ethnic, etc) may not have been affected the same way. Furthermore, *why* did the students believe the theory they believed? Where did they get those ideas? Could similar back grounds (maybe a parent telling them that they are not ever going to be good enough and leading to a belief in entity theory) be affecting their academic success during their formative adolescence? This study showcases the potential changes over middle-grade transitions. It is important for us as educators to be aware of trends of struggles for our students.

A study "hypothesized that students' goal orientations in reading would change little during the school year (i.e. from fall to spring), but would change significantly from year to year as students were exposed to different classroom environments. Surprisingly, more significant changes were found in students' goal orientation, particularly task-mastery (learning) and performance goals, from fall to spring than from year to year" (Vogler & Bakken, 2007). How can this tie into strategies for fostering positive or intrinsic motivation/goal orientation. Would teachers need to use different strategies in the fall than in the spring?

Goal orientation is not black and white. Where any individual lies on that continuum varies depending on the day, activity, resent issues in their life, etc. If orientation is constantly sliding on the spectrum, then how can one expect students to fit cleanly into one or the other. Studies addressing the spectrum of goal orientation can help instructors understand orientation in the real world.

Before a school could justify the launch of an expensive intervention inspired by any of these studies supporting intelligence theory education, it would expect to see repeated results on from studies with larger sample sizes. There are many other questions lingering as well. What are the roots of intelligence theories for developing children? What additional methods can teachers use to channel our students towards incremental beliefs and learning/mastery goals? More research validating specific examples of leaning-goal-promoting instructions, evaluations, and lessons are needed. In general, any additional research linking students' intelligence theory to their goal orientation would greatly benefit the educational field.

What are the most essential aspects of Problem-Based and constructivist theories to include in lessons? In Nancy Cerezo's (2004) study, one may question what is it about being able to work with other students that may motivate them to participate? It may provide room to interact while still engaging, because social relationships are one of the main focuses for adolescents. Conversely, this may decrease motivation to participate and engage because they can simply socialize in their groups. Yet ultimately, if students felt that PBL increased their class involvement, activity interest, and task concentration, then PBL may very well have encouraged their motivation to engage in class activities. None the less, this possible discretion needs more investigation.

Some studies have shown that PBL is not always as successful as expected, perhaps because standard assessments may not accurately assess what students are actually learning from PBL lessons (Loyens, Rikers, & Schmidt, 2006). Future research

could include new, less mainstream assessment methods to measure aspects of the learning process. In addition, minimal research has been conducted on the link between motivation and ill-structured problems (Song & Grabowski, 2006), despite the growing body of research on motivation overall. Min Liu's (2006) study leads one to ask, does a computer-lead PBL program foster more motivation than a non-technologically-lead PBL program? If mastery goals can promote intrinsic interest through increased effort and challenge seeking (Harackiewicz, 1998), then can this be reversed? Can increased effort and challenge seeking that often stems from PBL activities, promote motivation? Perhaps making PBL inaccessible to many, some people think that the financial cost of running a PBL program outweigh the potential benefits (Loyens, Rikers, & Schmidt, 2006). Ultimately, what methods can teachers employ to make PBL programs more accessible to classes with restricted resources?

Looking at attention to student needs, more research could be done on the Loyens, Riker, and Schmidt (2006) study. Perhaps students may not need as much initial motivation to be engaged in PBL as they would for lecture based learning. *Why* does this correlation exist, and *how* it can help teachers engage students with varying learning-style interests. There is a topic that could use more examination in the Loyens, Riker, and Schmidt (2008) study as well. Could it be that students who are already motivated may be drawn to constructivist instruction? Or conversely, could students who prefer constructivist education find themselves more motivated than students who are not as interested in such concepts? How does this relationship with motivation affect students?

Directing attention on the alternative programs (Gehlbach, et all, 2008; Tubin, Likritz, and Chen 2004), what aspect of these sorts of programs are responsible for their correlation with increase motivation? Is it the constructivism, the inquiry, the simulation, the perspective taking, the technology, or something else entirely? All that is known is that something about these programs is working. Now, research in this area needs to continue so that educators can know exactly what facets of these sorts of programs are most important to emphasize in the classroom, and how to incorporate those facets into other areas of curriculum. Also, the researchers for the Gehlbach, et all (2008) study were correct in saying that their study needed to be repeated with a comparison group that maintains the traditional lesson style used prior to this program's implementation.

