Implicit Theories of Intelligence and Intellectual Engagement:

A Correlational Study

by

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The completion of this thesis is symbolic of a longer journey as an educator. After thirty-four years’ experience as a classroom teacher and administrator in the Manitoba public school system, the completion of a graduate thesis has been personally, somewhat over-due. The interest in the topic addressed and the formulation of the research questions addressed in this study are the result of questions that have developed and lingered over time as experiences with students, parents and colleagues have amassed.

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Abstract

This study was an empirical investigation into the correlation between Grade 9 students’ self-theories of their intelligence and their tendency for intellectual engagement. Individuals have been shown to self-identify, with respect to their self-theories of intelligence as either entity theorists (who think of their own intelligence as fixed and fairly unchangeable), or incremental theorists (who think of their intelligence as malleable and able to be increased over time). Previous research has shown that individuals have a strong tendency to self-select one or the other of these theoretical frameworks. This study examined the correlation of this identification with individuals’ tendency to become intellectually engaged in their learning. Other demographic factors were also explored. Data were collected through a survey instrument that was composed of questions used in previous research to identify self-theories of intelligence and depth of intellectual engagement. The study found a moderate correlation between students’ self-theory of their intelligence and their tendency for intellectual engagement. In this study, female students showed a significantly higher proportion of an incremental self-theory of intelligence than males.

Implications for educational leadership and classroom planning and instruction include the need to explore students’ implicit theory of their intelligence at the classroom level in order to strategically plan instruction with this characteristic of the learner in mind, and the need to work collaboratively as educators to ensure that interactions with students serve to encourage the development of incremental self-theories in students and discourage the entrenchment of entity theories.
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Chapter 1
INTRODUCTION

Rationale

This study was precipitated by the increasing interest in student engagement advocated by education practitioners in the province of Manitoba (Manitoba Education, Citizenship and Youth, 2012; Pembina Trails School Division, 2011) and supported in the academic literature (Axelson & Flick, 2011; Harris, 2010; Kidwell, 2010; Kuh, 2009; Libbey, 2004; Schussler, 2009). School personnel continuously design, revise, and refine curricula, practices, and programs in an on-going effort to increase the degree of student engagement on personal, social, academic, and intellectual levels. This thesis focuses on the growing interest in intellectual engagement as a subsection of the body of work done in the area of student engagement. This dimension of student engagement is considered distinct from the other types of engagement and is defined as “A serious emotional and cognitive investment in learning, using higher order thinking skills, (such as analysis and evaluation) to increase understanding, solve complex problems or construct new knowledge” (Willms, Friesen, & Milton, 2009, p. 7). Intellectual engagement requires students to be stimulated and motivated to invest in their learning to a degree that may not typically be necessary to be successful in conventional school structures. In order for a student to become deeply intellectually engaged in learning, it reasonably follows that he/she must possess confidence in his/her own concept of intelligence and in his/her ability to learn in circumstances where there are demands to invest emotionally and cognitively.
An individual’s personal view of his/her intelligence has been identified as a self-theory of intelligence (Dweck, 1999, 2005, 2008). Dweck identified two distinct self-theories of intelligence: the entity theory, in which an individual sees his/her intelligence in a particular area as fixed and rigid; and the incremental theory, in which the individual sees his/her own intelligence as malleable and having the capacity to grow under the right conditions.

This study focused on the intersection of students’ capacity for deep intellectual engagement and their self-theory of intelligence. Specifically, the study attempted to establish a correlational relationship between individuals’ self-theory of their intelligence and the degree to which they are likely to become intellectually engaged in school. The survey instrument employed was developed as an amalgam of a survey used by Dweck (2009) to establish students’ self-theory of their intelligence with questions from the *Tell Them From Me* survey (Canadian Education Association, 2011) that were designed to establish students’ tendency for intellectual engagement.

This study is of theoretical interest because the findings have shed some light on the implications for educators for deepening intellectual engagement in high school students. The consideration of students’ self-theories of their intelligence and how they present themselves in school are not often considered by teachers as they plan learning experiences. The idea that some students may arrive at the class with a pre-conceived concept of their intelligence and that may put them in a better (or worse) position to engage intellectually is not often a topic discussed in the school environment or presented as being a significant element in academic literature. To that end, this study provided a
correlational comparison between self-theories of intelligence (Dweck, 1999) and intellectual engagement of students within an urban center in Western Canada.

This study is of practical interest because it delineates the relationship between how students think about their own intelligence and the degree to which they are likely to be intellectually engaged in school. Educators work hard at creating the conditions that will optimize student learning and engagement. The findings from this study will help focus these efforts on factors that are important in creating the conditions for intellectual engagement. These factors include such things as how teachers frame verbal and written instructions to students; how they phrase comments of encouragement and re-direction during instruction and other interactions with students; and how they choose to scaffold learning activities. It is hypothesized that those students who self-identify as having an entity theory of intelligence may not be as deeply intellectually engaged in school because they believe their intelligence levels in any one area is fixed; therefore, they may not believe that focused engagement will help them achieve at higher levels. Such “fatalistic thinking” has important implications for teachers who wish to foster student engagement within the classroom and who hope to encourage students to achieve successfully (and at higher levels) in the classroom environment. The ways in which they and other adults interact with students has been demonstrated to have a significant effect on how students develop their self-theory of intelligence (Dweck, 1990).

However, according to Dweck, (1999, 2005, 2008), an individual’s self theory of intelligence may be able to be altered, to move from an entity belief to an incremental one. The implications of this are that teachers may be able to help students shift their self-theory of intelligence and, therefore, provide better cognitive conditions within students
to help foster deep intellectual engagement. An important component of teachers’ efforts to engage students intellectually may be to focus on helping those students who have an entity belief of their intelligence transform this belief to that of an incremental theory, thus removing a barrier to deep intellectual engagement.

**Definition of Terms**

**Quantitative Research**

Creswell (2005) defines quantitative research as “a type of educational research in which the researcher decides what to study, asks specific, narrow questions, collects numeric (numbered) data from participants, analyses these numbers using statistics, and conducts the inquiry in an unbiased, objective manner” (p. 39). This study utilized quantitative methodology to determine the correlation between students’ self-theories of intelligence and their levels of intellectual engagement in schools.

**Self-theories of Intelligence**

Self-theories of intelligence, as described by Carole Dweck (1999) are our individual beliefs about the nature of our intelligence. These beliefs include our view of how intelligent we are, as well as whether or not we are able to change (increase) our levels of intelligence with our choices of behavior. The nature of our self-theory of our intelligence carries significant implications for our setting of achievement goals: self-esteem, our confidence as learners, our ability to take risks as learners, and our ability to accept failure as part of the process of learning (Dweck, 1999).
Incremental Theory of Intelligence

An incremental theory of intelligence is a type of self-theory where the individual holds the belief that his/her level of intelligence is malleable, and with productive effort can be increased. Learners with this belief are more open to setting ambitious learning goals for themselves, are open to challenging themselves with more difficult problems, demonstrate a high level of persistence in learning tasks, and are more willing to take reasonable risks in their learning, even with the prospect of possible failure. This self-theory of intelligence leads to learning behaviors that support significant cognitive growth and achievement (Dweck, 1999).

Entity Theory of Intelligence

An entity theory of intelligence is a type of self-theory where individuals hold the belief that their level of intelligence is fixed and that regardless of the efforts that they may make to learn new things, their level of intelligence will not be significantly changed. This notion of a concrete entity of intelligence can lead learners to be overly cautious about the degree to which they will challenge themselves with new and difficult tasks. They will set their own goals in relation to performance, with respect to their perception of their current (and fixed) abilities. This has the effect of limiting their growth over the longer term, which in time has a detrimental effect on self-esteem, cognitive development, and achievement (Dweck, 1999).
**Intellectual Engagement**

This study utilizes Willms, Friesen, and Milton’s (2009) definition of intellectual engagement to be “a serious emotional and cognitive investment in learning, using higher order thinking skills, (such as analysis and evaluation) to increase understanding, solve complex problems or construct new knowledge” (p. 7).

**Purpose of the Study**

This study was an empirical investigation into the relationship between students’ self-theories of their intelligence and their levels of intellectual engagement. The problems this study attempted to address were both theoretical and practical. The research literature on students’ self-theories of intelligence clearly indicates that students will tend to identify with either one of two self-efficacy beliefs about their intelligence. The self-theory that drives their learning behaviors is tightly held and typically has been reinforced by multiple experiences over a prolonged period of time.

Intellectual engagement is described as “a serious emotional and cognitive investment in learning, using higher order thinking skills, (such as analysis and evaluation) to increase understanding, solve complex problems or construct new knowledge” (Willms et al., 2009, p. 7). This study has attempted to establish the nature of the relationship between these two factors.

The role of school leaders is critical in fostering the conditions in the learning environment that will optimize students’ capacity to learn (Leithwood, Mascall, & Strauss, 2009). As instructional leaders, it is important that school administrators have a
thorough understanding of the metacognitive processes that are in play as students approach learning tasks. This is critical to the success of efforts to increase student achievement. This study demonstrated the degree to which students’ self-theories of their intelligence correlates to their levels of intellectual engagement. It follows that higher levels of engagement, when focused towards curricular outcomes, will manifest in higher achievement levels. (Kuh, 2003; Willms et al., 2009). This study demonstrates the importance of students’ self-theory of their intelligence on their levels of intellectual engagement which will in turn affect their efficacy as learners.

**Context of the Study for the Learner**

In terms of the desirability of the two self-theories of intelligence, there is a clear long-term learning advantage for those who operate with an incremental self-theory. Incremental theorists hold the belief that they are capable of learning new and challenging things with a combination of their existing skills and intelligence, sustained effort, creative approaches to problem solving, multiple attempts, reasonable risk taking, and perseverance. They hold the belief that their degree of intelligence in a particular area of learning might be minimal at the outset but has the capacity to increase with strategically applied hard work. As they continue to grind through their learning, they not only gain the knowledge and skills directly related to the subject at hand but also reinforce confidence in the idea that they are capable of learning new and challenging things. They tend to show growth in their repertoire of strategies for learning, they experience rewards in working hard at something, and they do not demonstrate a significant level of fear of potential failure. Incremental theorists develop a sense of resilience in the face of hard work and potential failure that allows them to keep trying
with an internal level of confidence in their ability to succeed eventually. In the simplest terms, incremental theorists believe that they can and will get smarter the harder they try. In addition to seeing eventual success in their learning, they see the enjoyment of their engagement in learning as an intrinsic reward (Dweck, 1999).

Entity theorists hold the belief that their level of intelligence in a particular area of learning is fixed and will not change with significant effort. They do not believe that they can improve their level of intelligence by using the same strategies as the incremental learner. They believe that their level of intelligence is what it is, and significant efforts to increase it will not produce any notable difference. They tend to devote significantly less time to learning new and challenging things and will not invest the same amount of time, number of attempts, reasonable risk-taking, creativity in approaches, or perseverance as someone with an incremental self-theory. Although individuals with an entity theory may be intellectually very capable, they have, perhaps, through reinforcement by various environmental factors come to believe that their pre-existing intelligence is what will determine their success in learning situations. In many cases, these are students who, through their natural cognitive abilities, have done well in school and by all traditional measures and indicators have been considered intelligent and academically capable. These students have likely shown consistent success with the academic tasks with which they have been presented in school, as these tasks have not challenged their entity theory of intelligence. Their experiences as learners may not have provided significant challenges to their intellectual abilities and have not in fact provided much experience with having to work hard to learn something or how to cope and work with past failure. Entity theorists
are poor academic risk takers and have difficulty extending themselves beyond their comfort zones as learners.

Self-theories of intelligence have a tendency to be self-perpetuating (Dweck, 1999, 2005). Those individuals with an incremental theory, through their habits of mind, will be able to manage more complex learning over time. This is because they believe that their intellectual capacity can grow and they have capacity to nurture that growth. The result is that they tend not to shy away from challenging tasks as they know from experience that with enough investment of time, strategy, and their current skill level, they will likely be able to succeed. They have had this reinforced enough over time that they are willing to risk failure to tackle new and challenging learning. By contrast, entity theorists may not engage in the learning because they do not feel that they have the pre-existing degree of intelligence necessary to succeed. They do not believe that working harder, or differently, or in a more sustained way will allow their intelligence to grow to meet the demand. They fear the consequences of failing to succeed and, therefore, may be reticent to engage.

Willms et al. (2009) describe intellectual engagement as “A serious emotional and cognitive investment in learning, using higher order thinking skills, (such as analysis and evaluation) to increase understanding, solve complex problems or construct new knowledge” (p. 7). This description leads to the question of whether the type of self-theory of intelligence students possess has a bearing on how capable they are of becoming intellectually engaged. Are students with an entity theory of their intelligence less likely to become intellectually engaged than those with an incremental theory? With greater importance being placed by schools on school improvement efforts targeted at
increasing the degree of intellectual engagement demonstrated by students, is there a need to actively encourage the development of incremental theories of intelligence in students? Is a student’s self-theory of intelligence an influencing factor in his/her ability to become intellectually engaged and to benefit from the cognitive processes imbedded in such engagement? What do school administrators need to consider in the planning for instruction in their schools to maximize students’ abilities if a relationship exists between students’ self-theories of their intelligence and their tendency towards intellectual engagement?

