

Prospective and Practicing Teachers' Beliefs:
A Study of Implicit Theories of Intelligence and Teacher Efficacy

by

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ABSTRACT

Teachers (N = 142) completed a questionnaire assessing implicit theories of intelligence, beliefs about the stability of intelligence, and efficacy beliefs. Comparisons were made between preservice and practicing, as well as elementary and secondary, teachers; sex, age, and years of experience were also explored. Preservice teachers rated social traits as more indicative of intelligence than practicing teachers. As preservice teachers' amount of practicum experience increased, so did their likelihood of rating social skills as important in describing an intelligent student. Most teachers believed intelligence is modifiable, although practicing and older teachers were comparatively more likely to believe it is stable. Teachers who believe intelligence is malleable had higher levels of efficacy for student engagement. Also, preservice teachers had higher efficacy for student engagement than practicing teachers, but as they gain practicum experience, efficacy for instructional strategies decreases. Sex and teacher school-level were not significantly related to differences among groups.

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CHAPTER ONE

INTRODUCTION

What do you think it means to be intelligent? How important are social skills when describing an intelligent person? Is intelligence something that never changes or can a person increase how bright they are? Can teachers make a difference in their students' lives? Teachers were asked some of these questions in this study.

Teachers' beliefs and attitudes have been found to substantially impact various aspects of the teaching and learning process (see Pajares, 1992, for a review). Three beliefs held by teachers are of interest here: implicit theories of children's intelligence, beliefs about the stability of intelligence, and perceptions of efficacy.

With respect to implicit theories of intelligence, studies involving both laypersons and teachers have typically found three factors underlying their conceptions of intelligence: cognitive (problem solving), verbal, and social (Fry, 1984; Sternberg, Conway, Ketron, & Bernstein, 1981). Other studies exploring teachers' implicit theories of intelligence have found only two dimensions underlying conceptions of intelligence, representing academic (both problem-solving and verbal abilities) and social/practical attributes (Lynott & Woolfolk, 1994; Murrone & Gynther, 1991). Fry (1984) conducted one of the most interesting studies regarding teachers' implicit theories of intelligence. She found that teachers' beliefs about children's intelligence shift from a focus on social attributes at the elementary level to an emphasis on more cognitive/reasoning skills at the secondary and post-secondary levels. No subsequent studies have documented this shift in implicit theories of teachers' intelligence and further evidence is needed to determine the relationship between teacher school level and implicit theories of intelligence.

Another area that falls under implicit theories of intelligence is beliefs about the stability of intelligence. Dweck, along with her colleagues, developed a model focusing on implicit theories about the stability of intelligence (Dweck, 1986; Dweck, Chui, & Hong, 1995; Dweck & Leggett, 1988). In this model, intelligence is viewed as either stable (entity theory) or malleable (incremental theory). People holding an incremental view of intelligence are motivated by learning goals, in which the focus is on increasing one's competence; whereas those holding an entity theory of intelligence are driven by performance goals, which involve a preoccupation with gaining favourable judgments and avoiding giving a negative impression. Learning goals lead to a mastery orientation while performance goals can result in a maladaptive, helpless orientation. Beliefs about the stability of intelligence have been found to impact individual's goals and behaviour patterns in the direction predicted by this model (e.g., Bempechat, London, & Dweck, 1991; Cain & Dweck, 1995; Hong, Chiu, Dweck, Lin, & Wan, 1999). Unfortunately, with the exception of Lynott and Woolfolk (1994), teachers' beliefs about the stability of intelligence have not been explored.

Teacher efficacy is the final teacher belief of interest in the present study. Teacher efficacy involves teachers' beliefs about their ability to help all students learn (Ashton, 1985; Guskey & Passaro, 1994). There has been extensive debate over how to define and measure teacher efficacy (Tschannen-Moran, Woolfolk Hoy, & Hoy, 1998). Nevertheless, despite the lack of cohesion of this construct in the literature, a consistent relationship between teacher efficacy and other teacher behaviours and student outcomes has been well documented (see Tschannen-Moran, Woolfolk Hoy, & Hoy, 1998, for a review). Studies exploring differences in levels of teacher efficacy between preservice and

practicing teachers have been inconsistent (Hebert, Lee, & Williamson, 1998); some studies have found no differences in efficacy levels between preservice and inservice teachers (Guskey & Passero, 1994), while others have found teachers' sense of efficacy is highest during the preservice period (Brousseau, Book, & Byers, 1988). Thus, more research is needed to clarify the relationship between teacher efficacy and experience. It is possible that teachers' beliefs about the stability of intelligence could play a role in teachers' level of efficacy.

The purpose of this research project is to examine the beliefs of practicing teachers and teacher education students. Specifically, differences between preservice teachers and inservice teachers, as well as differences between elementary teachers and secondary teachers, are analyzed for the three dependent variables: implicit theories of intelligence, beliefs about the stability of intelligence, and teacher efficacy. The impacts of sex, age, and years of teaching/practicum experience are also examined for these three variables. Finally, the relationship between beliefs about the stability of intelligence and the other two dependent measures (implicit theories of intelligence and teacher efficacy) is explored.

CHAPTER TWO

LITERATURE REVIEW

A detailed review of the literature related to implicit theories of intelligence, beliefs about the stability of intelligence, and teacher efficacy is provided in this chapter. Following this, the research questions and hypotheses for the study are presented.

Implicit Theories of Intelligence

Implicit theories are not formal, scientific theories; rather, they are simply people's *conceptions* of a construct. Carol Dweck (1996) has defined implicit theories as basic assumptions people hold about themselves and their environment. Implicit theories reside in individuals' minds, therefore, they "need to be 'discovered' rather than 'invented' because they already exist, in some form, in people's heads" (Sternberg & Powell, 1982, p. 977). Neisser (1979) implied that implicit theories of intelligence are the only worthwhile theories to investigate; he stated, "the concept of intelligence *cannot* be explicitly defined, not only because of the nature of intelligence but also because of the nature of concepts" (p.179). Intelligence is not a unitary quality with equally important defining attributes. According to Neisser (1979), people do not even have an implicit formal definition of intelligence, only the notions of a prototypic intelligent individual to which comparisons are made. It is possible that people judge intelligence using prototypic resemblance, that is, an individual is judged as intelligent to the extent to which his/her behaviour corresponds to the characteristics of an ideal prototype.

Individuals use their implicit theories to judge the intelligence of themselves and those around them (Paulhus & Landolt, 2000; Sternberg et al., 1981). By identifying people's implicit theories of intelligence, an understanding of how people assess their

own, as well as others' intelligence can be attained. Regardless of whether implicit theories are right or wrong, they are a strong part of a person's belief system and therefore impact assumptions and assessments they make (Fry, 1984). Important decisions are often made on the basis of assumptions about others' intellectual capacity, particularly in the education system. Hence, it is important to understand the content of people's basic beliefs regarding intelligence. Teachers are an especially important sample to study given their critical role and the responsibility they have in appraising children.

Laypersons' Implicit Theories of Intelligence

Sternberg et al. (1981) conducted a leading study in the area of implicit theories of intelligence. This study was a multifaceted project but the underlying purpose was to investigate implicit theories of intelligence, of both experts and laypersons. The goal of the first phase of this study was to compile a list of intelligent and unintelligent behaviors, based on laypersons' conceptions of intelligence, academic intelligence, and everyday intelligence. An interesting sample was used in this first phase; participants were comprised of 61 individuals studying in a college library (students), 63 people waiting for trains during rush hour (commuters), and 62 people entering a supermarket (mostly home-makers). For the students, intelligence and academic intelligence were significantly correlated. Conversely, intelligence was significantly correlated with everyday intelligence for the commuter and supermarket groups. This phase of the study resulted in a master list of 170 behaviours associated with intelligence and 80 unintelligent behaviours. This list has been used in several subsequent studies of implicit theories of intelligence (e.g., Fitzgerald & Mellor, 1988; Murrone & Gynther, 1989).

The second phase of the Sternberg et al. (1981) study was concerned with comparing experts' views of intelligence with those of the lay population. The layperson participants consisted of 122 individuals who responded to a newspaper advertisement; the expert group was compiled of 140 psychologists with doctoral degrees conducting research in the field of intelligence who responded to a questionnaire. Analysis of the laypersons' questionnaires indicated that the three types of intelligence in question (academic, everyday, and general) are highly overlapping but not identical. Three factors were evident in laypersons' ratings of characteristicness in an "ideally" intelligent individual: practical problem solving ability, verbal ability, and social competence. According to Sternberg et al.:

the first two (cognitive) factors that constitute people's belief system for intelligence seem closely to resemble the two principle factors in Cattell and Horn's theory of fluid and crystallized intelligence (Cattell, 1971, Horn, 1968). Fluid ability consists mostly of various problem-solving skills, whereas crystallized ability consists mostly of various verbal skills. Thus, the cognitive factors in people's implicit theories seem to correspond quite closely to the cognitive factors in one major explicit theory, that of Cattell and Horn. (p. 45)

Experts' notions of intelligence were strikingly similar to those of the lay population. Experts, even more than laypeople, perceived intelligence to be very closely related to both academic and everyday intelligence. Those people who professionally study intelligence identified two cognitive factors that were closely related to fluid and crystallized abilities; the third factor represented practical or social adaptation. Thus, it

appears that experts and laypersons perceive the construct of intelligence in similar ways. It is likely that experts' theories of intelligence have influenced the average person's conceptions. Alternatively, experts and laypeople are exposed to similar cultural influences, which could explain the similarities in their implicit theories of intelligence.

The goal of the third phase of this study was to determine the extent to which laypeople use the behaviours associated with intelligence to evaluate other people's intelligence. Written behavioural descriptions of others were presented to participants (168 individuals randomly selected from the phone book of which 65 responded). Participants were asked to read the description of the individual and rate the intelligence of the individual on a 1 to 9 scale, where 1 was "not at all intelligent", 5 was labeled "average intelligent", and 9 described the individual as "extremely intelligent". Most descriptors contained mixtures of intelligent and unintelligent behaviours but some contained only one set or the other in order to cover all ranges of intelligence. Half of the descriptors were quantified (e.g., she often reasons logically) and the other half were unquantified (e.g., she reasons logically). Results indicated that laypeople do in fact use their implicit theories of intelligence to assess the intelligence of others.