With the controversies over feedback, the field needs continued studies examining what aspects of feedback elicit various student responses. Specifically, teachers need to see additional research showing how praise over time might affect overall scholastic motivation. Most research on praise includes cofounding variables so it is challenging to know that the data are not resulting from teacher attention, special privileges, etc (Henderlong & Lepper, 2007). This is an area where further research could illuminate this haze.

Through all of these studies, many used questionnaire to measure motivational variables. Questionnaires only test the overall change, or a stagnant way of feeling, but they don't access the 'why' or the moment of change. Using each of these studies as a

base, and then jumping further through a variety of measuring methods would strengthen the entire field of research.

Educators need additional research in each of the topics that this paper covers. The current body of motivational research is growing but still limited. Future research must is essential, at the very least, to stay up dated. For all of the possible strategies assembled in these chapters, teachers need continued research to elucidate which specific features of these strategies are actually causing their correlation to increased student motivation and engagement.

Conclusion

Chapter one discussed the purpose of this paper, which is to obtain and analyze effective strategies for promoting motivation in the classroom. It asked, what are these methods for better supporting students' motivation to participate in the learning community and engage themselves in the learning process? Chapter two explained that motivation is a popular topic in educational research and philosophy, but despite the prevalent theories and theorists supporting the importance of motivation, our educational system in America has yet to embrace these ideas in its day to day classes.

Chapter three was a review of literature focused on effective strategies for fostering motivation. Each section of this chapter analyzed and summarized a particular topic within this field. The first section, Goal Orientation, addressed intelligence theory and goal orientation, both of which are tied to motivation in the classroom. The overall conclusion was that entity beliefs could lead to mastery goal orientation, which could lead to higher test scores, effort, enjoyment, and/or motivation, especially intrinsic

motivation. Another conclusion was that the context of the activity could affect goal orientation and motivation both positively and negatively.

The second section, Problem-Based Learning, showed that Problem-Based Learning has been successful at fostering motivation. All seven studies demonstrated that the researchers' use of PBL methods increased students' motivation, or aspects of motivation. Additional relevant findings included: value of real life situations, hands on work, role playing, participatory activities, and being able to socialize; enjoyment of media use in media-based PBL programs; overall improvement in scholastic success; and increases in intrinsic/mastery goal orientation, interest in and enjoyment of the subject matter, effort regulation, metacognitive self-regulation, task value, critical thinking, class involvement, confidence, concentration, ownership of one's own learning, and attitude towards science. Overall, these studies clearly showed that PBL activities can foster motivation both directly and indirectly.

The third section, Attention to Students' Needs, demonstrated that attention to students' needs can promote motivation. The following factors directly or indirectly influenced motivation positively: allocation of responsibility based on a student's performance and current status; promotion of students' autonomy, creativity, originality, and initiative; challenge; perception of high skill level; relevant instruction; student control; ability to concentrate; interest and enjoyment of the activity; inquiry framework and supervision of groups' development; encouragement and exhibition of confidence in students; one-on-one attention to every student; student-focused programs; group or individual work as opposed to watching videos or listening to

lectures; room to initiated one's own mini-activities matching one's personal agendas; choice of activities; activities that were less common, integrated art, computer-based inquiry, or incorporated multiple intelligences; and support in believing that one could truly play a role in solving an authentic problem. Other significant findings were that: goals & self-schemas lead to both motivational and learning strategies; the stronger a student's motivation, the stronger their agreement with constructivist conceptions; students who chose the PBL curriculum tended to already consider PBL concepts more important, also assigning less value to the role of motivation; and that prior knowledge strongly impacted task value, learning belief control, self-efficacy, intrinsic goal orientation. These various findings exemplify how individuals became motivated in their own ways.