**Research Questions**

Based upon the purpose developed above, the following research questions provided direction for the study:

1. What is the relationship between students’ implicit self-theories of their intelligence and their tendency for intellectual engagement? What is its direction and strength?
2. What is the relationship between self-theory of intelligence and factors such as sex, English as a first language, and attendance at school outside of Canada?
3. What are the implications of these findings for the instructional leadership practices of school administrators?

**Significance of the Study**

Recent publications in educational literature in the form of research papers, journal articles, and books have focused on the topic of student engagement and have
made an effort to draw the attention of educators to the importance of this topic as central to their success in increasing student achievement. (Axelson & Flick, 2011; Harris, 2010; Kidwell, 2010; Kuh, 2009; Libbey, 2004; Schussler, 2009) This work has focused for the most part on the ability of educators to increase student engagement in learning by working towards creating the external conditions within the students’ learning environment that will be more conducive to deeper engagement of the learner. In addition, most of the strategies described in the literature focus on the classroom as a whole rather than directly addressing the individual needs and differences of students. Little attention has been paid to the individual students’ internal environment – that being their personal self-theories of their abilities and preferences as learners and their mindsets with respect to their intelligence and its potential for growth.

As an educational leader and school administrator, I have felt growing concern over some of the changes in educational requirements in the Province of Manitoba, particularly for students in the senior years and the effect that they may have on the success rates of some students, particularly those at risk. Current trends demonstrate a movement towards more stringent requirements for students to qualify for graduation (Manitoba Education, Citizenship and Youth, 2008) and a raise in the minimum age for school leaving. Recent legislation has stipulated that youth must remain in school until they successfully graduate or reach the age eighteen, whichever comes first (The Public Schools Act, 2011). In large measure, I support these changes and feel that they are not only consistent with educational and societal values, but are of long term benefit to the majority of students in our school communities.
My concerns are specifically for those youth for whom traditional schooling and its associated requirements are not as appropriate, as they are not currently meeting their life needs or educational needs. The potential effects of these changes and how they were being perceived by the at-risk portions of our student populations became an area of professional interest. I was particularly taken by the tenor of conversations with some of these students when the discussion centered on what still needed to be done for them to meet the requirements for graduation. In a number of cases, particularly when graduation requirements had been increased during the student’s tenure in senior years and had the effect of raising standards for them, there was a feeling of despair and defeat. It was, for these students, as if the rules of the game had been changed after the starting whistle had blown and the player had not been trained for the new conditions. It was as if these students felt that their chances for success were compromised enough that the changes in requirements might be just enough to tip the balance against their chances for graduation. These students were functioning in the school system at a level where they would stumble across the finish line at the best of times. Now their prospects for success were compromised even further.

These experiences led me to begin to think about to what students attribute their success as learners. The work of Bernard Weiner (2005) on attribution theory led to research on self-efficacy belief by Albert Bandura and others (Alderman, 1990; Bandura, 1990, 1999; Bandura, Barbaranelli, Caprara, & Pastorelli, 1996). This work is the cornerstone of the research on implicit self-theories, particularly of Carol Dweck (1999), whose research is one of the foundations for this study. Her work on implicit self-theories, particularly self-theories of intelligence and the learning behaviours documented
in these studies, demonstrate a natural fit with the ideas surrounding engagement in learning. Students who have a self-theory of their intelligence that is supportive of productive learning behaviours will likely achieve better in school by all measures and will be more resilient in learning and in life.

Students across the spectrum display a wide range of levels of engagement in school. (Harris, 2010; Willms et al., 2009) Researchers have identified those who are disengaged; those who are socially engaged, but are not engaged in the academic aspects of their school experience; those who are institutionally engaged, but do so as a way to comply and meet the learning outcomes of their course-work, but do so out of a sense of duty and commitment; and those who become deeply intellectually engaged as learners – those that have “a serious emotional and cognitive investment in learning” (Willms et al., 2009, p.7). There is little doubt that when students become deeply intellectually engaged in their learning by investing emotionally and cognitively, they realize benefits that are far greater than students who are disengaged, or who are at best working through the learning exercises as an act of compliance. (Harris, 2010; Schussler, 2009; Willms et al., 2009).

School leaders have a significant responsibility to foster a learning environment for students that optimizes the conditions for learning (Graczewski, Knudson, & Holtzman, 2009; Leithwood, Louis, Anderson, & Walstrom, 2004; Printy, 2010; Stiggens & Duke, 2008). To this end, it is important that in addition to optimizing the conditions in students’ external environments, that the practice of educational leadership include any and all considerations with respect to the students’ internal cognitive environment. If it is accepted that deep intellectual engagement is a goal for students’ learning experiences, it
follows that fostering the cognitive conditions that will allow for this level of engagement will be of overall benefit to students and will increase achievement. The results of this study are significant in that they demonstrate, within the limitations of the data available, the degree of correlation between students’ implicit theory of their own intelligence and their levels of intellectual engagement. By definition, intellectual engagement involves higher order cognitive processing which will lead to growth in cognitive abilities. It also involves high levels of cognitive and emotional investment in learning. Both of these factors support higher levels of academic achievement.

In order to provide instructional leadership that fosters the awareness necessary for educators and the strategies and structures within classrooms that are needed to support intellectual engagement, it is important that educational leaders are aware of students’ self-theories of intelligence and the impact that these theories have on their learning. Given that these self-theories are malleable, it is also important that educational leaders foster the climate in classrooms that leads students towards the development of an incremental theory of their intelligence and encourages the metacognitive patterns that foster these thinking patterns.

**Delimitations of the Study**

Within the structure of this study, a number of delimitations were made in an effort to ensure that the data collected lead to conclusions that were valid, generalizable, and transferrable. The delimitations and justifications in this study were:
1. A large sample group (n = 897) of participants was identified across 10 schools of different grade configurations within a single suburban school division in Manitoba. This sample size was secured in an attempt to increase the validity of the results.

2. The survey participants were all registered in the same grade within the same school year.

3. Students in the school communities who were involved in the study came from a wide range of socio-economic environments. The subject school division contains the highest income postal code in the province of Manitoba as well as a number of areas of government-subsidized housing. These factors provided a sample group that represented a wide cross-section in terms of socio-economic background.

4. The subject school division is spread across a large suburban area serving to provide a diversity of community experiences for the study participants.

5. The subject school division has a proportion of males equaling 52.4% and females equaling 47.6% of the total grade nine sample group, thus providing a large sample size of each sex.

6. Survey responses were anonymous. As a result, participants were able to more freely respond to the survey instrument without concern that their responses might be attributed to them as an individual. This factor facilitates more genuine responses to the survey instrument.

7. The survey instrument was designed as a combination of questions from two distinctly different survey instruments, each designed to query participants’ thinking and experience with respect to the two experimental variables. The reliability of these instruments had been established though extensive previous use. The survey design, using questions from the two original instruments, collected data on the two experimental
variables in a way that allowed the researcher to clearly sort and identify the participants’ responses with respect to the two experimental variables.

**Overview of the Report**

This purpose of this study was to determine the correlational link between two variables of cognitive functioning of students that affect their learning and their resultant academic achievement. These variables are students’ self-theory of their intelligence and their levels of intellectual engagement. Given that one of the primary goals of educators is to maximize academic achievement, it is relevant to educational research to explore the link between these two variables in an effort to enhance instructional practice. This study was framed through the lens of instructional leadership. School leaders have a need to understand the factors that affect student learning so that they can provide appropriate support and direction to classroom teachers through curricula, instruction, and assessment practices that will optimize student learning.

This report outlines the research base for the study through the literature review in Chapter 2. This chapter reviews the literature on self-theories of intelligence, student engagement with particular focus on intellectual engagement and the relevance of these concepts to the field of educational leadership. Chapter 3 describes the quantitative methodology applied to this study and the methods used to collect data. The chapter includes a description of the survey instrument, along with the methods that were used to analyze the data. Chapter 4 details the results gleaned from the data collection and analysis. Chapter 5 summarizes the findings of the study and outlines the conclusions that were drawn from the analysis of the data. Generalizations for the results as well as
limitations on their application and directions for further research are documented in the chapter.
Chapter 2

LITERATURE REVIEW

This chapter reviews the theory and literature base related to the research problem presented in Chapter 1. It begins with a review of the literature and the current frameworks for the concept of instructional leadership as they apply to the practice of school administrators. This portion of the review builds on early work by Hallinger and Murphy (1987) and culminates with a review of relevant portions of the current literature on instructional leadership. The purpose of this part of the chapter is to situate the research problem in the domain of educational administration. There is significant evidence to suggest that the question: “Is there a relationship between students’ self-theory of their intelligence and their levels of intellectual engagement?” is a relevant consideration in the study of instructional leadership and consequently as a valid consideration for school administrators. The second part of the chapter presents a review of research findings on self-theories of intelligence grounded in the work of Carol Dweck (1999, 2005 & 2008) and the implications for learning. The chapter concludes by outlining the concept of student engagement with particular attention paid to the idea of intellectual engagement.

Instructional Leadership: How Important is it Anyway?

A glance through current education publications and web-sites reveals a preponderance of promotional material on conferences, workshops, books, instructional materials, and staff development programs that aim to assist school leaders with their efforts as instructional leaders. Whether these events and publications are created for
school leaders or aimed directly at classroom teachers, the theme remains the same: increased knowledge of teaching and learning on the part of leaders and practitioners in schools will help schools to better achieve their goals and mandates of increasing student achievement. Opportunities for staff development seem boundless, and subscription to these events and sales of these materials is significant.

As with any other product for sale, the supply line for school improvement resources has been created and driven by market demand in the education community. Virtually all school leaders in Canada and beyond recognize the importance of on-going professional development for teachers and administrators to support improvements in teaching and learning with a view to increasing student achievement. This is further evidenced by the fact that teacher in-service days are embedded into annual school calendars with many jurisdictions mandating a minimum number of these days to be utilized for professional development to support increasing student learning and achievement. This is a feature of the public education environment in Manitoba that is entrenched in legislation (Public Schools Act, 1995). An examination of the organizational goals of many school jurisdictions further finds that the focus of their development and improvement efforts are grounded in efforts to increase student engagement and achievement (Peel District School Board, 2010; Pembina Trails School Division, 2011; Surrey School District, 2010; Toronto District School Board, 2010).

In the Province of Manitoba, schools are required to report annually to Manitoba Education through their yearly school plan with respect to their development goals. These goals are required to be targeted on increasing student achievement with a focus on measurable results (Manitoba Education, Citizenship and Youth, 2004). Local school
divisions in the province have sharpened their focus on the target of increasing student learning in their own organizational contexts. The River East Transcona School Division (2011) has identified as one of its objectives to “maintain and enhance the process, procedures and practices to ensure all students will achieve or exceed expected program outcomes” (p.9). The Pembina Trails School Division (2011) has been more direct in addressing its position by publicly declaring three expectations for student learning as three main organizational goals. These goals are:

1) All students in Pembina Trails will be personally and intellectually engaged in their learning at school.

2) By the end of Grade 8, all students in Pembina Trails will meet the provincial curricular standards in literacy and numeracy, allowing them the greatest possibility for success in high school.

3) All students in Pembina Trails will graduate from high school. (Pembina Trails School Division, 2011, http://www.pembinatrails.ca/board_administration/ index.html)

The efforts on the part of school-based administrators and other educational leaders to increase student learning can be categorized as Instructional Leadership (Graczweski, Knudson, & Holtzman, 2009; Hallinger, 2005; Leithwood et al., 2004; Stiggens & Duke, 2008). As Stiggens and Duke (2008) suggest, “There is universal agreement that principals play a pivotal role in the improvement of student learning. Consequently, there is widespread agreement that principals should function as instructional leaders” (p. 285). Further, Leithwood et al. (2004) state:
the ability to engage in practices that help develop people depends, in part, on leaders’ knowledge of the “technical core” of schooling – what is required to improve the quality of teaching and learning – often invoked by the term “instructional leadership”. (p. 24)

School leaders at all levels are deeply involved in understanding and improving the conditions for learning in schools. At present, the role of education administrators involves a significant proportion of time and energy spent in improving both their own and teachers’ pedagogical skill – their understanding of teaching and learning and of the nature of learners themselves in order to provide the best learning experience that they can for students.

The role of the school-based administrator that has been in play since the origins of the position has traditionally been that of a bureaucrat (Cuban, 1988). Through this lens, the school administrator’s day was dominated by managerial functions that may have included such tasks as scheduling, financial management, human resources management, student discipline, and community relations (Graczweski, et al., 2009). Although there has long been an effort in some jurisdictions to have school principals focus at least some of their time and effort on increasing the quality of teaching and learning (Cuban, 1988), the focus on increasing student achievement through the instructional leadership of the principal began to emerge as a result of the effective schools movement that gathered momentum in the 1970s and 1980s (Graczweski, et al. 2009; Hallinger, 2005).