Fitzgerald and Mellor (1988) replicated procedures employed by Sternberg et al. (1981). Participants in this study consisted of 98 male and 94 female adults with a mean age of 42.9 years. This study employed a 65-item list of behaviours, 40 of which described intelligent behaviours, while 25 described unintelligent behaviours. The behaviours listed were selected from the 250 behaviours identified by Sternberg et al. (1981). Subjects were asked to rate the importance of each behaviour in evaluating intelligence on a nine-point scale (Very Important to Very Unimportant). The findings

suggested that behaviours were grouped together based on the belief of subjects that these items were of similar importance. As Fitzgerald and Mellor point out, "this is quite different from suggesting that subjects believed that behaviors were conceptually similar or related to the same cognitive factors" (p. 148). It is difficult to determine from importance ratings whether behaviours were viewed as conceptually related or unrelated.

In the second phase of this study, Fitzgerald and Mellor (1988) aimed to determine the degree to which implicit theories of intelligence are organized dimensionally versus categorically. Participants (50 male and 38 female undergraduate students) were asked to sort a stack of index cards that had intelligent and unintelligent behaviours listed on them. Subjects were to sort the cards into piles that they believed belonged together; they were told that there was no right or wrong way to sort them and that a pile could have any number of cards in it. There was some distinction found between verbal/individual factors and behavioural/social; nevertheless, intelligent behaviours were conceptualized as falling into two distinctive categories: intelligent and unintelligent. Fitzgerald and Mellor acknowledged that prototypes play a role in conceptions of intelligence but that implicit theories are simpler than Sternberg et al. concluded. Moreover, they believed that the implicit theories of laypersons share little in common with most formal theories of intelligence, with the exception of Spearman's theory of *g*. What can be termed a "general ability factor" may dominate laypersons' theories of intelligence with specific factors playing a smaller role. It is unclear whether laypersons' implicit theories of intelligence are as complex as Sternberg et al. (1981) determined or as simple as Fitzgerald and Mellor (1988) hypothesized.

Siegler and Richards (1982) sought to determine the characteristics of university students' prototype of the "ideally intelligent" individual. Undergraduate students in a developmental psychology class were asked to list five traits that they thought best characterized an intelligent adult and rate them relative to their importance. Five characteristics materialized as the most important: reasoning, verbal ability, problem solving, learning, and creativity. The students were asked to do the same task for 6-month olds, 2-year olds, and 10-year olds. The prototypes of intelligent children varied substantially from perceptions of adult intelligence. The five characteristics that emerged for 6-month olds were: recognition of people and objects, motor coordination, alertness, awareness of environment, and verbalization. Alternatively, the traits listed for two-year olds were: verbal ability, learning ability, awareness of people and environment, motor coordination, and curiosity. For a child of ten years, the following characterized intelligence: verbal ability, learning ability, problem solving, reasoning, and creativity; in this case the three middle traits were perceived as being equally important. It appears that cognitive traits such as problem solving and reasoning became increasingly important with age, while perceptual/motor abilities became less so. Verbal ability and ability to learn were considered important at all ages except six-months. Hence, the characteristics perceived as intelligent depend upon the developmental level of the person being assessed, at least according to this relatively nonrandom sample of university students.

Undergraduate students were also used in a study conducted by Murrone and Gynther in 1989. This study explored university students' implicit theories regarding children's intelligence. Participants were told that a child between the ages of six and ten years had been given an intellectual assessment and that the child had scored either in the

Average, Below Average, or Above Average range of intellectual functioning. They were then asked to rate the child (from Almost Never Describes to Always Describes) on a questionnaire that listed descriptors of intelligent and unintelligent behaviours; this questionnaire was adapted from Sternberg, et al. (1981). Murrone and Gynther (1989) found significant differences between the three levels of intelligence on all of the scales except for Social Competence. For social competency behaviours, there was a significant difference detected between the Below Average ratings and the other two groups, but no difference was found between the child described as Average and the one described as Above Average. It appears that people believe that children described as having below average intelligence will not acquire the same level of social skills as other children. Factor analysis revealed Problem Solving and Social Competence factors as being associated with adult's implicit notions of children's intelligence. However, a verbal abilities factor was not identified, as has been found in previous studies of adult intelligence (Siegler & Richards, 1982; Sternberg et al., 1981). In this study, neither the sex of the rater nor the sex of the child rated had a significant impact on responses.

Teachers' Implicit Theories of Intelligence

In 1984, Fry conducted a comprehensive study of the implicit views of male and female teachers regarding children's intelligence. Participants were from four major cities in Canada, and 4 cities in the United States. First, a list of behaviours and attributes representing intelligent functioning of students as perceived by teachers was compiled; factor analysis reduced this list to 37 behaviours representing teachers' conceptions of children's intelligence. Differences between elementary, secondary, and post-secondary teachers' implicit views of children's intelligence were evident, although there were some

commonalities. The common attributes and behaviours of intelligent functioning students, according to teachers, included three factors: Cognitive, Verbal, and Social. It is interesting that these three factors are consistent with Sternberg et al. (1981), yet contrary to Murrone and Gynther's (1989) findings. Although Fry did not discuss which of the factors was rated as most important, the means for each item were provided. By calculating the means for each factor, it is clear that the Cognitive factor ($M = 6.46$) was rated as most important, followed by the Verbal factor ($M = 6.20$), and the Social factor ($M = 5.72$) was rated as the least characteristic of an intelligent student. Thus, although it was not explicitly stated, teachers' conceptions of intelligence were dominated by cognitive factors, followed by verbal traits, and least of all social skills.

Results were compared to contrast elementary, secondary and post-secondary teachers' ratings of significance for the three dimensions of intelligent functioning. Post-secondary teachers, which Fry labeled tertiary teachers, perceived cognitive functions to be the most important, while elementary teachers comparatively attached the highest ratings to social and verbal skills. Furthermore, secondary teachers, when compared to post-secondary teachers stressed verbal variables, such as verbal fluency, in the "ideally intelligent" student. It should be noted however that there were some drawbacks to the methods employed by Fry; namely, that results are based on analysis of variance conducted on individual items rather than on scale scores, thus increasing the chance of Type I errors.

Regardless of the potential statistical flaws of this study, it appears that teachers' implicit notions of children's intelligence shift from more of a focus on social and verbal traits to an emphasis on cognitive/reasoning skills. If the implicit beliefs about

intelligence are transformed from the elementary to the secondary and post-secondary level, teachers' expectations are also likely to shift. Consequently, students are apt to be confused by the shift in teachers' beliefs and expectations. Further research is necessary to determine the impact of shifts in teachers' and other adults' conceptions of children's intelligence. Surprisingly, there does not seem to be any follow-up investigations of this topic.

In a more recent study, Murrone and Gynther (1991) obtained information about conceptions of children's intelligence held by elementary school teachers, all of which were female. The data indicated that these teachers held two distinct factors in their implicit theories of elementary school-age children's intelligence: Academic Skills and Interpersonal Competencies. Characteristics that were included under the Academic Skills factor included: displays a good vocabulary, learns quickly, is intellectually curious, and displays a good memory. It is important to note that verbal abilities are included in the Academic Skills factor. Interpersonal Competencies traits included: is kind toward others, earns trust of others, and displays an outgoing personality. This study also found that when teachers were given information about a child's intelligence, this information pervasively influenced how the child was rated. Years of teaching experience was considered as a variable, but no significant differences were found.

Lynott and Woolfolk (1994) also explored teachers' implicit theories of intelligence, but not specifically children's intelligence. The purpose of this study was to analyze the content and structure of teachers' implicit notions of intelligence (in general) and to determine the relationship between these implicit theories and educational goals. Participants in the first phase of this study were elementary school teachers or preservice

elementary teachers in university; the majority of these participants were female. First, behaviours representative of the “ideally intelligent” individual were determined. The teachers’ perceptions of intelligence included a social dimension, which is consistent with previous findings (Fry, 1984; Murrone & Gynther, 1991); conversely, teachers in this study did not identify a pure verbal abilities factor, as was found in the investigation of teachers’ implicit views conducted by Fry (1984). The two underlying dimensions of intelligence identified were labeled: Conceptual Thinking and Practical Knowledge.

The second phase of this study was concerned with identifying the relationship between teachers’ implicit theories of intelligence and their ratings of the importance of educational goals. A national sample of 319 elementary teachers was asked to (a) rate characteristics of an “ideally intelligent” individual based on scales developed in the first phase of the study, (b) respond to questions to determine whether they perceived intelligence to be a stable or malleable trait, and (c) rate the importance of educational goals. The two categories identified as dimensions of intelligence in the first phase of this study, Conceptual Thinking and Practical Knowledge, were not perceived as being equally important in the second phase. Conceptual Thinking behaviours were perceived as more characteristic of intelligence than behaviors signifying Practical Knowledge. A wide range of beliefs was discovered when examining teachers’ perceptions of intelligence as stable or modifiable. Despite the variability, a significant trend was identified; teachers with greater experience were more likely to believe intelligence is fixed and stable ($r = -.30, p < .01$). Interestingly, although age and years of experience were significantly correlated ($r = .68, p < .01$), age was not a statistically significant variable.

Teachers' preference for educational goals was related to their implicit beliefs about intelligence. For example, teachers who rated Conceptual Thinking behaviors as characteristic of intelligence also rated Conceptual Thinking goals as important. Thus, it appears that teachers' implicit theories of intelligence substantially impact the educational goals they choose for their students. This study also found a relationship between teachers' beliefs about behaviours characteristic of intelligence and their beliefs about the stability of intelligence. The more highly these teachers rated practical/social skills as characteristic of intelligence, the more likely they were to believe intelligence was a modifiable trait. No relationship was identified for the Conceptual Thinking dimension and beliefs about the stability of intelligence.

Sex, Age, and Years of Experience

Lynott and Woolfolk (1994) found no significant correlations between implicit theories of intelligence and sex or age. For years of experience, they did find a statistically significant negative correlation with the Conceptual Thinking dimension of their measure of implicit theories of intelligence ($r = -.12, p < .05$). The greater a teacher's experience, the less likely they are to perceive abstract thinking and problem solving as a characteristic of intelligence. Murrone and Gynther (1991) also looked at the impact of years of experience but found no significant relationship with implicit theories of intelligence.

Beliefs about the Stability of Intelligence

According to Dweck and her associates, individuals tend to favour one, of two, implicit theories of intelligence: an entity theory or an incremental theory (Dweck & Leggett, 1988). Entity theorists perceive intelligence to be a fixed, stable, and

uncontrollable quality (Dweck & Leggett, 1988). In contrast, incremental theorists believe that intelligence is a malleable, increasable, and controllable trait (Dweck & Leggett, 1988).