The fourth section, Experimental Programs Employing Multiple Variables, reviewed three alternative programs that all incorporated PBL strategies and philosophies, and all positively impacted student motivation and/or interest. One or more of these programs included a focus on: web-based simulation; real world problems; global/social perspective taking; role playing; interacting and relying on students both within and beyond one's own class; complex personal and public knowledge; dynamic curriculum taking on student's interpretations into account instead of a contextual/static/factual focus; and the goal of creating autonomous decision makers and life-long learners who know how to search for information, manage knowledge, and work in groups. In addition, in self-regulated environments, students were more actively involved in their learning process, felt more enjoyment in the

activities, and experience higher motivation to learn, than students in traditional environments. These three alternative programs created environments able to foster motivation.

In the fifth section, Feedback and Communication with Students, students who were already more intrinsically motivated continued to become more motivated after receiving intrinsically motivating instructions, and became less motivated after receiving extrinsically motivating instructions. Females experienced less motivation after receiving person praise or positive verbal feedback, especially coming from a male, but higher motivation after receiving product or process praise. Males' goal structure was more congruent with extrinsic motivation and not significantly affected by praise types. They also showed more intrinsic motivation after receiving positive verbal feedback, especially from a female. Both males and females experienced lowered intrinsic motivation from negative verbal feedback or failure, and heightened intrinsic motivation after receiving intrinsically motivating instruction. Feedback played a significant role in the promotion or demotion of motivation.

In summary, chapter three explicated that intrinsic/mastery goal orientation, incremental intelligence theory, programs that incorporate PBL and students' needs for challenge, interesting activities, and choice, and appropriate feedback all foster motivation.

Chapter four covered implications for teaching, showing that this research stimulates many ideas and methods to use in future classrooms. For example, by teaching our students that intelligence is malleable, they are more likely to engage in

the learning process (Blackwell, Trzeniewski, and Dweck, 2007; Harackiewicz, 1998; Vogler and Bakken, 2007). We can promote learning goals through our evaluation styles (Butler, 2006). Students who expect to be graded are more likely to put forth effort. Then by evaluating their progress, rather than just their outcomes or answers, we can encourage learning goals instead of performance goals. When giving instructions, we need to be sure that our words promote learning goals (Song & Grabowski, 2006).

If we incorporate Problem-Based Learning activities and programs into our regular curricula, our students may be more inclined to engage in classroom learning experiences (Cerezo, 2004; Chung and Chow, 2004; Liu, 2006; Sanchez, Neriz, and Ramis, 2008; Sungur and Tekkaya, 2006; Tarhan and Acar, 2007; Zumbach, Kumpf, and Koch, 2004).

We need to pay attention to our students' expressed needs (Chung and Chow, 2004; Harlow, Burkholder, and Morrow) as well as their unexpressed needs, keeping in mind their differences in conceptual foundations (Loyens, Rikers, and Schmidt, 2006; Loyens, Rikers, and Schmidt, 2008; Shernoff, et al., 2003). Give students variety and choice (Kosky and Curtis, 2008). Choice was a significant factor in student motivation for studies on intelligence theory, Problem-Based Learning, and other alternative teaching methods. We also need to provide opportunities for self-regulation and autonomy (Azevedo, 2006; Shernoff, et al., 2003; van Grinsven and Tillema, 2006; Zion and Slezak, 2005). Our topics and tasks need to be authentic if we want our students to consider them worth their time and effort (Gehlbach et al., 2008; Shernoff, et al., 2003). No matter what teaching styles we choose, we still need to install a solid foundation of

knowledge for their future activities, because students with more prior knowledge may be more motivated in that subject matter (Araz and Sungur, 2007).

When we present instructions, we need to choose words that encourage intrinsic motivation (Schaffner & Schiefele, 2007). Female students' motivation may be particularly sensitive to feedback (Deci, 1973a), so we can choose to give product and process praise in place of person praise (Henderlong & Lepper, 2007), and avoid negative feedback all together (Deci, 1973b).

Chapter four then discussed suggestions for future research. Overall, the suggestions were that researchers continue deepening their studies, strengthening their validity, and improving upon their study designs.

By analyzing current research, this paper answered its driving question: What are effective strategies for promoting motivation in classrooms? Those methods include: intrinsic/mastery goal orientation; incremental intelligence theory; programs that incorporate PBL and students' needs for challenge, interesting activities, and choice; and appropriate feedback. Through these techniques, teachers can better support students' motivation to engage in the learning process.

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