What constitutes instructional leadership is variable depending on who is describing it (Hallinger, 2003; Leithwood, et al., 2004). The model most widely used in
empirical investigations is that proposed by Hallinger and Murphy in 1987 (Hallinger, 2005; Leithwood et al., 2004). Hallinger’s model proposes three dimensions for the role of instructional leader: Defining the School’s Mission, Managing the Instructional Program, and Promoting a Positive School Learning Climate. Within these dimensions are located ten instructional leadership functions which, when considered together, encompass the interdependent elements that are instructional leadership. Over time, Hallinger (2003; Hallinger & Heck, 2010) has refined his model of instructional leadership to include a notion of shared leadership where responsibility and professional development are shared with teachers in an effort to share the load and build capacity within the teachers themselves to maintain sustainability and increase the quality of the improvements in teaching and subsequent increases in student achievement (Ylimaki, 2007). Leithwood et al. (2004) agree with this assessment when they state:

Neither superintendents nor principals can carry out the leadership role by themselves. Highly successful leaders develop and count on leadership contributions from many others in their organization. Principals typically count on key teachers for such leadership, along with their local administrative colleagues. (p. 27)

Schools are complex organizations with challenging mandates. It stands to reason that a singular approach to leadership may have limitations in its utility in such a setting. School principals are working and leading in environments that are characterized by numerous transactions and/or incidents on a daily basis. These range from the highly individualized, deeply personal, and perhaps emotionally charged encounters and exchanges with students, teachers, support staff, and parents, to the mundane procedural tasks that keep the lights and the heat on in the school. In response to this broad range of
contexts in all of which the principal is responsible for providing leadership, there is a need to do so with an awareness and judicious application of the appropriate type of response to each individual leadership need. As Hallinger (2005) writes, “Principals again find themselves at the nexus of accountability and school improvement with an increasingly explicit expectation that they will function as ‘instructional leaders’... principals who ignore their role in monitoring and improving school performance, do so at their own risk” (p. 2).

Cuban (1988) called for a balance between the political, managerial and instructional roles of the school administrator in order to provide appropriate leadership for schools. Horn & Loeb (2010) are clear that an appropriate approach to instructional leadership “includes broader personnel practices and resource allocation practices as central to instructional improvement” (p. 66). In fact, there is widespread acknowledgement that good school leadership is contextual to the circumstances of the school (Burch, 2007; Leithwood et al., 2004) and that school leaders need to be strategically leading and managing their schools to reap the highest yield for their investment of time and resources. This suggests that the concept of instructional leadership is itself continuing to evolve as researchers and practitioners broaden their view of leadership in the context of the on-the-ground day to day life of school administrators.

Burch (2007) presents the idea that there is a growing level of professionalism in the development of the concepts and practice of instructional leadership. She cites several indicators as evidence of this trend that include: the level of scholarly activity concerned with the ideas surrounding instructional leadership has increased significantly over the
past two decades; There has been an increase in the provision of funding to governments and local school entities to support the development of instructional leadership; In that same time frame, there has been a rapid increase in the number of professional publications, both in print, and more recently online, that are targeted at supporting the growth of instructional leadership as a professional pursuit; And lastly, an analysis of expenditures by educational authorities reveals a steady increase in funding to support instructional leadership activities. Her contentions support the work of Hallinger (2005) who suggests:

This renewed focus on the improvement of learning and teaching has once again brought the issue of principal instructional leadership to the fore. Indeed, there appears to be a new and unprecedented global interest among government agencies towards training principals to be instructional leaders. (p. 385)

As the practice of instructional leadership has expanded and understandings have deepened, an examination of the current practices of instructional leadership reveal a duality of influences (Burch, 2007). They are represented by institutional theories of organizational change balanced with the role of sense-making in processes of policy implementation:

Institutional theories provide a lens for understanding the influence of non-rational factors in education. In contrast to rational actor models, institutional perspectives consider how the roles of educational actors are embedded in larger institutions and socio-cultural norms. (Burch, 2007, p.196)
Burch states that this theoretical perspective of instructional leadership is in itself an incomplete picture of the current development and practice of the concept. She offers that in addition to the institutional theory perspective, the perspectives offered by theories of sense-making must also be considered. This theoretical perspective examines instructional leadership in terms of how school systems and individual schools implement new theory and practice in their local settings in ways that match their contexts. This position is supported by Graczewski et al. (2009) when they say that “because leadership is so profoundly shaped by context, a comprehensive understanding of that context is necessary” (p.74). Hallinger (2003) agrees by saying “instructional leaders must adjust their performance of this role to the needs, opportunities and constraints imposed by the school context” (p. 334). In terms of sense-making, Burch (2007) suggests:

Studies examining school factors in effective implementation of instructional policy have highlighted how principals’ and teachers’ interpretations of policy shape the ways in which external reforms unfold inside schools and classrooms – including which teachers participate, how students are served, and how broad policy goals such as instructional excellence, equity and democratic governance are created. (p. 197)

The question of whether the current focus on the practice of instructional leadership is yielding results in learning remains critical. Meta-analyses of the current research literature reveal that there does exist measurable effects and that, when compared with competing approaches, there exist greater gains with an instructional leadership philosophy (Hattie, 2009). Instructional leadership styles have a more positive effect on student achievement than transformational leadership (Hattie, 2009). However, within groups of schools engaged in instructional leadership practices, the positive effect
of instructional leadership practices on learning is greater in the younger grades with a
gradual decline in effect size as students get older. Despite this slight decline in effect
with age, there remains a significant effect on the improvement of student learning
outcomes with strong instructional leadership. Hattie (2009) suggests the following:

Specific dimensions of instructional leadership that had the greatest effects on student
outcomes were promoting and participating in teacher learning and development
\((d=0.91)\); planning, coordinating, and evaluating teaching and the curriculum (e.g., direct
involvement in the support of teaching through regular classroom visits and provision of
formative and summative feedback to teachers, \(d=0.74\)); strategic resourcing (aligning
resource selection and allocation to priority teaching goals, \(d=0.60\)); establishing goals
and expectations \((d=0.54)\); and ensuring an orderly and supportive environment such as
protecting time for teaching and learning by reducing external pressures and interruptions
and establishing an orderly and supportive environment both inside and outside
classrooms \((d=0.49)\). (p. 83)

As the concept of instructional leadership has become more defined and
legitimized over the last two decades, it has become clear that school administrators at all
levels need to be focusing their efforts on the improvement of student learning outcomes.
The principles of instructional leadership provide the framework that guides and focuses
the efforts of school leaders in their work to organize, resource, and lead schools in a way
that remains focused on the main goal of the institution – that being student learning.

It is important that school administrators be well versed in the issues and concerns
that impact the effectiveness of teaching on the learning happening in their schools.
Graczewski et al. (2009) summarize their endorsement of instructional leadership as central to school improvement when they say:

We . . . see a connection between school leadership’s engagement in instructional improvement and professional development and focus on content and curriculum. Within a system driven by instructional improvement, the potential effect of leadership activities on improved teacher practice is promising. (p. 94)

Leithwood, et al. (2004) concur when they suggest that “Leadership is second only to classroom instruction among all school-related factors that contribute to what students learn at school” (p. 5).

The scope and breadth of the role of the instructional leader in schools is both deep and wide. Current concepts of instructional leadership place school leaders’ knowledge of instructional practice as most important in their eventual effectiveness in leading schools that have the greatest impact in optimizing student learning (Graczewski et al., 2009; Hallinger, 2005; Hattie, 2009; Leithwood et al., 2004).

Much of what school leaders and teachers focus on with respect to improving student achievement relates to instructional practice. These factors include such things as choice of learning materials, quality of the learning environment, and instructional practices – all factors external to the learner. However, one of the factors that influences how well students respond to learning opportunities is how they view themselves as learners. One such critical perspective is students’ self-theory of their intelligence. As will be described in the next section, students’ abilities to meet the challenges of new learning can be heavily influenced by the nature of their self-theory of their intelligence.
Students with a particular view of their intelligence, the entity theory, may be at a distinct disadvantage in situations where they are required to expand their learning and push their comfort zones as learners. Those with an incremental theory may be in a naturally better position as adaptable and perseverant learners.

At the same time, research into self-theories is encouraging in that it shows that, although self-theories of intelligence are deeply entrenched, they are not completely intransigent. (Dweck, 1999) These findings lead us to the idea that one of the considerations for instructional leaders must be fostering classroom practices in schools that encourage students to develop and maintain incremental theories of intelligence and downplaying those patterns of interaction and instructional practices that might encourage that formation or solidification of entity theories of intelligence.

The importance of understanding self-theories of intelligence in learners is important for school leaders. In their roles as curricular leaders, leaders of effective classroom practice and leaders of school culture, it is important that they understand and include considerations of students’ self-theories in their leadership efforts. This includes considerations for setting the mission and vision of their schools, planning for teacher professional development, structuring extra-curricular and co-curricular activities, and planning for day to day instruction in their schools. The next section details the research findings on self-theories of intelligence and link this work to the concept of intellectual engagement.
Self-Theories of Intelligence

Self-theories of intelligence, also known as implicit theories of intelligence, were first proposed by Carol Dweck in the late 1990’s (Dweck, 1999). Dweck and her associates conducted a number of studies and authored a number of publications in the ensuing period of time. They continue to be actively engaged in research in this area. Dweck’s work on self-theories of intelligence is grounded in the research on attribution theory pioneered by Bernard Weiner and work on self-efficacy and social-cognitive theory, led by Albert Bandura.

Social-cognitive theory describes people as “agentic operators of their life course, not just onlooking hosts of brain mechanisms orchestrated by environmental events.” (Bandura, 1999, p. 22.) This type of thinking suggests that what we make of the opportunities that avail themselves to us is a function of how we choose to respond to them. As agents of our responses to our environments, we “operate as thinkers of the thoughts that serve determinative functions” (p. 23). It is what goes on in our brains with respect to our self-efficacy in particular situations that determine how we choose to respond to them.

The effect of the external influences on performance motivation is thus completely mediated by changes in perceived self-efficacy (Bandura, 1990, p. 129).

People choose to undertake various challenges based on their sense of self-efficacy with that challenge. How much effort is expended, how long a person will persevere, and whether the person will take the risk of trying to rise to the challenge at all are all in large measure dependent on their self-efficacy beliefs (Bandura, 1990, 1999).
People with self-doubts retreat more easily from challenging circumstances and display less confidence in their ability to succeed. Those that have a stronger sense of self-efficacy are more likely to exert the effort needed to rise to the challenge.

The importance of self-efficacy belief as a part of personal agency and how people internalize and operationalize it is the foundation of the conceptualization of Dweck’s theory of implicit theories, including implicit theories of intelligence. Dweck’s findings indicate that individuals view their intelligence in one of two ways: either as fixed or as malleable (1999). Those with a fixed theory of their own intelligence believe it to be a fixed trait that will not change, regardless of the amount of time, effort, or work put into it: “They have a certain amount of it and that’s that” (Dweck, 1999, p. 2). These people hold what is called an entity theory of their intelligence. In contrast, individuals who believe that they possess a more malleable intelligence believe that they can improve upon it by learning new things and that it will increase through effort. These individuals hold an incremental theory of their intelligence.

These two very different, and in many respects, opposing self-theories of intelligence lead to very different outcomes with respect to a number of behavioral outcomes that are critical to the success of students as learners. One’s self-theory of intelligence has a direct effect on self-esteem; the effects of failure on future learning; mastery versus helplessness; the identification of performance goals versus learning goals; the degree of effort expended in learning; the effect of I.Q. as an asset to learning; and the degree to which students will engage in challenging learning tasks (Dweck, 1999).
According to Dweck (1999) “The hallmark of successful individuals is that they love learning, they seek challenges, they value effort, and they persist in the face of obstacles” (p. 1). Dweck’s research focuses on how successful students adapt to their learning environment and apply the resources at their disposal to persevere as learners, even when their skills, background knowledge, processing abilities, or previous experiences with a topic or skill might not be as rich as other students. This work challenges several commonly held beliefs:

1) Students with high levels of ability are more likely to display mastery-oriented characteristics and as a result be more successful academically;
2) Success in academic pursuits leads to the further development of mastery-oriented qualities;
3) Praise, particularly of students’ intelligence encourages the further development of mastery-oriented qualities;
4) Students’ own confidence in their intelligence is an essential element of the development of mastery-oriented qualities.

In fact, the research on self-theories of intelligence has produced convincing evidence that these statements are based on flawed thinking and that the perpetuation of these ideas in the minds of parents and educators is detrimental to the development of adaptive thinking, motivation, and engagement in the lives of children, adolescents, and adults (Dweck, 1999, 2008; Dweck & Moulden, 2005). If the goal as parents and teachers is to foster the development of individuals who are motivated to learn and who demonstrate persistence, creativity, confidence, and strategic thinking regardless of the scope of their innate talents, it is critical to consider individual self-theories and their
effects on competence motivation in learners. In the pursuit of developing students’ capacities as life-long active learners, there is a need to attend to students’ processes of self-regulation of their learning (Elliot & Dweck, 2005). A deeper understanding of self-theories of intelligence can help parents and educators work to greater effect in maximizing students’ learning.