Dweck and her colleagues have formulated a model proposing that one's implicit theory of intelligence (as stable or modifiable) motivates goals, which in turn propel behavioural responses; these responses are contingent upon perceived ability (Dweck, 1986; Dweck, Chui, & Hong, 1995; Dweck & Leggett, 1988). To clarify, it has been shown that individuals who believe that intelligence is malleable (incremental theorists) tend to possess "learning goals" and a belief in *gaining* task ability (Dweck, 1996). In contrast, those who believe intelligence is a stable quality (entity theorists) are oriented towards "performance goals" and a belief in *having* task ability; the entity theory can be associated with a helpless motivational pattern if confidence in ability is low (Cain & Dweck, 1995). Consequently, people holding an entity theory are driven to document or prove their competence and those holding an incremental theory are concerned with developing or improving their competency. Thus, it appears that the incremental view of intelligence is often the more adaptive pattern. Incremental and entity theorists exhibit different behavioural responses relative to the confidence they have in their ability (see Figure 1).

This entity-incremental model has generated, and been supported by, a great deal of research (e.g., Ablard & Mills, 1996; Bempechat, London, & Dweck, 1991; Cain & Dweck, 1995; Faria, 1996; Faria & Fontaine, 1997; Hong, Chiu, Dweck, Lin, & Wan, 1999; Jones, Slate, Blake, & Sloas, 1995; Jones, Slate, Marini, & DeWater, 1993; Kovach, Wilgosh, & Stewin, 1999). Unfortunately, with the exception of Lynott and

Woolfolk (1994), no studies could be found that examined *teachers'* beliefs about the stability of intelligence.

Figure 1. The proposed impact of beliefs about the stability of intelligence on goals and behavior

Beliefs about the stability of intelligence	Goal orientation	Confidence in ability	Behavior pattern
Entity theory (Intelligence is fixed)	Performance goal (Goal is to gain positive judgments/avoid negative judgments of competence)	If high but If low	Mastery pattern Seeks challenge High persistence Helpless pattern Avoids challenge Low persistence
Incremental theory (Intelligence is malleable)	Learning goal (Goal is to increase competence)	If high or low	Mastery pattern Seeks challenge High persistence

Note. Adapted from “Motivational Processes Affecting Learning,” by C. S. Dweck, 1986, *American Psychologist*, 41, p. 1041.

The study by Lynott and Woolfolk (1994), described above, found that teachers varied substantially in their beliefs about the stability of intelligence. Lynott and Woolfolk (1994) did not provide specifics about the number of incremental and entity theorists in their sample; they did, however, state that teachers “express a moderately incremental perspective about the nature of intelligence, although the range of beliefs is wide” (p. 261). The only significant trends discovered were that experienced teachers were more likely to be entity theorists and incremental theorists tended to rate practical/social skills as being more characteristic of intelligence.

Given that research has shown that beliefs about the stability of intelligence affect goal orientations and behaviour patterns, it is likely that teachers are impacted by their theory of intelligence. It is also possible that teachers' beliefs about the stability of intelligence impact the beliefs of their students, potentially impacting students' motivation. As such, more research is needed to uncover teachers' beliefs about the stability of intelligence.

Dweck and her colleagues have extended this model to include beliefs about other human attributes, such as morality and personality. These beliefs have been connected to how people understand social actions and outcomes. Discussion of the extension of Dweck's theory to other attributes, however, goes beyond the scope of this project and readers are referred to Dweck (1999) for a thorough discussion of the model.

A simple three-item questionnaire, developed by Dweck and Henderson (1989), has been the primary measure used to assess beliefs about the stability of intelligence (see Appendix E). Participants are asked to state their level of agreement with the three statements on a 6-point scale ranging from 1 (strongly agree) to 6 (strongly disagree). All three statements espouse an entity view of intelligence; hence, the higher the participant's score, the less they believe intelligence is a stable entity. Although this measure is short and simple, Hong et al. (1999) report its high internal reliability (alpha ranging from .94 to .98) and high test-retest reliability ($r = .80$, $n = 62$, over a two week period). Others have attempted to develop more comprehensive measures of beliefs about the stability of intelligence (Faria, 1996; Jones, Slate, Marini, & DeWater, 1993) but these instruments lack the reliability of the simple, three-item measure.

Sex, Age, and Years of Experience

Recall that Lynott and Woolfolk (1994) explored elementary teachers' beliefs about intelligence and did look at the relationship between beliefs about the stability of intelligence and sex, age, and years of experience. The only significant finding was a negative correlation between years of experience and the belief that intelligence is modifiable ($r = -.30, p < .01$). Teachers with more experience were more likely to be entity theorists and therefore believe intelligence is a stable trait.

Teacher Efficacy

Teacher efficacy has been defined as teachers' "belief in their ability to have a positive effect on student learning" (Ashton, 1985, p. 142) and as "teachers' belief or conviction that they can influence how well students learn, even those who may be considered difficult or unmotivated" (Guskey & Passaro, 1994, p. 628). Tschannen-Moran, Woolfolk Hoy, and Hoy (1998) provide a more recent definition, "the teacher's belief in his or her capability to organize and execute courses of action required to successfully accomplish a specific teaching task in a particular context" (p. 233).

Teacher efficacy has been studied extensively in relation to other teacher beliefs and attitudes, as well as student achievement, confirming the importance of this construct (Tschannen-Moran, Woolfolk Hoy, & Hoy, 1998). For instance, Gibson and Dembo (1984) found that teachers with high personal and teaching efficacy are more likely to persist with a student who is struggling and are less likely to be critical. Moreover, teachers with a high sense of efficacy show less evidence of stress and an internal locus of control (Greenwood, Olejnik, & Parkay, 1990), and are less concerned with the demands of teaching tasks (Ghaith & Shaaban, 1999). High teacher efficacy has also been

correlated with positive student achievement and classroom management (Ashton & Webb, 1986), as well as student motivation (Midgley, Feldlaufer, & Eccles, 1989). Although the importance of teacher efficacy has been demonstrated, the development of this construct has been complicated and ongoing.

Teacher efficacy has generally been based on Bandura's theoretical framework of self-efficacy (Bandura, 1977, 1997). Bandura (1997) defined self-efficacy as "beliefs in one's capabilities to organize and execute the courses of action required to produce given attainments" (p. 3). Self-efficacy is task-specific and has to do with self-perceptions of competence. According to Bandura's social cognitive theory, behaviour is affected by outcome expectations and efficacy expectations. Outcome expectations are the judgments people make about whether a given behaviour will lead to a specific consequence, whereas efficacy expectations are people's belief that they have the capacity to execute the behaviours required to achieve that consequence. Ashton (1985) clarifies the need to distinguish the two types of expectations, "a person may believe that certain behaviors will produce a desired behavior (outcome expectation), but may not feel capable of performing the behavior (efficacy expectation)" (p. 143).

Ashton and Webb (1986) extended Bandura's theory to the construct of teacher efficacy. Using a two-item, Likert scale developed by the Rand Corporation (Berman & McLaughlin, 1977), they proposed that the two Rand statements represented the two expectancies of Bandura's theory. The first Rand item, "When it comes right down to it, a teacher really can't do much because most of a student's motivation and performance depends on his or her home environment" (Berman & McLaughlin, 1977, p. 137), was believed to represent *teaching efficacy*, referring to outcome expectations about the

ability of teachers in general. The second item, "If I try really hard, I can get through to even the most difficult or unmotivated students" (Berman & McLaughlin, 1977, p. 137), was seen as reflecting *personal efficacy*, signifying an individual's efficacy expectations about his or her own personal ability to bring about desired outcomes. To clarify, Ashton and Webb (1986) developed a framework in which teacher efficacy was broken down into two dimensions: teaching efficacy and personal efficacy; the former referring to beliefs about teachers' ability in general (outcome expectations) and the latter to beliefs about individual teachers' personal effectiveness (efficacy expectations).

Building upon the work of Ashton and Webb (1982), Gibson and Dembo (1984) developed a more comprehensive measure of teacher efficacy. Their Teacher Efficacy Scale (TES), a 30-item Likert scale, when administered to 208 elementary teachers yielded two substantial factors accounting for 28.8% of the total variance; the first factor, personal teaching efficacy, accounted for 18.2%, and the second factor, general teaching efficacy, accounted for 10.6% of the total variance. Gibson and Dembo (1984) reported analysis of internal consistency reliabilities resulting in Cronbach's alpha coefficients of .78 for the nine items representing personal efficacy, .75 for the seven items representing teaching efficacy, and .79 for the total 16 items that made up the two factors. Gibson and Dembo recommended use of the 16-item version of the TES as it yielded similar reliability to the original 30-items. Interestingly, Hoy and Woolfolk (1993) used a modified version with only 10 items and found reliabilities in the same range as longer versions. In the area of teacher efficacy, the majority of studies have used Gibson and Dembo's (1984) TES, and hence their conceptualization of teacher efficacy (see Tschannen-Moran, Woolfolk Hoy, & Hoy, 1998, for a review).

Gibson and Dembo's conceptualization of teacher efficacy has been widely accepted; nevertheless, there have been several critiques. The correspondence between the two dimensions of teacher efficacy and Bandura's outcome and efficacy expectations has been questioned (Guskey & Passaro, 1994; Pajares, 1996; Woolfolk & Hoy, 1990). For instance, Woolfolk and Hoy (1990) point out that teaching efficacy, as conceptualized by Ashton and Webb, as well as Gibson and Dembo, does not truly represent an outcome expectation because it involves judgments about the ability of teachers to overcome adverse influences, as opposed to judgments about the consequences of their behaviour. Moreover, Guskey and Passaro (1994) point out that inspection of the TES items loading on the personal efficacy factor, not only use the first person but are also positive and reflect an internal locus of control (i.e., "I can..."). Conversely, the items loading on the teaching efficacy factor tend to be negative and have an external locus of control (i.e., "teachers can't..."). Guskey and Passaro (1994) developed a modified version of the TES in which they varied the referent and locus of control resulting in support for an internal versus external distinction between the two factors of the TES. The internal/external dimensions are seen as being similar to locus-of-control dimensions of causal attributions. Furthermore, Deemer and Minke (1999) investigated the wording confounds of the TES and found that if items reflected both negative and positive orientations, the TES appears unidimensional. A final critique of this widely accepted conceptualization of teacher efficacy is that it is too general and does not coincide with Bandura's task-specific theory of self-efficacy (Bandura, 1997; Tschannen-Moran, Woolfolk Hoy, & Hoy, 1998). Despite the critiques of this conceptualization of teacher efficacy, the TES has been used extensively and this model has been a driving force in the area.

The biggest measurement problem related to teacher efficacy is discerning the most useful level of specificity; measures that are either too general or too specific are problematic (Tschannen-Moran & Woolfolk Hoy, 2001). Instruments need to assess teachers' beliefs about their competence in a wide array of tasks, yet as Tschannen-Moran and Woolfolk Hoy (2001) point out, "there is a danger of developing measures that are so specific they lose their predictive power for anything beyond the specific skills and contexts being measured" (p. 795). Global measures are susceptible to capturing a more general construct rather than actually measuring a teacher's sense of efficacy (Bandura, 1997). Efficacy judgments refer to one's ability to successfully complete a task; therefore, the context must be specified in order to capture true efficacy judgments (Henson, 2002). Bandura (1997) maintained teachers' self-efficacy changes across different situations, tasks, and subject matter. Hence, adequate measures must tap into various tasks that teachers are required to perform.

Tschannen-Moran and Woolfolk Hoy (2001) refer to an unpublished measure developed by Bandura (undated) to measure teacher efficacy. This 30-item instrument provides specific tasks performed by teachers and asks them to rate on a 9-point scale how much influence they have over these tasks. This unpublished measure includes seven subscales: efficacy to influence decision making, efficacy to influence school resources, instructional efficacy, disciplinary efficacy, efficacy to enlist parental involvement, efficacy to enlist community involvement, and efficacy to create a positive school climate (as cited in Tschannen-Moran & Woolfolk Hoy, 2001). Sample items include, "how much can you influence the decisions that are made in the school?" and "how much can you do to keep students on task on difficult assignments?". So far, little research is

available using Bandura's new measure, likely because it has not been published (Tschannen-Moran & Woolfolk Hoy, 2001).

In response to the need for a new measure with a suitable level of specificity, Tschannen-Moran and Woolfolk Hoy (2001) recently developed a new scale, the Ohio State Teacher Efficacy Scale (OSTES), which builds on the unpublished work of Bandura. This new instrument is a 24-item scale, with a 12-item short form, that investigates three areas: Efficacy for Student Engagement, Efficacy for Instructional Practices, and Efficacy for Classroom Management. This instrument has the same Likert-type scale used by Bandura, ranging from 1 (Nothing) to 9 (A Great Deal), a score of 3 indicates 'Very Little', 5 indicates 'Some Influence' and a response of 7 indicates 'Quite a Bit'. The development of this scale was comprehensive, involving three studies, which included both preservice and inservice teachers, to test the new instrument. Tschannen-Moran and Woolfolk Hoy (2001) found alpha reliabilities ranging from .86 to .90 for the three subscales and from .92 to .95 for the full 24-item scale. Moreover, evidence for construct validity was provided as they found that this measure correlates positively with other measures of personal teaching efficacy. This new instrument, which is used in the present study, shows promise for overcoming some of the measurement problems that have plagued teacher efficacy.

Sex, Age, and Years of Experience

Of particular interest to the present study is the difference between teacher education students and practicing teachers. Bandura (1977) pinpointed experience as the key determinant of self-efficacy. Preservice teachers have been a sample used often in this area of research because once efficacy beliefs are established, they are somewhat resistant

to change (Tschannen-Moran & Woolfolk Hoy, 2001; Woolfolk Hoy, 2000). Research investigating the development of or changes in teacher efficacy has been inconclusive; some studies suggest that teachers' sense of efficacy is highest during the preservice period (Brousseau, Book, & Byers, 1988), whereas others suggest that there is no difference between experienced and prospective teachers (Guskey & Passaro, 1994; Imants & DeBrabander, 1996). Soodak and Podell (1997) found that for elementary teachers, personal efficacy was elevated during the preservice years, fell drastically in the first years of teaching, and then increased as they gained experience. Soodak and Podell also studied secondary teachers, yet no significant changes were identified.

As is evident, findings have been inconsistent when comparing preservice and practicing teachers' sense of efficacy. Different conceptualizations of teacher efficacy, as well as various instruments used to measure the construct could account for the lack of coherent findings (Hebert, Lee, & Williamson, 1998). Further research is necessary to determine changes in teacher efficacy from the preservice to inservice years. Another area with limited exploration involves other factors that may impact the development and maintenance of teachers' sense of efficacy (Hebert, Lee, & Williamson, 1998). What antecedent variables are related to high teacher efficacy? Teachers' beliefs about the stability of intelligence, discussed above, is one area that has not been examined in the existing literature. If teachers consider intelligence to be a stable trait, it could be reasoned that they believe that teacher interventions have little influence over student competence and hence, feel that they personally are less able to influence students' learning.

Research Questions and Hypotheses

1. What are preservice and practicing teachers' implicit theories of children's intelligence?

It was expected that overall, teachers would rate cognitive/reasoning abilities as being most characteristic of an intelligent student, followed by verbal abilities, and social traits would be rated as the least important in describing an intelligent child (Fry, 1984; Lynott & Woolfolk, 1994).

2. Do preservice teachers' implicit theories of children's intelligence differ from practicing teachers' and do elementary teachers' implicit theories differ from secondary teachers'?

No prior studies have compared the implicit theories of preservice and practicing teachers; therefore, no directional hypothesis was formulated. As for elementary and secondary teachers, based on Fry's (1984) findings, it was expected that elementary teachers would emphasize social skills in their conceptions of intelligence, whereas secondary teachers would be more likely to stress cognitive/problem-solving abilities.

3. Do preservice and practicing teachers' implicit theories of children's intelligence differ as a function of their sex, their age, or their years of teaching/practicum experience?

No directional hypotheses were made for sex or age, as Lynott and Woolfolk (1994) found no significant findings related to these variables. For years of teaching experience, it was expected that teachers with more experience would rate cognitive factors as being less characteristic of an intelligent student (Lynott & Woolfolk, 1994).

4. What are teachers' beliefs about the stability of intelligence and do they differ as a function of teaching experience (preservice vs. practicing), school-level taught (elementary vs. secondary), sex, age, or years of teaching/practicum experience?

It was anticipated that overall, there would be more incremental theorists than entity theorists. No differences between elementary and secondary teachers were expected. Lynott and Woolfolk (1994) found that teachers with more experience were more likely to be entity theorists. It was therefore expected that a greater number of practicing teachers would be entity theorists when compared to preservice teachers. Also, it was hypothesized that older teachers and teachers with more experience would be more likely to be entity theorists. Lynott and Woolfolk (1994) found no differences between the sexes, hence, males and females were expected to have similar beliefs about the stability of intelligence.

5. Do preservice teachers differ from practicing teachers in their level of teacher efficacy and do elementary teachers differ from secondary teachers in their level of teacher efficacy?

As discussed previously, findings have been inconsistent when comparing preservice and practicing teachers' level of efficacy; although, some studies have found that preservice teachers have higher levels of teacher efficacy (Brousseau, Book, & Byers, 1988; Soodak & Podell, 1997). Therefore, in the present study, preservice teachers were expected to have higher levels of efficacy when compared to practicing teachers. No directional hypothesis was made for comparing elementary and secondary teachers' level of efficacy.

6. Is teacher efficacy impacted by sex, age, or years of teaching/practicum experience?

No specific results were anticipated for sex, age or years of teaching/practicum experience.

7. Are implicit theories of intelligence (conceptions of what it means to be intelligent) impacted by beliefs about the stability of intelligence?

Based on the findings of Lynott and Woolfolk (1994), it was anticipated that teachers that were incremental theorists (believe intelligence is modifiable) would rate social skills as being important indicators of intelligent students, when compared to entity theorists.

8. Is there a relationship between beliefs about the stability of intelligence and teacher efficacy?

Although no previous studies have looked at the relationship between teacher efficacy and beliefs about the stability of intelligence, it was expected that entity theorists would have lower teacher efficacy when compared to incremental theorists.

CHAPTER THREE

METHOD

In this chapter, the specifics of the methods of this study are detailed. First, the research design is outlined, followed by a discussion of the participants, instruments, and procedure.

Research Design

This study involved a quantitative, comparative design. To determine if there were differences between groups of teachers varying in teaching experience (practicing versus preservice teachers) and school-level taught (elementary and secondary teachers) a between-subjects design was employed. Specifically, differences were analyzed across the independent variables of teaching experience and school level for the three dependent measures: implicit theories of intelligence, beliefs about the stability of intelligence, and teacher efficacy. The impact of sex, age, and years of teaching/practicum experience was also examined for the three measures. Finally, the relationship between beliefs about the stability of intelligence and the other two dependent measures (implicit theories of intelligence and teacher efficacy) was also explored. Based on responses to the beliefs about the stability of intelligence measure, respondents were divided into two groups (entity and incremental theorists) and differences between these two post-hoc groups on the implicit theories of intelligence and teacher efficacy measures were investigated.

Participants

A total of 142 individuals participated in this study: 71 practicing teachers and 71 preservice teachers. The *preservice* teachers were students enrolled in the final year of the teacher education program at the University of Victoria. All of the preservice teachers had

some practicum experience; the range was from one week to one year. Practicum experience was calculated as a portion of a year, with the average preservice teacher having about 8 weeks of practicum experience ($M = 0.156$ years, $SD = 0.164$). The preservice teachers ranged in age from 21 to 52 years ($M = 26.58$ years, $SD = 6.78$), with between 4 and 9 years of post-secondary education ($M = 5.37$ years, $SD = 1.11$). Of the 71 preservice teachers working toward a Bachelor of Education degree, 28 of them had other undergraduate degrees (18 Bachelor of Arts degrees and 8 Bachelor of Science degrees).

The *practicing* teacher sample consisted of teachers teaching public school in the Greater Victoria School District 61, ranging in age from 25 to 63 years, with an average age of 44.11 years ($SD = 10.12$), which is consistent with the British Columbia provincial average of 44.6 years for public school teachers in the 2002/2003 school year (British Columbia Ministry of Education, 2002). Practicing teachers had between 4 and 11 years of post-secondary education ($M = 6.40$ years, $SD = 1.76$). Nineteen of the practicing teachers had more than one undergraduate degree and 27 (38%) had a Master's degree. For the 2002/2003 school year, 22.9% of teachers in British Columbia had Master's degrees, this sample therefore appears to have more education than the average (British Columbia Ministry of Education, 2002). Practicing teachers in this study had between 1.5 and 35 years of teaching experience, with an average of 16.4 years ($SD = 9.83$), which is slightly more than the provincial average of 13.2 years for British Columbia teachers in the 2002/2003 school year (British Columbia Ministry of Education, 2002).

Of the preservice teachers, 14.0% were males and 86.0% were females. As for the practicing teachers, 28.2% were males and 71.8% were females. For the 2002/2003 school year, 68.3% of public school teachers in British Columbia were female (British

Columbia Ministry of Education, 2002); hence, this study has slightly more females than the provincial average, especially for the preservice teachers.