**Entity Theorists vs. Incremental Theorists**

Those individuals who hold an entity theory of their intelligence believe that their intelligence exists as a pre-determined and fixed characteristic that is locked-in in terms of quantity and type. Intelligence, in their view, is an internal trait that is difficult to change. In spite of the fact that many students who hold this belief are inherently intelligent by all standard measures, they can expend a tremendous amount of energy in looking smart. They tend to worry about whether they are smart enough and “want to look smart (to themselves and others) and avoid looking dumb” (Dweck, 1999, p.15). Dweck (1999) suggests that what makes entity theorists feel good about their intelligence is the following:

Easy, low effort successes and out-performing other students. Effort, difficulty, setbacks, or higher-performing peers call their intelligence into question – even for those who have high confidence in their intelligence.

The entity theory then, is a system that requires a diet of easy successes. Challenges are a threat to self-esteem. In fact, students with an entity theory will readily pass up valuable learning opportunities if these opportunities might reveal inadequacies or entail errors –
and they rapidly disengage from tasks that pose obstacles, even if they were pursuing
them successfully shortly before. (p. 3)

By contrast, students with an incremental theory of their own intelligence view their
intelligence as a work in progress. Intelligence in their world is an on-going development
project – one that will continue to require effort. They are very willing to take learning
risks, take on challenging tasks, and try multiple strategies and approaches:

This view too, has many repercussions for students. It makes them want to learn. After
all, if your intelligence can be increased, why not do that? Why waste time worrying
about looking smart or dumb, when you could be becoming smarter? And in fact,
students with this view will readily sacrifice opportunities to look smart in favour of
opportunities to learn something new. Even students with an incremental theory and low
confidence in their intelligence, thrive on challenge, throwing themselves wholeheartedly
into difficult tasks- sticking with them. (Dweck, 1999, p. 3)

This approach to task completion is reflected in the age-old colloquialism, “When
the going gets tough, the tough get going.” Entity theorists, fearing failure and exposing
themselves as unintelligent, would retreat from the challenge under the same
circumstances.

In fact, research has repeatedly demonstrated that “both theories are equally
popular. When self-theories are assessed in children and adults, about 40% of people tend
to endorse the entity theory, about 40% tend to endorse the incremental theory and about
20% are undecided” (Dweck & Molden, 2005, p. 123).
Self-theories of Intelligence and Self-Esteem

Traditional thinking would hold that individuals who had been successful in their academic pursuits had demonstrated being clever and to whom learning had come easily were, by all understandings, smart. They may have never had to try very hard to meet, and perhaps even exceed, expectations placed upon them to learn new things. In fact, they may well be very intelligent and be capable of higher order learning. These individuals may have been praised by adults for their intelligence and over time have developed an expectation that success is theirs for the taking and that it should not come at the price of significant effort or risk. They have strong confidence in their intelligence and rely on it to carry them smoothly through new learning situations. Their self-concept and self-esteem are based on the perpetuation of a pattern of success based on their innate levels of intelligence. These individuals are heavily invested in an entity theory of their intelligence. Overall, however, such individuals have a self-concept that is vulnerable to failure and over time they are susceptible to erosion of their self-esteem. In addition, teachers may inadvertently reinforce this thinking as they work with students:

we encourage vulnerabilities in our students when we try to boost self-esteem within this (entity) system. The well-meant successes we hand out and the praise for intelligence we lavish upon them does not encourage a hardy, can-do mentality. What it does foster is an entity theory, an over concern with looking smart, a distaste for challenge, and a decreased ability to cope with set-backs. (Dweck, 1999, p. 3)

Robins and Pals (2002) conducted a longitudinal study of 363 university students over the course of their university years and found that, compared with the incremental
theorists, those with an entity self-theory were on a "downward trajectory" in terms of their self-esteem. These results were shown to be independent of any differences in their average level of self-esteem and independent of their grades. They concluded that self-theories were able to predict the development (or decline) of self-esteem.

Dweck (1999) characterizes the self-esteem trajectories for incremental theorists as different entirely from that of entity theorists:

Self-esteem . . . is something completely different in the incremental system. It is not an internal quantity that is fed by easy successes and diminished by failures. It is a positive way of experiencing yourself when you are fully engaged and are using your abilities to the utmost in pursuit of something you value. It is not something we give people by telling them about their high intelligence. It is something we equip them to get for themselves – by teaching them to value learning over the appearance of smartness, to relish challenge and effort, and use errors as routes to mastery. (p. 4)

Self-esteem then is positively linked to an incremental theory of intelligence. Those who view their intelligence as improvable and who have developed the coping mechanisms to utilize failures and set-backs as learning opportunities develop a more positive and durable sense of self. These individuals tend to develop constructive learning goals and mastery-oriented strategies in their learning. In contrast, those with an entity theory of their intelligence were more prone to setting performance goals, attribute their failures to limits in their intelligence, and develop a sense of helplessness when challenged beyond their present abilities. This experience, in turn leads to diminished levels of self-esteem (Dweck & Molden, 2005).
Performance Goals vs. Learning Goals

Two different types of achievement goals have been identified in investigations with students across the age ranges (Dweck, 1999). These have been labeled as *performance goals* and *learning goals*:

The first is a ‘performance goal’. This goal is about winning positive judgments about your competence and avoiding negative ones. In other words, when students pursue performance goals they are concerned with their level of intelligence. They want to look smart (to themselves and others) and avoid looking dumb.... The other goal is a ‘learning goal:’ the goal of increasing your competence. It reflects a desire to learn new skills, master new tasks, or understand new things – the desire to get smarter. (Dweck, 1999, p. 15)

In three longitudinal studies (Blackwell, Trzesniewski, & Dweck, 2007; Robins & Pals, 2002; Trzesniewski & Robins, 2003) of students in different age ranges and school circumstances, it has been shown that there was a significant link between students’ self-theory of intelligence and the type of achievement goal that they favour. In Dweck and Molden’s (2005) analysis of this work, they found that students who held an incremental theory were much more likely to value their learning and the efforts made to achieve it over the outcome itself. These students held learning goals rather than performance goals. Those students with an entity theory were more inclined to value the measurable outcome of their performance through their marks. These students held performance goals, rather than learning goals.
Another study conducted by Hong, Chiu, Dweck, Lin, and Wan (1999) demonstrates this tendency. They investigated the way in which students with different self-theories of intelligence chose either performance or learning goals. They investigated a cohort of students who were entering the University of Hong Kong where all instruction is delivered in English. During the registration process, among the data collected from registrants, information was gathered that determined each student’s self-theory and their English proficiency score. At the same time students were asked if they would like to take a remedial English course if it were to be offered. Students responded along clear self-theory lines with incremental theorists being very receptive to the offer and entity theorists seemingly preferring to live with their deficiency – even at the risk of performing poorly in the start of their post-secondary efforts rather than exposing something that may be perceived as a weakness.

**Helpless vs. Mastery-Oriented Responses**

Closely tied to the notion of self-theories of intelligence and the resulting achievement goal schema just described is the individual’s response to failure. Two distinct patterns of response to failure have been identified. They are *the helpless response* and the *mastery-oriented response* (Dweck, 1999). Dweck (1999) and her colleagues identified a number of student reactions to failure that include “denigration of their intelligence, plunging expectations, negative emotions, lower persistence, and deteriorating performance” (p. 6) that they have included as part of the helpless response to failure. Students with an entity theory blamed their intelligence for their lack of success. These students attributed their failure to a lack of ability, and because, according to their self-theory of their intelligence, this is a fixed trait, they experienced a helpless
response. These students not only gave up on challenging tasks much more quickly than those with an incremental theory, they also demonstrated some regression in their abilities to cope with the problems with which they were faced. Students showed a pattern of not being able to perform at levels in which they had previously displayed ability in the face of failure to succeed with subsequent tasks. They began to not only doubt their intelligence, but lost ground in their previously demonstrated abilities – generating a mindset that served as a one-two punch to their ability to persevere with the tasks. This would help to explain why students with an entity theory lose ground over time when compared with their peers with incremental theories. In effect, “the helpless response is not just an accurate appraisal of the situation. It is a reaction to failure that carries negative implications for the self and that impairs students’ ability to use their minds effectively” (Dweck, 1999, p. 9). As Dweck (1999) suggests, “Students prone to the helpless pattern may easily react with self-doubt and disruption, deciding prematurely that they aren’t any good in the subject. This would put them at a real disadvantage as school progresses, especially in areas of math and science that really ask the student to enter a new conceptual world” (p. 12).

Bernard Weiner (2005), in an essay on motivation and attribution, considers mastery-oriented and helpless responses from the attributional perspective. According to Weiner, incremental theorists attribute their successes to hard work and perseverance rather than innate intelligence and whatever other influences there might have been on an outcome - what Weiner refers to as unstable factors. Their belief that their intelligence is malleable is an asset in circumstances that demand tasks that are intellectually challenging. Students who hold an incremental theory establish a pattern of responding to
failure that is very different from their entity theorist peers. They tended to be more
strategic in their approach and displayed much more perseverance that the entity
theorists. Their approach to new and challenging learning leads them to improvements in
the quality of the strategies that they employ to the point where a number of these
students are able to solve problems that had originally been deemed to be beyond their
abilities (Dweck, 1999) – an indication of a mastery orientation and far from a helpless
response.

There exists a possibility that individuals may hold differing self-theories of their
intelligence depending on the academic domain being considered. According to Dweck
and Molden (2005) “people can and often do hold different theories about different
personal attributes. They can even hold different theories about different intellectual
skills, for example, believing that their math ability is fixed but their verbal abilities can
develop” (p. 123). This idea is consistent with the intra-personal variation in natural
tendencies and abilities shown in other aspects of personality and intellect. Over the
years, there has been much work done and much attention given by teachers to matching
teaching with the individual learning styles of students. In addition, the work of
researchers over the years like Howard Gardner (1983) on multiple intelligences has long
been a consideration when planning learning activities for students. The idea that
individual students may possess an entity theory in one academic area and an incremental
one in another is consistent with their diverse preferences and abilities in other aspects of
their individual cognitive characteristics. In light of this information, teachers planning
for instruction in their classes would be well advised to consider the individual
differences in the self-theories of intelligence of their students, in the context of
individual subjects and skill sets. The implications for this are far-reaching. In addition to finding a way to simply and quickly determine the self-theory held by individual students in specific skill and subject areas, teachers would then need to consider this information as they plan for instruction. Those students who are incremental theorists would likely be more resilient in their experiences as learners and be able to progress more independently. Those with an entity theory in a given area might require more support by way of scaffolded instruction and be approached in ways that build confidence in abilities rather than focusing on levels of intelligence and performance.

**Entity to Incremental: The Potential to Change One’s Self-Theory**

Experimental evidence has accumulated to indicate that those individuals who hold an entity theory of their intelligence are capable, under the right conditions, of changing their beliefs to those of incremental theorists (Aronson, et al., 2002; Blackwell, et al., 2007; Dweck, 1999; Dweck & Molden, 2005; Elliot & Dweck, 2005; Good, et al., 2003; Robins & Pals, 2002). Although the meaning implied by much of the literature of self-theories of intelligence suggests that an individual’s self-theory is intransigent, “...the fact that implicit self-theories show no mean-level change and relatively high stability over time does not preclude the possibility of systematic change at the individual level” (Robins & Pals, 2002, p. 329). According to Dweck and Molden (2005), “People’s self-theories can be changed in a more long-term way through targeted interventions” (p. 123).

A number of studies (Aronson, et al., 2003, Dweck, 1999; Good, et al., 2003) have shown that with appropriate interventions, individuals can be taught to consider
their intelligence differently. In these studies, students of various ages were provided with some direct and targeted instruction on the nature of self-theories and their effects on learning. In experiments with controlled groups of students, with some who received this instruction and some who did not, the entity theorists who were subject to the instruction began to change their self-theory to that of incrementalists. These students also showed sustained increased academic achievement (Aronson, et al, 2002; Good, et al., 2003).

These findings are significant in that they demonstrate that an entity theory, which is less conducive to long-term academic progress, although firmly entrenched in the psyche of students, is not entirely intransigent. The recognition of this fact and the application by school leaders and teachers of appropriate strategies in classroom instruction can lead to a shift in an entity theorist’s self-theory from that of an entitist to that of an incrementalist – a set of beliefs about one’s ability to think and learn that is much more conducive to cognitive and academic development over the longer period.

Although self-theories tend to be relatively stable over time, the fact that they can be altered with targeted interventions suggests that there is a degree of malleability inherent in the concepts. It also suggests that individuals may operate with more than one self-theory, depending on the circumstances and conditions. Dweck and Molden, (2005) advocate:

changing people’s self-theories can lead to a cascade of changes in their motivation, behavior and outcomes. Thus, the self-theories provide powerful frames for situations, ones that influence what people try to accomplish in those situations, how they go about it, and how successful they are likely to be. (p. 137)
It is clear from the literature that an individual’s self-theory of his/her intelligence is a critical element of his/her psyche as a learner. Students’ abilities to persist with challenging learning tasks, their willingness to take reasonable risks as learners, their acceptance of failure as an inevitable part of challenging learning, and their willingness to approach difficult learning tasks from a variety of perspectives and with multiple strategies provides those with an incremental theory of their intelligence with a distinct advantage when faced with challenging learning tasks.