Both preservice and practicing teachers were divided into two groups, elementary ($n = 75$) and secondary ($n = 67$), based on the age group they taught or anticipated that they would be teaching; elementary teachers taught students in grades 1 to 6 and secondary teachers taught students in grades 7 to 12, and hence “secondary” teachers also included middle school teachers. Of the preservice teachers, 39 were classified as elementary and 32 were secondary. Thirty-six of the practicing teachers were elementary and 35 were secondary.

Instruments

Recall that three teacher beliefs are of interest in this particular study: implicit theories of intelligence, beliefs about the stability of intelligence, and teacher efficacy. Within the literature, beliefs about the stability of intelligence have been referred to as implicit theories of intelligence (Dweck, 1986, 1996); however, for the purposes of this study, a distinction is made between implicit theories of intelligence (what it means to be intelligent) and beliefs about the stability of intelligence. Due to this distinction, implicit theories of intelligence are measured separately from beliefs about the stability of intelligence. Implicit theories of intelligence are measured using ratings on the Beliefs About Students' Intelligence Scale, which is based on the work of Fry (1984). Beliefs about the stability of intelligence, on the other hand, are measured using a rating scale indicating agreement with statements that present an entity view of intelligence. This measure, the Beliefs About the Stability of Intelligence Questionnaire, was developed by Dweck and Henderson (1989). A detailed discussion of these two measures follows,

along with a description of the teacher efficacy measure, the Ohio State Teacher Efficacy Scale (Tschannen-Moran & Woolfolk Hoy, 2001), and information about the demographics questionnaire. All participants completed the same three questionnaires with the same wording; the demographics questionnaire, however asked preservice and practicing teachers to provide different information.

Demographics Questionnaire

Respondents who agreed to participate first completed the consent form (see Appendix A). A short demographics questionnaire was used to collect some personal information from preservice teachers (see Appendix B) and practicing teacher participants (see Appendix C). Most of the information provided was used to describe the participants and to determine the impact of sex, age, and years of experience. Each demographics sheet had an identification number on it, which corresponded to the same number on the other questionnaires. The demographics form was kept separate from the rest of the questionnaires. All respondents were asked to provide: Name, age, sex, and years of post-secondary education. Preservice teachers were asked to provide the following information: whether they have an undergraduate degree and what degree it is, what university program they were in, the length of practicum experience they have had and with what grades, and what grade they anticipate they will be teaching. The practicing teachers were asked what grade level they taught, how long they have been teaching, what university degrees they have, and what grades they have taught in the past and for how long.

Beliefs About Students' Intelligence Scale

As discussed previously, following the methods of Sternberg et al. (1981), Fry (1984) assessed teachers' conceptions of intelligence. Teachers were asked to rate how characteristic each of 37 traits and behaviours were of the "ideally intelligent" elementary, secondary or post-secondary student. The list of the 37 traits and behaviours was compiled in the first phase of Fry's study in which teachers were asked to list attributes of intelligent functioning children. The behaviours were subsequently factor analyzed resulting in three factors underlying teachers' conceptions of intelligence: Cognitive, Verbal, and Social. This same list was used in the present study (see Appendix D) and is referred to as the Beliefs about Students' Intelligence Scale (BASIS) for the purposes of this study. The BASIS required respondents to rate how important each of the attributes is in describing an intelligent student on a scale of 1 (does not describe) to 5 (describes a great deal), a rating of 3 indicates that the respondent believed the attribute "describes somewhat". The 37 items were presented in the random order for all of the participants.

Beliefs About the Stability of Intelligence Questionnaire

Based on the work of Dweck and her colleagues (Dweck, 1999; Dweck & Henderson, 1989; Hong et al., 1999), beliefs about the stability of intelligence were assessed using a simple three-item measure (see Appendix E). Respondents were asked to state their level of agreement with the three statements, on a 6-point scale ranging from 1 (Strongly Agree) to 6 (Strongly Disagree). All three statements espouse an entity theory of intelligence; hence, the higher the participant's score, the less they believe intelligence is a stable entity. Respondents are dichotomized as entity or incremental theorists based

on their mean score (ranging from 1 to 6). Entity theorists have mean scores of 3.0 or less and incremental theorists have scores of 4.0 or more. Dweck, Chiu, and Hong (1995) recommend removing those respondents with a score between 3.0 and 4.0 because although the three statements are essentially the same, these individuals have agreed with some of the statements and disagreed with others.

Despite the simplicity of this measure, Hong et al. (1999) report its high internal consistency (alpha ranging from .94 to .98) and high test-retest reliability ($r = .80$, $N=62$, over a two week period). As Hong et al. point out, “only three items are included because the items are intended to have the same meaning, and continued repetition of the same idea becomes somewhat bizarre and tedious to the respondents” (p. 590). Dweck (1999) has also developed an eight-item measure that includes both entity and incremental statements. Dweck recommended the three-item scale for teachers because they may be reluctant to endorse an entity theory when it is contrasted with an incremental theory (Dweck, personal communication, May 10, 2002).

Ohio State Teacher Efficacy Scale

A new scale developed by Tschannen-Moran and Woolfolk Hoy (2001) was used to measure teacher efficacy (see Appendix F). This promising new instrument, the Ohio State Teacher Efficacy Scale (OSTES), is a 24-item measure that asks teachers to rate “how much they can do” in three areas: Student Engagement, Instructional Strategies, and Classroom Management. The rating scale ranges from one (nothing) to nine (a great deal); a response of five indicates that the teacher believes they have “some influence”. A 12-item short form also has been introduced but the more comprehensive 24-item version was used in the current study. Tschannen-Moran and Woolfolk Hoy (2001) found alpha

reliabilities ranging from .86 to .90 for the three subscales and from .92 to .95 for the full 24-item scale. In the development of the scale, three strong factors were revealed for inservice teachers, accounting for 54% of the variance (24-item version). When preservice teachers' responses were analyzed, a single factor was the best solution, indicating that the total scale score is likely the best indicator of preservice teachers' efficacy. Tschannen-Moran and Woolfolk Hoy provided evidence for construct validity; a positive correlation was found between this new scale and other measures of personal teaching efficacy.

Procedure

Participants were treated in accordance with the CPA's code of ethical conduct (Canadian Psychological Association, 2000). In accord with standard practice, all consent procedures and methods were approved by the university's ethics committee. Upon ethical approval from the university, I requested consent from the directors of the teacher education programs to have some time to speak to students. During meetings directed towards teacher education students in the final year of their program, I made two short presentations, one to students in the elementary education program and one to students in the middle school and secondary education programs. I explained the purpose of the study and outlined the important information contained in the consent form (see Appendix A). Students were asked to take a questionnaire package with them if they thought they may be interested in participating and were asked to return the completed questionnaires within two weeks. Of approximately 100 elementary education students that I spoke to about participating, 39 returned completed questionnaires; and 32 students out of

approximately 100 in the secondary/middle school program responded. Hence, a total of 71 preservice teachers participated.

Data collection for practicing teachers was as follows, I first sought consent from the superintendent of the school district (see Appendix G). Following that, I approached individual principals to attain consent from them. It was my intention to discuss the study with individual teachers but all of the principals I spoke to preferred that I drop the questionnaire packages in the teachers' mailboxes. A week following the initial visit to each school, I returned to deliver a thank you/reminder letter (see Appendix H) and then returned the following week to collect the completed questionnaires. Of 20 elementary schools contacted, 8 principals agreed to participate; 11 secondary/middle schools were contacted and 5 participated. The return rate from each school was surprisingly low, ranging from 0 to 60 percent for the elementary schools, with an average of 33% of the questionnaires that were dropped off being returned. For the secondary and middle schools, which had a much larger population of teachers in each school, the return rate was between 10 and 22.5 percent, with an average return rate of 16.2%. To try and get more practicing teachers to participate, an email was sent out to all graduate students in education asking if they, or anyone they knew, were certified teachers, and if so, if they would be willing to complete the questionnaire. The goal was to get a minimum of 70 practicing teacher respondents, in order to have a similar sample size as the preservice teacher sample. As a result of this email circulation, this goal was reached; thirteen more respondents were recruited, 4 elementary practicing teachers and 9 secondary. A total of 71 practicing teachers participated in the study, 36 elementary and 35 secondary teachers.

CHAPTER FOUR

RESULTS

The results of the study are presented in three sections. In the first section, preliminary analyses relating to the factor analytic structures of the Beliefs About Students' Intelligence Scale and the Ohio State Teacher Efficacy Scale are reported. The second section is devoted to the findings related to: the Beliefs About Students' Intelligence Scale, the Ohio State Teacher Efficacy Scale, and the Beliefs About the Stability of Intelligence Questionnaire. Each of these measures is discussed in relation to group differences relative to teacher experience (preservice vs. practicing teachers) and teacher school level (elementary vs. secondary teachers). As well, the impact of sex, age, and years of teaching experience are reported for the three scales. The third and final section is devoted to the relationship between measures. Specifically, responses to the Beliefs About the Stability of Intelligence Questionnaire (entity vs. incremental theorists) are reported as they relate to the Beliefs About Students' Intelligence Scale and the Ohio State Teacher Efficacy Scale.

Principle Component Analyses

In order to ensure that the factor structures of the instruments used in the present study were consistent with the findings of prior work, a series of principle component factor analyses with varimax rotation were conducted, one for the scale developed by Fry (1984), the Beliefs About Students' Intelligence Scale, and one for the Ohio State Teacher Efficacy Scale (Tschannen-Moran & Woolfolk Hoy, 2001). This section reports the results of each of these principle component analyses.

Beliefs About Students' Intelligence Scale

Based on methods employed by Fry (1984), the principle component analysis of the Beliefs About Students' Intelligence Scale (BASIS) was restricted to three factors. The factor structure obtained by Fry (1984) is found in Table 1. For comparative purposes, the principle component analysis conducted with the present sample is also displayed in Table 1, under the heading 'Replication'. Consistent with the most stringent criterion suggested by Tabachnick and Fidell (1989, p. 640), items with factor loadings of less than .40 were eliminated. This rather conservative criterion resulted in ten items being removed; consequently, a 27-item modified instrument (Revision) was used for the remaining analyses.

Table 1

Factor Loadings – Beliefs About Students' Intelligence Scale

Factor	Fry (1984)	Replication	Revision
<i>Cognitive Factor</i>			
Analyzes major points in the problem	.67	.81	.80
Reasons well	.69	.81	.79
Thinks clearly and logically	.69	.77	.77
Is objective in his/her judgment	.65	.64	.73
Makes good decisions	.65	.64	.66
Thinks deeply about issues	.65	.70	.65
Deals with problems maturely	.69	.47	.54
Displays common sense	.67	.49	.53

Has good concentration	.70	.55	.53
Is knowledgeable about a number of subjects	.72	.32	
Is organized and efficient	.72	.23	
Has clear-cut goals and ambitions	.71	.21	
Is highly motivated to do the best	.71	.27	
Has a very good command of language and vocabulary	.67	.39	
Is quick in decision-making	.67	.11	
Shows creativity	.65	.37	
<i>Verbal Factor</i>			
Is verbally fluent	.70	.67	.63
Responds rapidly	.73	.71	.60
Has a good conversation ability, is interesting	.77	.55	.58
<i>Speaks clearly</i>	.69	.46	.55
Reads widely	.68	.48	.53
Is energetic	.76	.38	
Studies hard	.66	.31	
<i>Social Factor</i>			
Is sensitive to other's needs	.67	.84	.85
Is helpful	.65	.81	.84
Is fair in dealing with others	.68	.81	.81
Respects law and order	.72	.78	.81
Is friendly	.64	.75	.78
Is prompt	.65	.71	.73
Is gracious in dealing with others	.79	.74	.72
Is self-confident	.65	.69	.72
Respects the judgment of adults	.69	.68	.71
Is diligent and anxious to please	.69	.66	.70

Displays interest in people around him/her	.75	.61	.63
Is persistent	.72	.58	.51
Is not afraid to speak the truth	.66	.55	.49
Is very popular	.79	.39	

Ohio State Teacher Efficacy Scale

Based on methods used by Tschannen-Moran and Woolfolk Hoy (2001) in the development of the Ohio State Teacher Efficacy Scale (OSTES), the number of factors to be extracted was set *a priori* at three. The factor structure obtained by Tschannen-Moran and Woolfolk Hoy (2001) is outlined in Table 2. The principle component analysis conducted with the present sample is also displayed in Table 2 for comparative purposes. Again, as recommended by Tabachnick & Fidell (1989, p. 640), items with loadings less than .40 were removed. Table 2 illustrates, under the heading 'Revision', that three items were removed from factor one, two items were removed from factor two, and no items were removed from the third factor, resulting in a modified 19-item version of the OSTES.

Table 2

Factor Loadings – Ohio State Teacher Efficacy Scale

Factor	Tschannen-Moran & Hoy (2001)	Replication	Revision
<i>Factor 1 – Instructional Strategies</i>			
How well can you provide appropriate challenges for very capable students?	.55	.67	.78

How much can you do to adjust your lessons to the proper level for individual students?	.59	.75	.78
How well can you implement alternative strategies in your classroom?	.66	.64	.63
How much can you use a variety of assessment strategies?	.72	.48	.61
To what extent can you provide an alternative explanation or example when students are confused?	.70	.52	.60
To what extent can you craft good questions for your students?	.68	.29	
How well can you respond to difficult questions from your students?	.66	.36	
How much can you gauge student comprehension of what you have taught?	.57	.31	
<i>Factor 2 – Classroom Management</i>			
How well can you establish routines to keep activities running smoothly?	.50	.83	.82
How well can you establish a classroom management system with each group of students?	.66	.69	.78
To what extent can you make your expectations clear about student behaviour?	.53	.71	.74
How much can you do to get children to follow classroom rules?	.69	.64	.73
How much can you do to control disruptive behaviour in the classroom?	.78	.50	.58
How much can you do to calm a student who is disruptive or noisy?	.66	.41	.58
How well can you keep a few problem students from ruining an entire lesson?	.62	.35	
How well can you respond to defiant students?	.61	.34	

Factor 3 – Student Engagement

How much can you do to get through to the most difficult students?	.47	.71	.75
How much can you do to improve the understanding of a student who is failing?	.57	.65	.73
How much can you do to motivate students who show low interest in school work?	.66	.68	.69
How much can you do to help your students value learning?	.70	.70	.69
How much can you do to get students to believe they can do well in school work?	.75	.68	.68
How much can you do to foster student creativity?	.50	.66	.63
How much can you do to help your students think critically?	.56	.62	.61
How much can you assist families in helping their children do well in school?	.63	.47	.53

As part of the preliminary data analyses, the data were perused for any missing data. All of the respondents completed all of the questionnaires, thus any missing data were simply individual responses. In these cases, for each individual with missing data, a mean score for that particular scale was calculated and this mean score was inserted.

Beliefs About Students' Intelligence Scale

Following the principle component analysis, a modified 27-item instrument, the Beliefs about Students' Intelligence Scale, was created to measure teachers' implicit theories of intelligence (see Table 1). Analyses were based on the three subscales: Cognitive, Verbal, and Social. The new measure had high internal consistency for each subscale (α ranged from .80 to .94) and for the total measure ($\alpha = .94$) with this sample.

Overall, items on the Cognitive subscale were rated highest ($M = 3.7$, $SD = .77$), followed by the Verbal subscale ($M = 3.2$, $SD = .81$), and items on the Social subscale were rated as least important ($M = 2.8$, $SD = .89$). The Cognitive subscale was rated significantly higher when compared to the Verbal subscale, $t(141) = 8.18$, $p < .001$, and to the Social subscale, $t(140) = 13.15$, $p < .001$. There was also a statistically significant difference between the Verbal subscale and the Social subscale, $t(140) = 7.32$, $p < .001$.

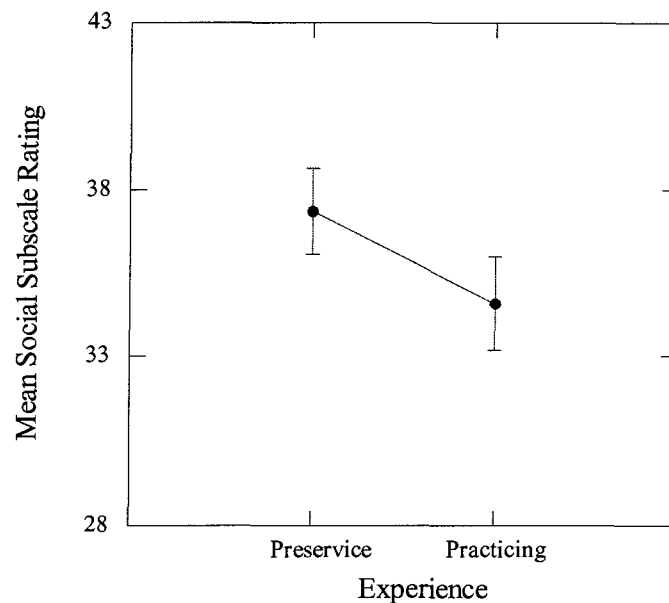
In order to determine if groups' implicit theories of intelligence differed, a series of 2 (level: elementary vs. secondary) \times 2 (experience: preservice vs. practicing) ANOVAs were conducted. For the *Cognitive* subscale, results of the analysis of variance revealed no significant main effect based on level ($F_{1,140} = 0.93$, $p = .34$) or experience ($F_{1,140} = 2.01$, $p = .16$), nor was a significant interaction between the two detected ($F_{1,140} = 0$, $p = .99$). Similarly, the analysis of the *Verbal* subscale revealed no statistically significant findings for level ($F_{1,141} = 0$, $p = .99$), experience ($F_{1,141} = 0.05$, $p = .82$), or an interaction of the two ($F_{1,141} = 0.22$, $p = .64$). On the *Social* subscale, however, a significant main effect for experience ($F_{1,140} = 6.61$, $p < .02$) was found, but not for level ($F_{1,140} = 2.10$, $p = .15$) or for the interaction ($F_{1,140} = 0.91$, $p = .34$). As illustrated in Figure 2, preservice teachers ($M = 38.74$, $SD = 10.65$) rated items on the Social subscale significantly higher in importance than practicing teachers ($M = 33.52$, $SD = 11.96$).

Sex, Age, and Years of Experience

Along with group differences relative to teacher school-level, comparing elementary and secondary teachers, and experience, preservice versus practicing teachers, sex, age, and years of teaching/practicum experience were also considered. No differences were identified between males and females on the Cognitive [$t(138) = -.40$, p

= .69], Verbal [$t(139) = .29, p = .77$], or Social [$t(138) = .03, p = .98$] subscales. There was also no statistically significant relationship found between age and the Cognitive, Verbal, or Social subscales of the BASIS (see Table 3).

Figure 2. Preservice and practicing teachers mean scores on the BASIS - Social Subscale (5-point scale with 13 items)



Years of teaching experience was investigated separately for preservice and practicing teachers. All of the preservice teachers had some practicum experience; years of teaching/practicum experience was therefore calculated as a cumulative total of the length (portion of a year) of their practicum experiences. For the preservice teachers, no statistically significant correlation was found between amount of practicum experience and the Cognitive or Verbal subscales. However, a statistically significant positive correlation was found between years of teaching/practicum experience (amount of

practicum experience) and the Social subscale (see Table 3). Preservice teachers with more practicum experience are more likely to rate social skills as characteristic of intelligence. For practicing teachers, as shown in Table 3, no statistically significant correlations were found between years of teaching experience and the three subscales of the BASIS.

Table 3

Correlations between Implicit Theories of Intelligence and Age and Years of Experience

BASIS Subscale	Age	Years of Teaching/Practicum Experience	
		Preservice	Practicing
Cognitive	.02	-.05	.15
Verbal	.13	-.12	.22
Social	-.12	.24*	.14

* $p < .05$

Beliefs About the Stability of Intelligence Questionnaire

This three-item measure had high internal consistency with this sample, with a Cronbach's alpha of .97. Consistent with the methods employed by Dweck et al. (1995), participants were dichotomized as entity or incremental theorists based on their mean score, with entity theorists scoring 3.0 or below and incremental theorists scoring 4.0 or above. As explained previously, Dweck et al. recommend removing those respondents

with a score between 3.0 and 4.0 because these individuals do not have a clear theory. Of the 142 respondents, 13 scored between 3.0 and 4.0, meaning that 9.15% did not have a clear theory regarding the stability of intelligence and hence were removed from further analyses. Dweck et al. state that typically 15% of individuals are excluded based on this criterion. Thus, fewer participants in this study were excluded in comparison to typical studies. Of the 13 respondents excluded from further analyses, 4 were elementary and 9 were secondary teachers; 6 were preservice and 7 were practicing teachers.