This notion, when coupled with the knowledge that self-theories are malleable and can be changed with appropriate instructional interventions, is a powerful piece of knowledge for teachers and school leaders as they work towards creating the optimum conditions in the classroom for student learning. This is particularly so, when evidence suggests that students with an entity theory of their intelligence can, with appropriate interventions, be moved towards an incremental set of beliefs and that incremental theorists are more likely to be persistent, resilient, and motivated as learners – exactly the qualities of the life-long independent learner that schools purport to create.

It is important for teachers and school leaders to take this knowledge into account when guiding students in their learning. A solid understanding of self-theories of intelligence and how they drive students’ thinking about their learning and the views that they hold of themselves as learners is critical in fostering a learning environment that is most conducive to the development of the learner. Furthermore, it would be useful for teachers and school leaders to understand and be able to apply the strategies that will help students adjust their self-theories from entity theories towards incremental theories. It is
with incremental self-theories that students will stand the greatest chance of thriving as self-driven, adaptable and self-motivated learners.

**Intellectual Engagement**

A lack of student engagement has been identified as a driving force behind current efforts to re-tool learning experiences for students (Lemke, 2010). The idea of student engagement has been present in education literature for over seventy years in one form or another and has evolved over that time (Kuh, 2009). Post-secondary institutions, in particular, in an effort to support improvement efforts and increased accountability, have expended significant capital in assessing and attempting to increase levels of student engagement (Axelson & Flick, 2011; Kuh, 2009). These efforts have been targeted at moving the discussion about the quality of these institutions away from measures such as students’ average SAT scores, the size of endowment funds, and traditional reputation to a more meaningful look at the quality of students’ educational experience (Kuh, 2003). At the same time, there is still little consensus as to the definition of student engagement (Archambault, 2009; Axelson & Flick, 2011, Libbey, 2004) and in fact there is some discomfort in the notion that many of the current conceptualizations of student engagement over-simplify the realities of the idea itself, leaving the construct “theoretically messy” in the literature (Axelson & Flick, 2011).

Post-secondary institutions, particularly in the United States, have developed and employed a number of instruments to assess student engagement based on definitions of engagement as constructs of quality of effort and involvement in productive learning activities. These instruments include the College Students’ Experience Questionnaire...
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(CSQE) in the 1970’s and the more current Community College Survey of Student Engagement (CCSSE) and the National Survey of Student Engagement (Kuh, 2009).

Jones (2009) describes academic motivation as: “a process that is inferred from actions (e.g., choice of tasks, effort, persistence) and verbalizations (e.g., “I like Biology”), whereby goal-directed physical or mental activity is instigated and sustained” (p. 272.). He suggests that academic motivation in and of itself is not the same as engagement, but does provide the conditions for students to become academically engaged.

Current literature on student engagement describes it as a multidimensional construct comprised of elements that are behavioral, affective, and cognitive in nature. A comprehensive consideration of student engagement, therefore, needs to be inclusive of multiple considerations, as all of these elements and their sub-categories are inter-relational in their effect on student engagement (Archambault et al., 2009a, 2009b; Axelson & Flick, 2011; Libbey, 2004; Willms, et al., 2009).

Willms, et al. (2009) describe three categories of student engagement that when considered together comprise a more complete picture of the construct of student engagement. They identify the characteristics of social engagement; academic engagement, and intellectual engagement (refer to Appendix C). The label of academic engagement has recently been changed to institutional engagement to better reflect the parameters of the concept (Dunleavy, Willms, Milton, & Friesen, 2012). Each of the three categories of engagement is comprised of three domains as shown in Table 1.
The category of student engagement that was of particular interest to this research is that of *intellectual engagement*. Schussler (2009) describes intellectual engagement by saying that “engagement in learning involves formulating a deeper connection between the student and the material, whereby a student develops an interest in the topic or retains the learning beyond the short term” (pp. 115-116). Schussler also refers to a “sweet spot” (p. 116) of intellectual engagement that is created when students feel that they are experiencing appropriate levels of academic challenge and academic support, and that the
things that they are learning are valuable and relevant. Willms, et al. (2009) describe intellectual engagement as “a serious emotional and cognitive investment in learning, using higher-order thinking skills (such as analysis and evaluation) to increase understanding, solve complex problems, or construct new knowledge” (p. 7). Intellectual engagement is characterized by a high challenge in intellectual activity accompanied with high student confidence in their skills as they apply to the task at hand. When these two factors are closely related and students are productively engaged in learning, they are more likely to experience a sense of flow as described by Csikszentmihalyi (1997). The degree to which students are intellectually engaged can be measured by exploring students’ attitudes towards their interest and motivation in their learning tasks as well as the degree of effort that they feel they put forth in their learning. Students’ views on the quality of the instruction that they receive is also critical when considering the extent of their intellectual engagement (The Learning Bar, 2012a). For the purposes of this research, the concept of intellectual engagement as defined by Willms et al. (2009) with recent refinements (Dunleavy et al., 2012), is used as the conceptual foundation.

The purpose of this study was to determine the degree of relationship between a students’ self-theory of their intelligence and their tendency to become intellectually engaged as learners. Research on self-theories of intelligence shows that individuals with an incremental theory of their intelligence establish significant advantages for themselves as learners over their peers who possess an entity theory. These advantages manifest themselves in these individuals’ creativity in problem solving, their persistence with challenging tasks, their ability to take risks as learners and their self-perpetuating belief that hard work will result in an increase in their intelligence (Dweck, 1999). At the same
time, educational literature documents that students who establish a “serious emotional and cognitive investment in their learning” (Willms et al., 2009, p. 7), are intellectually engaged. When students are intellectually engaged, their cognition as learners is operating at the highest levels. This in turn leads to a long term increase in cognitive abilities – a self-perpetuating increase in learning capacity or arguably, an increase in intelligence.

When viewed through the lens of educational leadership, it is clear that schools, through both formal leadership structures and the practical considerations of instruction in the classroom, will better serve their students when due consideration is given to instructional practices that encourage the development of incremental theories of intelligence. At the same time, instructional practices that encourage, either directly or indirectly, experiences for students that allow them to become intellectually engaged, will enhance learning and cognitive development by placing the student in the experiential zone of intellectual engagement. This study is relevant to this conversation because it helps to demonstrate the link between students’ self-theory of their intelligence and their tendency for intellectual engagement.

This study attempted to demonstrate a relationship between students’ self-theories of their intelligence with their tendency to become intellectually engaged – with the implication that: if intellectual engagement is a desired cognitive condition for higher level learning and if an incremental self-theory of intelligence places students in a better position to become intellectually engaged then in order to increase academic achievement, it is important for school leaders and teachers to create the conditions in
schools that will encourage the development of incremental theories of intelligence in their students.

**Summary**

This chapter has presented a review of the educational leadership literature in an effort to situate the research questions of this study in an educational administration context. The literature in this area clearly indicates that an increased understanding of teaching and learning on the part of educational leaders is desirable in terms of its utility in increasing student achievement. The chapter continued with a description of the research on implicit theories of intelligence and their implications for student learning and a review of current work on student engagement, with particular emphasis on intellectual engagement. The following chapter outlines the methods that will be used in the research.
Chapter 3

METHODOLOGY

This chapter includes a description of the methodology used to investigate the research questions posed in this study:

1. Is there a relationship between students’ implicit self-theories of their intelligence and their tendency for intellectual engagement, and if so, what is its direction and strength?
2. What are the relationships between self-theory of intelligence and the factors of sex, English as a first language, and attendance at school outside of Canada.
3. What are the implications of these findings for the instructional leadership practices of school administrators?

This chapter includes a description of the participants, the survey instrument and its development, the methods used for data collection, and the methods used for statistical analysis.

Quantitative Methodology

This study used quantitative methodology. Creswell (2005) indicates that quantitative research “is a type of educational research in which the researcher decides what to study, asks specific, narrow questions, collects numeric (numbered) data from participants, analyzes these numbers using statistics, and conducts the inquiry in an unbiased, objective manner” (p. 39). A quantitative method was useful for this study as the variables have been conceptualized, explored and quantified by other researchers with established validity and reliability coefficients. A quantitative study of this sort enabled
me to describe the relationship between these variables in both direction and strength. The survey instrument allowed for a focused analysis of the participant responses with respect to the research questions and the purpose of the study.

This study collected data from survey participants with regard to the two variables from a potentially large number of participants in an effort to generate results that would allow the researcher to draw generalizable conclusions about the strength and direction of the correlational relationship between the two variables. In addition, select demographic information was also collected in order to explore any possible significant differences for various groups on the aggregated mean scores of the two variables under study. In the case of this study, a survey instrument was constructed that contained questions designed to determine the participants’ beliefs about themselves in terms of two variables: their self-theory of their intelligence as defined by Dweck (1999, 2005) and their tendency to become intellectually engaged in their learning as defined by Willms et al. (2009). Both variables were quantified in previous research by Dweck and Willms respectively. A quantitative methodology was chosen for this study, as it provided not only an indication of whether a relationship exists between the two variables but also an indication of how strong that relationship was by establishing the degree of statistical correlation. The following sections outline the methods used in this study to establish the relationship between the variables of students’ self-theory of intelligence and their tendency to become intellectually engaged in their learning.
Research Positioning

My association with the Manitoba school division in which the study surveys were administered is of relevance to this study and has had an effect on its methodology and ethical considerations. As a result, my association needs to be described in order to place the structure of the study in context with respect to the methodology and the measures taken to ensure confidentiality and ethical integrity.

At the time that this research was conducted, I held a position as Principal of one of the high schools within the surveyed school division, and, at one time, I was the Principal of one of the other high schools. In total, at the time of this study, I have held administrative positions for the last 17 years in this jurisdiction. I moved to my current school five years prior to the time of this study. The grade configuration of this school did not include grade 9 students; therefore none of the participants were associated with me in any way at the time of the study. It is, however, almost a certainty that some of the participants would become students in this school in the year following the completion of this study. As a result, extensive measures were taken in the presentation of the opportunity for students to participate and the collection and analysis of data to ensure that I had no direct contact with them and no way to discern which students had or had not participated.

In addition to my position within the school division, my role as a school administrator for the last 17 years situated me in a place where I viewed the world of public school education through the lens of a school leader and administrator. As part of this experience, I have been afforded the opportunities to be exposed, through ongoing
professional dialogue and professional development opportunities, to the ever-evolving paradigm of what the role of school leader and administrator has been over that time period. As an educational leader, I am expected to be a learner and stay up to date with current professional thinking and the ever-progressing trends in instructional practice. This, along with my experience as a graduate student in Educational Administration, has influenced my perspectives and undoubtedly had an effect on how I interpreted the findings of this study.

As a researcher, I am aware of the potential influence that my employment position may have brought to the study, if not managed judiciously in the methodology. School staff members and students alike would have reason to be concerned that their decisions whether to participate in this study and the nature of their responses to the survey questions could influence decisions made for them in the future. As an administrator in the surveyed school division, depending on the position and location of the staff member or student, I have some degree of professional and positional responsibility to them and for them regardless of which school they are associated with.

In order to establish and maintain the ethical integrity of the research, the identity of staff members who have any contact with the presentation of the survey had to remain anonymous to me as the researcher. This was an imperative, as all staff members of the school division are potential future employees who may be under my direct supervision at any time. Likewise, the identity of any and all students who may have chosen to or declined to participate in the study needed to remain anonymous and unknown to me as the researcher, as they could at any time become a student in a school in which I had direct authority. It is also important to note that, as an administrator in the surveyed
school division, I have electronic access to a significant amount of personal and academic data on every student who is currently or ever has been registered in the division. It is for these reasons that an impartial research assistant was engaged to provide a complete separation between myself as the researcher and the survey participants and any opportunity for me to associate them with their individual survey responses. This process ensured that I did not have any opportunity during the presentation of the survey or the collection or organization of the data to identify any individual student or staff member of the school division.