Overall, significantly more of the participants were identified as incremental theorists (73.6%) than entity theorists (26.4%); [$\chi^2(1, n = 129) = 28.8, p < .01$]. Of the *elementary* teachers (both preservice and practicing), 77.5% were incremental and 22.5% were entity theorists; [$\chi^2(1, n = 71) = 21.4, p < .01$]. Among *secondary* teachers, 69% were incremental theorists and 31% were entity; [$\chi^2(1, n = 58) = 8.34, p < .01$]. *Preservice* teachers yielded 86.2% incremental and 13.8% entity theorists [$\chi^2(1, n = 65) = 32.98, p < .01$]. Practicing teachers had the highest percentage of entity theorists and were the only group that did not have a statistically significant higher number of incremental theorists when compared to entity theorists; sixty-one percent of *practicing* teachers were identified as incremental theorists, whereas 39% were entity theorists. Table 4 illustrates the number of individuals that were incremental and entity theorists relative to their experience (preservice vs. practicing) and school-level (elementary vs. secondary).

Table 4

Number of Entity and Incremental Theorists Relative to Experience (Preservice vs. Practicing) and School-Level (Elementary vs. Secondary)

<i>Theory</i>	<i>Experience</i>		<i>Total</i>	<i>Level</i>		<i>Total</i>
	<i>Preservice</i>	<i>Practicing</i>		<i>Elementary</i>	<i>Secondary</i>	
Entity	9	25	34	16	18	34
	(7.0)	(19.4)	(26.4)	(12.4)	(14.0)	(26.4)
Incremental	56	39	95	55	40	95
	(43.4)	(30.2)	(73.6)	(42.6)	(31.0)	(73.6)
Total	65	64	129	71	58	129
	(50.4)	(49.6)	(100)	(55.0)	(45.0)	(100)

Note. Percentage of total sample in brackets

Separate chi-square analyses were computed for entity and incremental theorists to determine if there were significant differences in relation to teaching experience and teacher school-level. The chi-square analysis for the entity theorists yielded a significant effect for experience [$\chi^2(1, n = 34) = 7.52, p < .01$], combining elementary and secondary teachers; of the 34 entity theorists, there were significantly more practicing teachers ($n = 25$) than preservice teachers ($n = 9$). Among entity theorists, no statistically significant effect was found for school-level (elementary vs. secondary) [$\chi^2(1, n = 34) = 0.18, p > .05$], combining preservice and practicing teachers. The chi-square analyses for the incremental theorists yielded no significant effect for experience [$\chi^2(1, n = 95) = 3.04, p > .05$] or for level [$\chi^2(1, n = 95) = 2.36, p > .05$].

Sex, Age, and Years of Experience

The impacts of sex, age, and years of teaching/practicum experience on beliefs about the stability of intelligence were considered. First, to determine if there were a proportionate number of males and females that were incremental and entity theorists, two chi-square analyses were performed. Of the 34 entity theorists, 10 were male and 24 were female; given that 21% of the participants in this study were male and 79% were female, there were a statistically proportionate number of male and female entity theorists [$\chi^2(1, n = 34) = 1.32, p > .05$]. Of the 95 incremental theorists, 19 were male and 76 were female. Again, this was statistically proportionate given the number of male and female participants [$\chi^2(1, n = 95) = .07, p > .05$].

As illustrated in Table 5, there was a low but statistically significant negative correlation between age and scores on the BASIQ. It appears that as the age of preservice and inservice teachers increases, they are more likely to believe that intelligence is a stable entity (their scores on the BASIQ decrease). Interestingly, there were no statistically significant correlations found between years of teaching/practicum experience and scores on the BASIQ, for both preservice and practicing teachers (see Table 5).

Table 5

Correlations between Beliefs About the Stability of Intelligence and Age and Years of Experience

	Age	Years of Teaching/Practicum Experience	
		Preservice	Practicing
BASIQ Score	-.20*	-.06	-.06

* $p < .02$

Ohio State Teacher Efficacy Scale

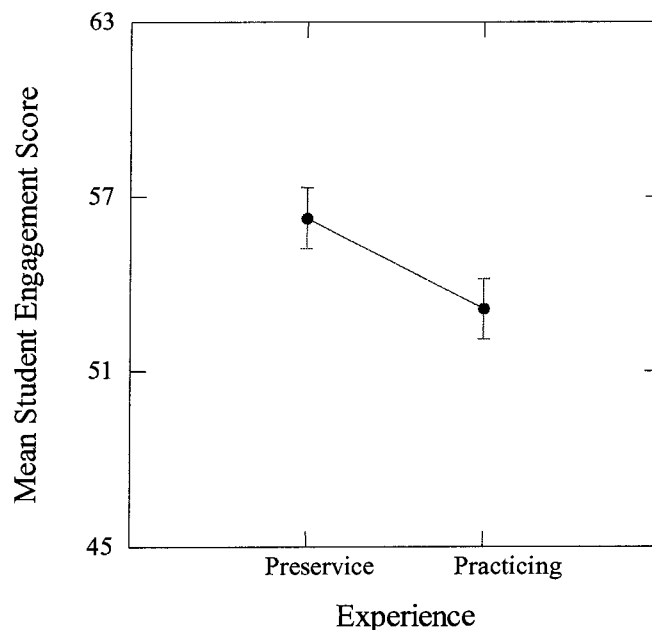
As indicated earlier, the original 24-item OSTES developed by Tschannen-Moran and Woolfolk Hoy (2001) was modified to a 19-item version (see Table 2). High internal consistency was found for each of the three subscales (α ranged from .88 to .92) and for the total scale ($\alpha = .95$) of this new measure with this sample. Overall, the participants scored relatively high on the OSTES. For the total scale, respondents had a mean score of 7.16 ($SD = 1.02$). Recall that the scale ranges from 1 (nothing) to 9 (a great deal), with a score of 5 indicating the teacher believes they have “some influence” and a score of 7 indicating “quite a bit”.

Separate 2 x 2 ANOVAs were conducted to determine the effects of teacher school level (elementary vs. secondary) and teacher experience (preservice vs. practicing) relative to teacher efficacy. For the first subscale, Instructional Strategies, groups did not differ in respect to their level ($F_{1,142} = 0.003, p = .96$) or experience ($F_{1,142} = 0.75, p = .39$); the interaction of level and experience ($F_{1,142} = 1.39, p = .24$) was also statistically

nonsignificant for this subscale. Analysis of variance on the second subscale, Classroom Management, also revealed no significant main effect for level ($F_{1,142} = 0.08, p = .78$), experience ($F_{1,142} = 0.005, p = .94$), or level \times experience ($F_{1,142} = 0.04, p = .53$).

However, a significant main effect was identified on the third subscale, Student Engagement, as a function of experience ($F_{1,142} = 4.48, p < .05$), but not relative to level ($F_{1,142} = 0.21, p = .65$), or the interaction ($F_{1,142} = 0.09, p = .77$). As illustrated in Figure 3, preservice teachers ($M = 56.28, SD = 6.86$) had significantly higher teacher efficacy on the Student Engagement subscale when compared to practicing teachers ($M = 53.16, SD = 10.24$). For the total scale, results of the ANOVA were statistically nonsignificant for level ($F_{1,142} = 0.39, p = .53$), experience ($F_{1,142} = 0.59, p = .44$), and the interaction of the two ($F_{1,142} = 0.58, p = .45$).

Figure 3. Preservice and practicing teachers mean scores on the OSTES – Student Engagement Subscales (9-point scale with 8 items)



Sex, Age, and Years of Experience

The impact of sex, age, and years of teaching experience on teacher efficacy was explored. No differences were detected between males and females on the Instructional Strategies [$t(140) = -.74, p = .46$], Classroom Management [$t(140) = .33, p = .74$], or Student Engagement [$t(140) = 1.10, p = .28$] subscales of the OSTES. Moreover, no statistically significant differences were detected between the sexes on the total score of the OSTES [$t(140) = .39, p = .70$]. There was also no statistically significant relationship found between age and teacher efficacy, as measured by the three subscales of the OSTES and the total score (see Table 6).

Table 6

Correlations between Teacher Efficacy and Age and Years of Experience

OSTES Subscale	Age	Years of Teaching/Practicum Experience	
		Preservice	Practicing
Instructional Strategies	.03	-.26*	-.01
Classroom Management	-.11	.09	-.12
Student Engagement	-.16	-.07	.01
Total Scale	-.10	-.08	-.05

* $p < .03$

The impact of years of teaching or practicum experience was analyzed separately for preservice and practicing teachers. For the preservice teachers, a statistically significant negative correlation was found between amount of practicum experience and the Instructional Strategies efficacy subscale score, as indicated in Table 6. As preservice teachers gain more practicum experience, their efficacy for Instructional Strategies decreases. In contrast, a statistically significant correlation was not found between amount of practicum experience and the total score, the Classroom Management or the Student Engagement subscales for the preservice teachers (see Table 6). For practicing teachers, no statistically significant correlations were found between the three subscales or the total score of the OSTES and years of teaching experience, as outlined in Table 6.

Relationship Between Measures

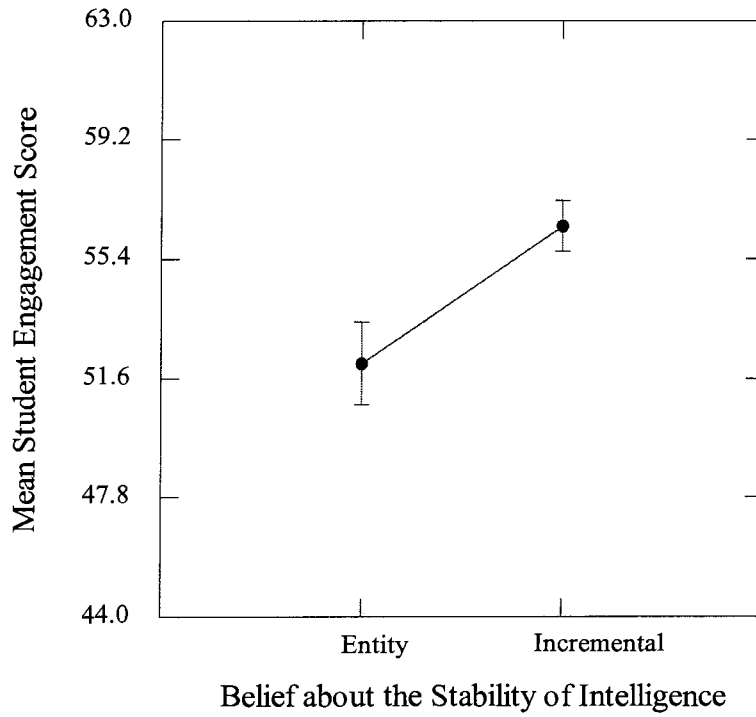
Beliefs About the Stability of Intelligence Questionnaire and Beliefs About Students' Intelligence Scale

To determine if entity theorists differed from incremental theorists on their responses to the BASIS, a series of two-tailed t-tests were performed. For the Cognitive subscale, no statistically significant difference was found between incremental and entity theorists, $t(125) = 1.46, p = .15$. Similarly, no statistically significant difference was detected between the two groups for the Verbal subscale, $t(126) = 1.24, p = .22$. Again, for the Social subscale, no difference was detected between entity and incremental theorists, $t(125) = -0.10, p = .92$. Thus, entity and incremental theorists appear to have similar implicit theories of intelligence as no significant differences were detected on the Cognitive, Verbal, or Social subscales.