Participants

Survey participants included grade 9 students from the schools within a suburban school division within the City of Winnipeg, Manitoba. \((n=897)\). These schools ranged in enrolment size and grade configurations as well as program offerings (refer to Table 2). Sample participants came from 10 different schools with 4 different grade configurations. Some schools were single track with instruction in English only, while others were dual track offering instruction to students either in English or in a French Immersion program stream. The smallest school in the sample had a single grade 9 class of 15 students while the largest single school sample group was represented by eight classroom groupings that numbered 205 students in total. A chart of the schools (pseudonyms used for names) from which survey participants were drawn is included as Table 2.
Table 2

*Characteristics of Surveyed Schools*

<table>
<thead>
<tr>
<th>School Name</th>
<th>Grade Configuration</th>
<th>Program of Instruction</th>
<th>Grade 9 Student Enrolment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ashbend School</td>
<td>7 - 9</td>
<td>English</td>
<td>205</td>
</tr>
<tr>
<td>Aspen Grove School</td>
<td>7 – 9</td>
<td>English</td>
<td>130</td>
</tr>
<tr>
<td>Basswood Collegiate</td>
<td>9 – 12</td>
<td>Dual Track</td>
<td>88</td>
</tr>
<tr>
<td>Birch Trail Junior High</td>
<td>K – 9</td>
<td>English</td>
<td>57</td>
</tr>
<tr>
<td>Elmvale Middle School</td>
<td>5 – 9</td>
<td>English</td>
<td>106</td>
</tr>
<tr>
<td>Mapleleaf Collegiate</td>
<td>9 – 12</td>
<td>English</td>
<td>102</td>
</tr>
<tr>
<td>Oakburn Junior High</td>
<td>7 – 9</td>
<td>Dual Track</td>
<td>76</td>
</tr>
<tr>
<td>Spruce Meadows School</td>
<td>7 - 9</td>
<td>English</td>
<td>65</td>
</tr>
<tr>
<td>Pine Hollow Community School</td>
<td>K – 9</td>
<td>English</td>
<td>15</td>
</tr>
<tr>
<td>Tamarack School</td>
<td>9 – 12</td>
<td>Dual Track</td>
<td>53</td>
</tr>
</tbody>
</table>

The participants were all members of heterogeneous class groupings registered in Grade 9 of the same school year. This helped to ensure that a representative sample of the grade 9 population in these schools was accessed. This helped to ensure that a representative sample of the grade 8 population in these schools was accessed. A letter seeking permission to access students for purposes of this study was provided to the Superintendent’s office of the school division. This request sought permission to approach the principals of the schools within the division that contained grade 9 students. Once this permission was granted, letters from myself as the researcher were sent to each
principal for the purpose of gaining access to their Grade 9 classes. Once this permission was provided, letters were sent to each teacher of Grade 9 classes that were to be approached, to indicate that a research assistant would be coming into the classroom to outline the parameters of the study and to distribute letters of consent and assent to participate to students.

Arrangements were made through the schools for the research assistant to visit Grade 9 classes to provide a brief overview of the purpose of the study, a summary of what would be expected from participants, and letters of informed consent and assent to be taken home to parents and guardians for their consideration and signatures. Students were asked to have the signed letters returned to a drop-box situated in the office within two weeks. The research assistant reminded the groups once at the end of the first week to complete the forms and picked up the returned consent and assent forms over the course of the following two weeks. This initial invitation to participants yielded a low number of participants (n=16). As the original research protocol did not include any incentive for participation, the decision was made to apply for an amendment to alter the protocol to provide an incentive of a Mini iPad to students who completed the survey. To that end, the research assistant made arrangements to re-visit classes to provide a second invitation for student to participate. This second invitation provided a further seven participants, thus increasing the sample size and increasing the degree of reliability of the results only very modestly.

The survey instrument was posted on a password protected survey website (FluidSurveys.com). Participating students from whom consent and assent was obtained were provided with an electronic invitation necessary to access the site and complete the
survey. The survey was available online for a two-week period beginning after the first collection of the consent and assent forms. Student survey input was collected on a secured remote server and transferred to the researcher’s private password-protected computer, at the end of the data collection period. Of the 673 grade 9 students who were provided with an invitation to participate in the study a total of 23 \( (n=23) \) completed the survey.

**Survey Instrument**

Data for this study were collected through a survey provided to grade 9 students in a Manitoba school division. The participants were invited to complete a questionnaire posted on a password-protected online survey (FluidSurveys.com). The survey had been adapted from questions meant to gather information from two different perspectives for comparison – one perspective that contained questions from the Implicit Self-Theory Assessment Questionnaire (Dweck, 1999) and the other with questions crafted to identify students’ tendency for intellectual engagement based on elements of the Canadian Education Association’s “Tell Them From Me” Survey (2011). The data collected from each participant were anonymous as each participant gained access to the survey through a personalized electronic invitation that was provided to them from the research assistant once consent/assent to participate had been granted by parents/guardians and the students.

The questions contained in the survey were aligned with one or other of the two experimental variables: implicit theory of intelligence and tendency for intellectual engagement. Question design elicited responses from the participants that when aggregated and scored allowed for the determination of the participants’ implicit theory
of their intelligence and their tendency towards intellectual engagement. Participant responses to self-theory questions were scored on a scale of 1 to 6. Those intended to gather information about the participant’s tendency for intellectual engagement were scored on a scale of 0 - 10. Some questions in the survey were reverse-scored to help increase the validity of the results.

Survey questions exploring the participants’ implicit theory of intelligence (scored on a scale of 1 – 6, strongly agree through strongly disagree) included:

1. You have a certain amount of intelligence and you can’t really do anything to change it.
2. No matter who you are, you can significantly change your intelligence.
3. You can learn new things, but you can’t really change your intelligence.

Survey questions exploring the participants’ tendency for intellectual engagement (scored on a scale of 0 - 10, strongly disagree through strongly agree) included questions such as:

“I enjoy class projects so much that often I do not want to stop.”

The survey instrument also collected demographic data that were used to explore possible relationships between participants’ self-theories of intelligence and other factors that may have been of significance in influencing the development of their self-theory. These included the participants’ sex, whether they had ever attended school outside of Canada or the United States, whether they were born outside Canada, and whether English was their first language. These demographic characteristics were chosen to explore potential differences between girls and boys, and to examine the possible
educational implications of the growing diversity within the surveyed school division due to immigration.

Because the survey items were used in other copyrighted instruments, permission had been accessed to use the items for each variable. However, permission was not granted to include the complete list of items in this public document. Although the thesis committee and the University of Manitoba Education and Nursing Research Ethics Board (ENREB) approved the survey for the purpose of this study, it cannot be included in this report.

Data Collection and Analysis

Participant responses to the survey questions were collated, scored and analyzed. Individual aggregate scores for each participant were generated for the primary research variables of self-theory of intelligence and tendency for intellectual engagement. Tables were produced of the scores from all participants’ data, and scatter-plots generated to graphically represent the relationship between the two variables. A Kendall’s tau-b correlation coefficient was calculated for the aggregated data representing the two primary variables. The Kendall tau-b value represents a non-parametric correlative relationship between two variables and accounts for tied pairs in the data. The Kendall’s tau-b correlation coefficient was then examined to determine the type and strength of the relationship between the respondents’ identification of their self-theory and their tendency for intellectual engagement.

Statistical significance of the results based upon the demographic information collected from participants of sex, whether participants had attended school outside of
Canada, and whether English was their first language was determined for both primary variables through the application of an independent t-test with a significance level of 0.05.

**Validity and Reliability**

The survey instrument for this study was an amalgam of questions from two different instruments, each previously designed to collect data on either self-theory of intelligence or tendency for intellectual engagement. As a result, the reliability and validity of this questionnaire was considered in the context of the two original instruments.

Dweck, Chiu, and Hong (1995) cite data from six different studies on the reliability and validity of the measures of self-theories of intelligence used in their research work. These studies measured internal reliability of the instrument that ranged from 0.94 to 0.98 with a test-retest reliability over a two week interval as 0.80. Through the use of factor analyses the survey instrument was determined to be a valid measure of participants’ theory of intelligence and was demonstrated to be measured independently of other related factors in the participant population as well as other factors measured by the same survey instruments. The original survey instruments also included questions exploring self-theories of morality and self-world theories. The survey used in this study contained only those items related to self-theories of intelligence.

The questions in the survey instrument that are intended to collect data related to a students’ tendency to become intellectually engaged have also shown high reliability. Student-level internal reliability for the question categories in the *Tell Them From Me*
Survey (Canadian Education Association, 2011) that explore intellectual engagement range from 0.80 for effort-related questions to 0.85 for items on valuing school outcomes (The Learning Bar, 2012b). Due to the fact that participants in this survey submit their responses anonymously and can only be identified by the school that they attend, test-retest reliability is challenging to measure.

Confidentiality and Ethics

This study involved survey participants in Grade 9 in a suburban Manitoba school division completing an online questionnaire. The position of the researcher as a Principal within the surveyed school division necessitated that extensive confidentiality and ethics safeguards were incorporated into the methodology. These considerations were carefully attended to so that the researcher had no way of knowing which students from the potential pool of respondents completed the survey and which did not. An impartial research assistant was employed to provide all information to teachers and potential student participants, as well as to collect all consent/assent forms and provide secured access and reminders for survey completion to participants. This separation between researcher and participants was judiciously maintained throughout the duration of the study and the completion of the research report. This research project had the approval of the Education and Nursing Research Ethic Board of the University of Manitoba. The approval certificate is included as Appendix A. A subsequent amendment to the protocol was granted after the initial round of data collection, in an effort to increase rates of participation. The Amendment Approval is included as Appendix B.
Survey results were available to the researcher through an online data collection tool in a format that is in no way traceable to individual participants. Results were downloaded onto the researcher’s private and password protected computer. All consent/assent letters were sealed in an envelope and signed over the seal by the research assistant and held by the researcher in a locked filing cabinet in the researcher’s private office until after the completion of the research report. During the study and preparation of the research report, all data collected from the survey was accessible only to the researcher and the research advisor. All completed letters of consent/assent, working papers, and electronic copies of the original survey results were destroyed upon completion of the research report.

Data from the survey instrument appeared in the research report in its analyzed form. There was no connection to the survey respondents or their location. Compiled data and the conclusions drawn from it were provided in the final research report, thesis defense and any subsequent thesis publication. Findings were also provided to the school division and all schools by way of a research summary distributed upon completion of the final research report and defense. Participants were able to view this summary posted online by accessing a URL that was made available to all the Grade 9 students who participated in the study. The URL and publication date for this posting was provided to participants by the research assistant after they provided signed letters of consent and assent. It is also possible that research findings contained in this report will be made available through presentations, seminars, or correspondence with interested parties or organizations.
Summary

This chapter outlines the methodology that was followed to complete this study. It includes a rationale for the choice of quantitative method in the context of the research problem and specifies the position of the researcher in relation to the sample population. The researcher positioning creates implications for the research design in terms of confidentiality and ethics. These implications are detailed along with other confidentiality and ethical considerations. This chapter also describes the participant group and the survey instrument that they were asked to complete. A description of the collection and analysis of the survey data follows, along with information pertaining to the validity and reliability of the two original instruments whose items were used to create the instrument used in this study. The next chapter will provide a summary and analysis of the data provided by the survey respondents.
Chapter 4

RESULTS

This chapter describes the results of the correlational study between participants’ implicit theory of their intelligence and their tendency for intellectual engagement. Grade 9 students who participated in the study responded to a survey with questions that were designed to establish their state of mind in relation to the two variables in the correlational design. One bank of questions within the survey sought to establish the participants’ implicit theory of their intelligence and another, their tendency for intellectual engagement at school. These question banks were drawn, with permission from the original authors, from previously developed instruments designed to identify these tendencies in subjects of this age group (Dweck, 1999, & Canadian Education Association, 2011). Other questions in the survey asked participants to declare their sex; whether they were born outside of Canada; if English was their first language; and whether they had ever attended school outside of Canada or the United States. These factors were explored in order to establish whether there was a relationship of any significance between these factors and the two variables that were central to the study: self-theory of intelligence and tendency for intellectual engagement.

Survey Sample Description

Of the ten schools with grade 9 students within the surveyed school division, students from 6 of these schools were provided with an invitation to participate in the study. Arrangements were unable to be made to visit the students in the remaining 4 schools in the sample pool to offer this invitation. As shown in Table 3, the students who
actually received an invitation to participate represented 71% of the total grade 9 students within the division. Of that potential set of respondents, only 23 responses to the survey were received \(n=23\) – a return rate of 3.6% of those who received an invitation. This sample represents 2.6% of the total grade 9 student population in the surveyed school division.

Table 3

*Survey Participation Rates*

<table>
<thead>
<tr>
<th>Total category</th>
<th>% of total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total number of students in the sample pool</td>
<td>897</td>
</tr>
<tr>
<td>Number of students invited to participate</td>
<td>637</td>
</tr>
<tr>
<td>Schools represented in sample</td>
<td>6</td>
</tr>
<tr>
<td>Percentage of respondents from invited group</td>
<td>23</td>
</tr>
<tr>
<td>Number of respondents from total sample pool</td>
<td>23</td>
</tr>
</tbody>
</table>

The small number of respondents to the survey creates concern about how representative the sample is of the general population of grade 9 students in this school division. Those students who took the opportunity to participate in the study were a very small proportion of the total sample pool, and therefore, the results cannot be interpreted as generalizable across this population. Likewise, the low rate of return significantly
reduces the degree to which the results of this study can be considered to be reliable or generalizable.

**Demographic Factors**

The responses to the demographic questions in the survey yielded the data summarized in Table 4. 26.1% \((n=6)\) of respondents was male while 73.9% \((n=17)\) was female. This is a difference of 26.8% from the composition of the group of students who were actually provided with the opportunity to participate in the study in favour of female students. 34.8% \((n=8)\) of the respondents indicated that they were born in a country other than Canada. 26.1% \((n=6)\) of the respondents indicated that the first language that they learned was not English, while 30.4% \((n=7)\) said that they had attended school outside Canada or the United States.

Table 4

**Demographic Data**

<table>
<thead>
<tr>
<th></th>
<th>Male</th>
<th></th>
<th>Female</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Sex</td>
<td>MALE</td>
<td>26.1%</td>
<td>FEMALE</td>
<td>73.9%</td>
</tr>
<tr>
<td>Born outside Canada</td>
<td>Yes</td>
<td>34.8%</td>
<td>No</td>
<td>65.2%</td>
</tr>
<tr>
<td>First Language is English</td>
<td>Yes</td>
<td>73.9%</td>
<td>No</td>
<td>26.1%</td>
</tr>
<tr>
<td>Attended school outside Canada or the United States</td>
<td>Yes</td>
<td>30.4%</td>
<td>No</td>
<td>69.9%</td>
</tr>
</tbody>
</table>

Non-representation, non-reliability, and poor generalizability of results due to the small sample size and the disparity between the number of females and males who
responded to the survey compared to the proportion by sex in the sample population are of particular concern when examining the results of the demographic factors. The numbers of participants were too low to draw reliable conclusions with regard to these factors and their influence on a student’s implicit theory of their intelligence or their tendency for intellectual engagement. Caution needs to be taken in the interpretation of any of these results.

**Correlational Analysis**

Data from the questions on both the participants’ implicit theory of intelligence and their tendency for intellectual engagement were collected through questions in a Likert scale grid format. Questions targeted at determining a participant’s implicit theory of intelligence were scored on a six-point scale of 1 (Strongly Agree) through 6 (Strongly Disagree). Half of these questions were reverse-scored to improve reliability. Responses to questions used to determine a participant’s tendency for intellectual engagement were collected on a five-point scale and calculated on a scale of 0 (Strongly Disagree) through 10 (Strongly Agree). Questions targeting each variable were scored and aggregate scores for each participant’s responses were calculated. The aggregate scores for each variable were then rendered on a scatter plot (Figure 1). The correlation coefficient for the two variables was then calculated as a Kendall’s tau-b correlation coefficient ($\tau_b = 0.496$).

The Kendall’s tau-b correlation was chosen to reflect several characteristics of the data that needed to be accounted for in the methodology: The data were ordinal in nature, rather than being interval, and there were a significant number of ties in the data set where aggregated values from respondents for one or other of the variables were the same
as another respondent. The resulting coefficient of $\tau_{fb} = 0.496$ reflects a moderate positive correlation between a student’s self-theory of their intelligence and their tendency to become intellectually engaged at school.

Figure 1.

*Scatter plot of the Correlation between Implicit Theories of Intelligence and Intellectual Engagement*

Table 5 shows the results for statistical significance when independent $t$-tests were applied to the various segments of the sample group as they identified themselves through the demographic questions. There appears to be a link between the sex of the respondents and their implicit theory of their intelligence. Female respondents were more apt than males to indicate that they had an incremental theory of their intelligence ($p = 0.053$) Although falling just short of being statistically significant, this result is of importance because this self-theory has been demonstrated (Dweck, 1999, 2005) to be
Table 5

Statistical Significance: t-test Results for Demographic Factors and Implicit Theory of Intelligence and Intellectual Engagement

Implicit Theory of Intelligence:

<table>
<thead>
<tr>
<th>Response</th>
<th>Mean</th>
<th>t-test</th>
<th>Significance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sex of Respondent</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>7.872</td>
<td>( t_{(21)} = 2.049 )</td>
<td>( p = 0.053 ) (NS)</td>
</tr>
<tr>
<td>Female</td>
<td>6.609</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Was the respondent born in a country other than Canada?</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>7.309</td>
<td>( t_{(21)} = 0.772 )</td>
<td>( p = 0.460 ) (NS)</td>
</tr>
<tr>
<td>No</td>
<td>6.741</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Is English the respondent’s first language?</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>6.797</td>
<td>( t_{(21)} = 0.814 )</td>
<td>( p = 0.425 ) (NS)</td>
</tr>
<tr>
<td>No</td>
<td>7.338</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Has the respondent ever attended school outside Canada or the United States?</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>6.924</td>
<td>( t_{(21)} = 0.027 )</td>
<td>( p = 0.975 ) (NS)</td>
</tr>
<tr>
<td>No</td>
<td>6.944</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Tendency for Intellectual Engagement

<table>
<thead>
<tr>
<th>Response</th>
<th>Mean</th>
<th>t-test</th>
<th>Significance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sex of Respondent</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>6.737</td>
<td>( t_{(21)} = 0.406 )</td>
<td>( p = 0.689 ) (NS)</td>
</tr>
<tr>
<td>Female</td>
<td>7.010</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Was the respondent born in a country other than Canada?</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>7.019</td>
<td>( t_{(21)} = 0.373 )</td>
<td>( p = 0.713 ) (NS)</td>
</tr>
<tr>
<td>No</td>
<td>6.788</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Is English the respondent’s first language?</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>6.482</td>
<td>( t_{(21)} = 0.934 )</td>
<td>( p = 0.361 ) (NS)</td>
</tr>
<tr>
<td>No</td>
<td>7.099</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Has the respondent ever attended school outside Canada or the United States?</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>6.944</td>
<td>( t_{(21)} = 0.031 )</td>
<td>( p = 0.975 ) (NS)</td>
</tr>
<tr>
<td>No</td>
<td>6.924</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
possessed by more successful learners. This result however, must be interpreted with some caution as the sample size of the survey population is small and may not be representative of the larger population of this age group.

**Summary of Results**

**Correlational Study**

The primary purpose of this study was to establish the correlational relationship between students’ implicit theory of their intelligence and their tendency for intellectual engagement at school. An analysis of a cohort of 23 grade 9 students suggests that a correlation exists between these two variables. A Kendall’s tau b correlation coefficient was calculated for the data and yielded a correlation of $\tau = 0.496$. This represents the correlation as calculated to account for the ordinal nature of the data and the existence of ties within the data.

The results of this study indicate a moderate degree of correlation between participants’ implicit theory of their intelligence and their tendency to become intellectually engaged at school. This measure is instructive in supporting the conclusion that a moderately strong relationship can be demonstrated between students’ self-theory of their intelligence and their tendency for intellectual engagement.

**Demographic Factors**

Data were collected in the study to determine what proportion of the respondents: where male and female; where born outside of Canada; attended school outside Canada
or the United States; and whose first language was English. Information from each responded was then compared with their data for their implicit theory of intelligence and their tendency for intellectual engagement.

When this data were analyzed to determine if any of these demographic factors were of statistical significance, it was found that with one significant exception, there was no clear link between any of the demographic factors explored and either implicit theory of intelligence or intellectual engagement for these respondents. The exception noted was the apparent relationship between the sex of the respondents and implicit theory of intelligence, where female respondents showed a relationship closely approaching statistical significance ($p = 0.053$) with an incremental self-theory of their intelligence.

**Summary**

This chapter outlined the quantitative results of the study. The relationship between students’ self-theory of their intelligence and their tendency for intellectual engagement at school was described using a Kendal’s tau b correlation coefficient. The statistical significance of four different demographic factors in relation to these two variables was also determined. The study found a moderate correlation between an incremental self-theory of intelligence and a tendency for intellectual engagement at school ($r = 0.496$). It was found that there was no statistically significant relationship between any of the demographic factors and these two variables. Of note however is that the results for female students with respect to their tendency to possess an incremental theory of their intelligence, was shown to be approaching statistical significance ($p = 0.053$). The next chapter will discuss the findings of this study and their implications for
classroom and administrative practice in schools. It will also delineate the limitations of the findings and potential directions for further research on this topic.
Chapter 5

CONCLUSIONS AND IMPLICATIONS

The primary purpose of this study was to determine if there is a relationship between students' implicit theories of their intelligence and their tendency for intellectual engagement, and if so, what is the direction and strength. Secondary purposes of this study were to determine the nature of possible correlations between self-theory of intelligence and demographic factors such as sex, Canada as a country of birth, the learning of English as a first language and attendance at school outside of Canada or the United States. The results of the quantitative study of these elements are discussed in this chapter. A third research question addressing the implications of these findings for instructional leadership practices is also addressed.

Limitations of Results

The following factors in this study place limitations on the interpretations of the results:

1) As all participants in this study were students in the same grade in the same school division, the results may have some limitations in how transferable the findings are to other ages and stages of cognitive development or the degree to which they can be generalized to other school divisions.

2) Students who received an invitation to participate in this study represent a diverse set of ethnic, socio-economic, local geographical and educational cultural experiences. If this diversity was in fact represented in the group of participants, they may have had an influence on the results.
3) As the study progressed and initial data were analyzed, it became evident that a clear majority (approximately 80%) of respondents were identifying themselves as incremental theorists with respect to their own intelligence and this correlated with relatively high levels of intellectual engagement. This observation is based on data that were collected early in the study. At that time, due to the very low numbers of participants, it was recognized that there would be a need to alter the methodology to provide an incentive for participation. Data that were collected after the introduction of an incentive showed a wider range of correlated responses across the data, although still weighted towards respondents with an incremental theory of intelligence and a higher tendency for intellectual engagement. The resulting scatter plot (Figure 1) shows correlated values throughout the scaled range. This data are inconsistent with data that were collected in the original research studies from which the survey questions were drawn (Dweck, 1999; Canadian Education Association, 2011). This observation points towards a limitation in the methodology that favours participation of highly engaged students. This trend would create a bias towards participation of those students who are highly engaged (or at least highly compliant to tasks originating in the classroom) and a bias against students who were less engaged (or perhaps those who viewed optional activities such as participating in research studies, as not worthy of their time and attention).

The introduction of an attractive incentive to the same groups of students resulted in only a slight increase in participation rates. In the case of both the original instruments, the data that were collected were from studies that surveyed class groups of students without any selection steps or other means that would allow potential
participants to self-select or opt not to participate. For all intents and purposes, participation in the original surveys was compulsory for the participants and a complete population of the subject group was surveyed. This was accomplished by the institutions in which the participants were enrolled, choosing to have their student bodies participate en masse as part of their school experience. In the case of the current study, participation may have been effectively limited by the ethical considerations embedded in the methodology that involved various levels of permissions and actions on the part of students in order for them to participate: including permission from superintendents, principals, teachers, parents and the students themselves; letters of consent and assent that needed to be processed and returned to the school; and students then responding to an e-mail sent to them and then taking the time to visit a web-site to complete the survey. All of these steps were voluntary to all participants and originally without an extrinsic incentive. With the exception of administrators’ permissions, there was significant loss of participation at each step, resulting in a low rate of participation and a sample group skewed towards intellectually engaged incremental theorists. This is evidenced by the fact that approximately 80% of the respondents indicated that they possessed an incremental theory of their intelligence. Previous research would suggest that a result of 40% incremental theorists would be expected (Dweck, 1999). The introduction of an attractive incentive in an effort to increase participation rates did not prove to be effective in significantly raising participation rates. It would appear that in order to obtain truly cross-sectional data, a data collection method that will ensure a higher level of participation across a broader spectrum of the sample population would need
to be employed. This may include embedding the elements of the questionnaire into surveys that are routinely administered to whole school populations by the schools themselves.

Ironically, a study on student engagement was not, even with the offered incentive, engaging to Grade 9 students. This furthers supports the idea that a broader spectrum of participants would be desirable in better representing a population of students and that different methodologies, within the bounds of ethical research, would be necessary to access it.

4) Several of the demographic factors explored in this study are either directly or indirectly related to the recent immigration to Canada of participants from other countries. These factors include whether a student was born in Canada, whether their first language was English and whether they have ever attended school outside Canada or the United States. The methodology of the study dictated that all participants would be treated as a single pool for purposes of data collection and analysis, rather than being identified by school. This methodology does not take into account that there are significant differences in immigrant populations in the surveyed school division depending on the area of the school division in which they live as measured by the proportion of students in each school receiving provincial EAL funding (Pembina Trails School Division, 2011). The proportion of recent immigrants to different schools in the Division can vary between the extremes of 1% to 75% of a single school population. As this feature of the data could not be reflected in the analysis, this study may be limited in the validity of any conclusions based on the data for these factors. These results and any interpretation of them are severely
limited by a small sample size that may not be representative of the subject group and due to the methodology has no comparative basis for analysis with local school population demographics.

**Summary**

**Correlational Study**

The primary focus of this study was to explore the possible correlation between a student’s implicit theory of his/her intelligence and his/her tendency to become intellectually engaged at school. The participants in this study were grade 9 students in heterogeneous class groupings from a suburban Manitoba school division. They represented a wide-ranging demographic in terms of school configuration, socio-economic background, ethnic background, English as a first language, Canada as their country of birth, and sex. The sample size was $n = 23$.

The results that emerged in this study indicate a moderate correlation between implicit theory of intelligence and intellectual engagement with a Kendall’s tau b correlation coefficient of 0.496. The Kendall’s tau b is a calculation of correlation between two variables that takes into account the ordinal nature of the data and the ties in the data that were evident in this study.

The Kendall’s tau b of $t = 0.496$ provides evidence of a correlative relationship between a student’s self-theory of their intelligence and their tendency for intellectual engagement at school. In this study an incremental self-theory of intelligence correlates with a high degree of intellectual engagement and an entity self-theory of intelligence correlates with a low level of intellectual engagement.
**Demographic Factors**

The result of *t*-tests on the demographic factors explored in the survey determined that there was no statistical significance in the data collected, although the relationship between female respondents and an incremental theory of intelligence was very close to being significant (*p* = 0.053) Tests of statistical significance for the other demographic factors, including birth outside of Canada; English as a first language; and attendance at school outside of Canada or the United States, showed no relationship of statistical significance. None of the four demographic factors explored showed a statistically significant relationship to the either the respondents’ self-theory of their intelligence or their tendency for intellectual engagement.

**Implications for Teaching Practice**

Although limited in generalizability and reliability, the results of this study support the notion that students bring to the classroom self-theories of their own intelligence that will affect how they view themselves as learners in terms of their capabilities, how they adapt to new and challenging learning experiences, what resilience they have in the face of high challenge learning activities, and the degree to which they will intellectually engage in their learning. The results indicate that there is a relationship between students’ self-theory of their intelligence and their tendency for engagement in learning. This knowledge has significant implications for classroom teachers in terms of how they think about, plan for, and provide learning experiences for their students. In order to provide the best conditions for learning, teachers will need to:
1. Be aware of the existence of students’ self-theories of intelligence and how these beliefs can affect students’ behavioural choices as learners.

2. Find ways to determine individual student’s perceptions of themselves as learners with respect to their self-theories of their intelligence and apply this knowledge in the differentiation of interaction and instruction with students.

3. Examine and modify their instructional strategies with a view to maximizing the positive impact that they can have on helping to develop more incremental self-theory beliefs in students.

4. Critically examine the nature of their casual and formal interactions with students, parents, and colleagues to ensure that these interactions foster the development of incremental theories of intelligence in students and discourage the entrenchment of entity theories. Dweck, (1999) identifies the types of interactions with students that foster this development. They include interacting with students in ways that focus on and encourage the development of a wide range of problem-solving strategies, collaboration and resiliency as learners rather than interacting in ways that center on a student’s level of intelligence. These teaching strategies focus on building on student’s beliefs of their own self-efficacy, rather than developing in them a dependence on a self-theory of intelligence that is fixed in nature. Although Dweck does not identify sex as a significant factor in determining self-theory of intelligence, data from this study suggests that there may a connection where females are more likely to hold an incremental theory of their intelligence than their male counterparts. This data set is not large enough to be considered representative, nor does it quite meet the burden of statistical significance however it does raise the possibility that
boys may benefit from specific and targeted strategies to encourage them to develop as incremental theorists with respect to their own implicit view of their intelligence.

5. Include the development of incremental self-theories of intelligence and the resulting creativity, resilience, academic risk-taking, and intellectual engagement of students as a pervasive goal in all teaching and learning.

6. Be aware of and employ effective strategies to engage males as learners. The preponderance of female participants in this study supports a growing body of other research that current instructional practices and program structures are not capturing boys as learners as well as they are girls.

**Implications for Instructional Leadership Practice**

The results of this study suggest that the internal cognitive conditions that students bring to the classroom may have a significant influence on how they see themselves as learners which in turn may affect how they function towards the achievement of learning outcomes. Specifically, those students who possess an incremental theory of their intelligence appear to be more likely to become intellectually engaged at school and are much better prepared to achieve prescribed learning outcomes over the long term than those who possess an entity theory of their intelligence. Although not within the bounds of statistical significance, the findings suggest that a higher proportion for female students may possess the more advantageous incremental self-theory of intelligence. It is therefore incumbent on instructional leaders to build the knowledge base, assessment processes and instructional strategies within schools to:
1. Acknowledge the importance of understanding the variety of ways that students think about themselves as learners.

2. Work with teachers to design and implement formative assessment practices that will inform classroom teachers about individual students' implicit theories of their intelligence. Many school jurisdictions set aside time early in the school year to do individualized formative assessments of every student to establish baseline data on students' learning and to identify areas for growth throughout the coming school year. These assessments typically explore reading levels, numeracy skills, attitudes towards learning, learning styles, problem solving abilities, metacognitive skills, and occasionally venture into other areas including psycho-motor development (Pembina Trails School Division, 2013; Winnipeg School Division, 2013). Incorporating assessment elements into such formative assessment opportunities could allow information to be gathered on individual students that could inform instruction with that student to ensure that the student's self-theory of his/her intelligence was taken into account when interacting with that student. This could allow teachers to foster the development of incremental self-theories of intelligence within that student and work towards extinguishing entity self-theories. This awareness and strategic instructional practice will lead to more resilient, resourceful and self-reliant learners.

3. Continually examine institutional practice across the spectrum of interactions with all involved to ensure that all stated goals, communications, and instructional practices support and encourage the formation of incremental self-theories on the part of all learners. Without a consistent message that builds self-efficacy on the part of all learners, opportunities will be lost to develop the self-reliance and resilience of
learners that they will need in the face of challenges. This effort may be particularly important in the early years as students are establishing their self-perceptions of their place on the school system.

**Implications for Future Research**

The results of this study suggest a number of directions for future research into the impact of students’ implicit theories of their intelligence on intellectual engagement, as well as the effects of various demographic variables on students’ tendencies to become intellectually engaged at school.

The effect of students’ self-theories of their own intelligence on their intellectual engagement warrants further investigation. A number of potential research questions arise from the results of this study. They include:

1) Does the age and experience in the school system have a bearing on the proportion of students who identify as either entity or incremental self-theorists? Do students tend to gain self-efficacy beliefs of themselves as learners or do they diminish with experience in the school system?

2) Does the age and experience in the school system have a bearing on students’ tendency to be intellectually engaged at school? Do students tend to become more intellectually engaged as learners or do they become more difficult to intellectually engage with experience in the school system?

3) Does the sex of a student have a bearing on their identity as either entity or incremental self-theorists? Does this pattern show a developmental trend with age and experience within the school system? Although the results of this study suggest a link
between sex and self-theory, the small sample size does not provide sufficient representation or reliability to determine this link. Further study with a variety of methodologies is required.

4) Does the sex of a student have a bearing on students’ tendency to be intellectually engaged at school? Are there changes that are evident at particular ages and stages? Although no link was found in this study, different methodologies and larger sampling of student populations may yield more representative and reliable results.

5) How does a students’ experience in a different educational system affect their self-theory of intelligence?

6) How students’ experiences as second language learners affect their self-theory of intelligence?

7) What classroom and instructional leadership practices and strategies will best support the development of more efficacious self-theories of intelligence in students?

Future studies targeting these questions may need to be conducted with a different research protocol in order to better ensure a more representative sample of students and to include a larger number of participants. Results from this study were limited to those grade 9 students in the sample school division that worked their way through all of the steps required by the research protocol to receive access to the questionnaire and then took the time to complete it. The cumulative impact of the multiple steps involved and the voluntary nature of participation may have been responsible, in part, for the low percentage of students who completed the process and contributed to the data set. Future studies should take this limitation onto account with a view to create a protocol that reduces or eliminates these limitations and thus
generates more robust data. It may be possible to incorporate the survey instrument into existing surveys that are being administered to all students as part of routine information gathering. This proprietary data could then be isolated and analysed, providing that the protocols remained within the scope of research ethics.

A further recommendation would be to extend the research through a qualitative methodology by selecting a cohort of participants that represent a cross-section of responses to the initial quantitative survey. The purpose would be to explore these subjects' experiences with respect to their self-theory of intelligence and intellectual engagement more deeply. The results of this type of study could help to situate the quantitative results contextually and would likely provide more specific directions to focus further investigation. Longitudinal studies of a cohort of participants may yield results that provide information on how students develop over time with respect to their self-theories of intelligence and their degrees of intellectual engagement.

**Conclusion**

In her research on implicit theories of intelligence, Dweck (1999) has identified students’ self-theory of their own intelligence as a critical factor in determining an individual’s efficacy as a learner. She has identified those individuals with an incremental theory of their own intelligence as being significantly better equipped to be creative, resilient, self-reliant, perseverant, and adventurous learners. These qualities are those that will carry these students through the challenges posed by higher order learning tasks and will allow them to gradually build on both their knowledge base and their confidence to
tackle challenging learning tasks. In contrast, those with an entity theory of their own intelligence are less likely to thrive as learners in the long term, even with higher levels of innate ability as quantified by traditional measures of intelligence. (Dweck, 1999, 2008; Dweck, & Molden, 2005).

Research conducted by Willms et al. (2009) describes students who demonstrate high levels of intellectual engagement as those who have “A serious emotional and cognitive investment in learning, using higher order thinking skills, (such as analysis and evaluation) to increase understanding, solve complex problems or construct new knowledge” (Willms et al., 2009, p. 7). Intellectual engagement is the desired state for learners in the classroom in order to maximize learning and cognitive development.

The results of this study show a relationship between students’ implicit theory of their intelligence and their tendency to be intellectually engaged in their learning. Those participants in the study who identified with an incremental theory of their intelligence were more likely to be intellectually enraged at school. Conversely, the study indicates that those with an entity self-theory were less likely to experience intellectual engagement. Results also indicate that there might be nuances the attributable to the sex of the respondents Although this study shows that female students may be more likely to possess an incremental theory of their intelligence, the other demographic factors explored showed no significant connection to the two variables central to the study.

Albert Bandura (1990) writes that “personal empowerment through mastery experiences is the most powerful means of creating a strong, resilient sense of efficacy. This is achieved by equipping people with knowledge, sub-skills and the strong self-
belief of efficacy needed to use one’s skills effectively” (p.133). The importance of the pre-existing cognitive biases that students bring to the classroom with respect to their own abilities as learners along with their predilections to be creative, resilient, self-reliant, perseverant, and adventurous as learners has not received much attention to date from educators at all levels of the school system. The results from this study indicate that strategic and pervasive attention to these important internal characteristics of learners is worthy of inclusion in our knowledge of the students we serve, so that we can work to provide the most appropriate, supportive, and effective instruction that we can.
References


Appendix A: Ethics Approval Certificate

UNIVERSITY OF MANITOBA
Research Ethics and Compliance
Office of the Vice-President (Research and International)

APPROVAL CERTIFICATE

January 7, 2013

TO: John R. Karraas
Principal Investigator

FROM: Stan Straw, Chair
Education/Nursing Research Ethics Board (ENREB)

Re: Protocol E2012:114
"Implicit Theories of Intelligence and Intellectual Engagement: A Correlational Study"

Please be advised that your above-referenced protocol has received human ethics approval by
the Education/Nursing Research Ethics Board, which is organized and operates according to
the Tri-Council Policy Statement (2). This approval is valid for one year only.

Any significant changes of the protocol and/or informed consent form should be reported to the
Human Ethics Secretariat in advance of implementation of such changes.

Please note:
- If you have funds pending human ethics approval, the auditor requires that you submit a copy of this Approval Certificate to the Office of Research Services, fax 261-0325 - please include the name of the funding agency and your UM Project number. This must be faxed before your account can be accessed.
- If you have received multi-year funding for this research, responsibility lies with you to apply for and obtain Renewal Approval at the expiry of the initial one-year approval; otherwise the account will be locked.

The Research Quality Management Office may request to review research documentation from
this project to demonstrate compliance with this approved protocol and the University of
Manitoba Ethics of Research Involving Humans.

Appendix B: Ethics Approval – Amendment Approval

AMENDMENT APPROVAL

March 5, 2013

TO: John R. Karras
   Principal Investigator

FROM: Stan Straw, Chair
       Education/Nursing Research Ethics Board (ENREB)

Re: Protocol #E2012:114
   “Implicit Theories of Intelligence and Intellectual Engagement: A Correlational Study”

This will acknowledge your Amendment Request dated March 4, 2013 requesting amendment to your above-noted protocol.

Approval is given for this amendment. Any further changes to the protocol must be reported to the Human Ethics Secretariat in advance of implementation.
### Appendix C: Characteristics and Outcomes of Student Engagement

<table>
<thead>
<tr>
<th></th>
<th>Social Engagement</th>
<th>Academic Engagement</th>
<th>Intellectual Engagement</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Definition</strong></td>
<td>Meaningful participation in the life of the school.</td>
<td>Active participation in the requirements for school success.</td>
<td>Serious emotional and cognitive investment in learning.</td>
</tr>
<tr>
<td><strong>Factors Influencing Engagement</strong></td>
<td>School teams, clubs, student government, and school-wide campaigns such as environment week.</td>
<td>Defined curriculum outcomes, Assignments, tests and marks, Individual self-effort, High expectations for success, Positive classroom disciplinary climate, Intellectually challenging lessons, Teacher and parental encouragement, Direct and indirect consequences</td>
<td>Instructional challenge characterized by: Curriculum as discipline, Exploration, understanding of concepts, Development of ideas through the disciplines and through work on authentic problems, Individual and collective knowledge-building, Effective learning time, Positive classroom disciplinary climate, High expectations for success, Positive relationships with teachers</td>
</tr>
<tr>
<td><strong>Developmental Outcomes</strong></td>
<td>Friendships, social networks, sense of belonging, self-confidence, and often enjoyment of school.</td>
<td>Academic success, credit accumulation, and high school graduation. Post-secondary destinations. Orientation to good work and personal responsibility.</td>
<td>Confidence as knowledge-builders, problem-solvers, conceptual thinkers, self-motivated learners. Orientation to original work and often collaboration.</td>
</tr>
</tbody>
</table>

*Characteristics and Outcomes of Student Engagement: from Willms, et al., (2009)*