Beliefs About the Stability of Intelligence Questionnaire and Ohio State Teacher Efficacy Scale

This final section is devoted to the differences between entity and incremental theorists' levels of teacher efficacy. To determine if entity theorists differed from incremental theorists on their levels of teacher efficacy, a series of one-tailed t-tests were performed; it was predicted that entity theorists would have lower teacher efficacy when compared to incremental theorists. For Instructional Strategies, the first subscale of the OSTES, no statistically significant difference was detected between the two groups, $t(127) = -0.21, p = .42$. Similarly, no group differences were found for the second subscale, Classroom Management, $t(127) = -0.18, p = .45$. Conversely, a significant difference was identified between the two groups on the Student Engagement subscale, $t(127) = -2.29, p < .02$. Incremental theorists ($M = 55.08, SD = 8.78$) scored significantly higher on the Student Engagement subscale when compared to entity theorists ($M = 55.99, SD = 8.47$) (see Figure 4). For the total score on the OSTES, no statistically reliable differences were detected between the two groups, $t(127) = -1.12, p = .14$.

Figure 4. Entity and incremental theorists mean scores on the OSTES – Student Engagement Subscale (9-point scale with 8 items)



Summary of Significant Findings

Teachers' responses on the Beliefs About Students' Intelligence Scale indicate that they believe cognitive traits are the most important factor used to describe an intelligent student ($M = 3.7$, $SD = .77$). Verbal traits were rated as the second most important ($M = 3.2$, $SD = .81$), and social traits were rated as least important ($M = 2.8$, $SD = .89$). When compared to practicing teachers, preservice teachers rated social traits as being more indicative of an intelligent student ($F_{1,140} = 6.61$, $p < .02$). Also, as preservice teachers gained more practicum experience, they were more likely to rate social skills as important in describing an intelligent student ($r = .24$, $p < .05$).

As for the Beliefs About the Stability of Intelligence Questionnaire, most teachers (73.6%) believe intelligence is modifiable. However, as teachers' age increases, they are more likely to believe intelligence is stable ($r = .20$, $p < .02$). In addition, of the teachers who believe intelligence is stable, significantly more of them were practicing teachers ($n = 25$) than preservice teachers ($n = 9$), [$\chi^2(1, n = 34) = 7.52$, $p < .01$].

Regarding the Ohio State Teacher Efficacy Scale, overall, the participants had high levels of teacher efficacy ($M = 7.16$, $SD = 1.02$). Compared to practicing teachers, preservice teachers had high levels of efficacy for student engagement ($F_{1,142} = 4.48$, $p < .05$). Also, as preservice teachers gain practicum experience, efficacy for instructional strategies decreases ($r = -.26$, $p < .03$).

Finally, teachers who believe intelligence is malleable tended to have higher levels of efficacy for student engagement, $t(127) = -2.29$, $p < .02$. Sex and teacher school-level (elementary vs. secondary) were not significantly related to differences among groups.

CHAPTER FIVE

DISCUSSION

This chapter summarizes the results of the study and provides an interpretation of the findings based upon previous research in this field. The strengths, shortcomings, and implications of the results are included throughout each section. The first section is composed of a discussion of findings related to teachers' implicit theories of intelligence. The second section covers beliefs about the stability of intelligence. The third section is devoted to teacher efficacy. The fourth section contains a discussion of the relationship between teachers' beliefs about the stability of intelligence and implicit theories of intelligence. The final section discusses the relationship between teachers' beliefs about the stability of intelligence and teacher efficacy. The chapter concludes with directions for future research.

Implicit Theories of Intelligence

As predicted, preservice and practicing teachers rated cognitive reasoning skills as being the most important characteristic of an ideally intelligent student. The participants rated verbal traits as the second most important category, followed by social skills. These findings are consistent with the findings of Fry (1984), as well as Lynott and Woolfolk (1994). Thus, it appears that cognitive/reasoning skills dominate teachers' conceptions of students' intelligence. Teachers rated traits such as "analyzes major points in the problem", "reasons well", and "thinks clearly and logically" as the most important characteristics of an intelligent student.

No differences were identified between preservice and inservice teachers on the cognitive or verbal importance ratings. However, preservice teachers, when compared to practicing teachers, rated social traits as being more important characteristics of an intelligent student. Although this finding was not expected, one can speculate as to why preservice teachers would stress social traits more than practicing teachers. First, preservice teachers may be more influenced by societal norms related to implicit theories of intelligence than practicing teachers. Recall that in the Sternberg et al. (1981) study, layperson's implicit theories of intelligence had a strong focus on social competence, which Sternberg et al. found surprising given the relatively small role social aptitude played in formal theories of intelligence at that time. Preservice teachers are just beginning their careers in education and therefore may have conceptions of intelligence similar to "laypersons".

Second, preservice teachers are coming from the perspective of a student, which may impact their beliefs about intelligence. As students, preservice teachers are exposed to recent theories about intelligence, which have tended to place more emphasis on social aspects than previous theories, especially within the area of education. Specifically, Gardner's (1983) theory of multiple intelligences has been taught in teacher education programs within the last two decades, which has likely influenced preservice teachers' conceptions of intelligence. This theory proposed seven forms of intelligence: linguistic, logical-mathematical, spatial, musical, bodily-kinesthetic, interpersonal, and intrapersonal. One can see that this theory of intelligence emphasizes social dimensions more so than traditional theories of intelligence. Hence, preservice teachers exposed to such a theory are perhaps influenced by the emphasis on social traits. Moreover, as

students, preservice teachers may be preoccupied with their own social standing and therefore place more value on social skills than practicing teachers.

Third, practicing teachers, with their added experience working with children, may be more likely to differentiate the “good conduct student” from the intelligent student (Lynott & Woolfolk, 1994). Preservice teachers, by emphasizing social traits in their conceptions of intelligence, may view students who meet teacher expectations as intelligent. Students who are “friendly” and “diligent and anxious to please” may be viewed as intelligent by a novice teacher because these students are easier to teach. Practicing teachers may also be more effective at classroom management and therefore focus less on the social skills of their students. Practicing teachers are likely more adept at differentiating the students who are able to act in accordance with teacher expectations from those students who possess high levels of intelligence. In the next section, this point will be clarified in greater detail by exploring the impact of years of experience.

Fourth, teacher education students may be more likely to believe traits such as “is sensitive to other’s needs”, “helpful”, and “fair in dealing with others” are important dimensions of children’s intelligence because these are traits that can be observed. Although, participants were asked to rate a prototypically intelligent student, they were likely “picturing” such a student while completing the questionnaire. Preservice teachers do not have as much experience as practicing teachers evaluating students’ academic (reasoning and verbal) abilities. Stereotypes of intelligence have been found for social behaviours; Murphy, Hall, and Smith Lebeau (2001) found that prototypic intelligent individuals are believed to use less hesitation while speaking, have quicker rates of speech, have a steady eye-gaze, and have an upright posture. Hence, visible, social cues

have been associated with stereotypes of intelligence. Preservice teachers may rely more on these visual, social cues to evaluate students' intelligence. Preservice teachers have limited modes of evaluation that they can use to assess students' intelligence and may therefore focus on a wider range of traits. Practicing teachers, on the other hand, are accustomed to using forms of evaluation based on reasoning and verbal ability, such as written tests and prior report card grades and thus may be more likely to stress such qualities in their conceptions of intelligence.

Finally, there were more females in the preservice sample (86% females) in comparison to the practicing teacher sample (72% females) and it is possible that females place more value on social traits. This, of course, is simply a speculation and would need to be examined with further research into female teachers' beliefs about social skills. Gender differences related to intelligence do exist; for example, studies addressing estimates of intelligence have found that females consistently rate their intelligence lower than males, and both males and females estimate male relatives' (fathers, brothers, grandfathers, etc.) intelligence as higher than female relatives'; this has been found in several studies with different populations (see Furnham, 2001, for a review). Furnham (2001) speculates that these gender differences in estimates of intelligence may be related to value people place on social traits in their conceptions of intelligence. Thus, gender differences in teachers' conceptions of intelligence may be worth investigating further. Although, as discussed in the next section, in this study no gender differences were found in teacher's implicit theories of intelligence.

There was no evidence to support the second hypothesis that elementary-school teachers would emphasize social traits in their conceptions of students' intelligence when

compared to secondary teachers. In contrast to Fry's (1984) findings, elementary teachers were no more likely than secondary teachers to stress social skills in their conceptions of intelligence. There are several explanations for this inconsistency of findings. Most importantly, Fry's conclusions were based on analysis of variance conducted on individual items, whereas the present study utilized scale scores, which minimized the potential for Type I errors. Of the 17 items that Fry reported to have a significant main effect, only 2 items were significant at $p < .001$, the alpha required for statistical significance if one takes into account the number of statistical tests conducted. These two items were both on the cognitive subscale ("has clear-cut goals" and "thinks deeply about issues"). Further research is needed to clarify if elementary-school teachers have different conceptions of intelligence when compared to secondary teachers.

Second, it is possible that the chances of finding significant results would increase if the teachers had been broken down further based on the grades they taught. Due to the small sample size, it was not possible to categorize the teachers into more than the two groups, elementary and secondary. The original intent was to sort teachers into four groups: primary elementary (Kindergarten to Grade 3), intermediate elementary (Grades 4-6), junior high (Grades 7-9), and senior high (Grades 10-12). Perhaps primary elementary school teachers would stress social skills as being indicative of an intelligent student if compared to senior high school teachers. Siegler and Richards (1982), in fact, found that conceptions of adults' intelligence differed substantially from conceptions of children's intelligence. Cognitive traits such as problem solving and reasoning became increasingly important with age when undergraduate students were asked to list the traits of an intelligent 6-month old, 2-year old, 10-year old, and adult. Hence, if one were to

compare Kindergarten teachers to Grade 12 teachers, it is possible that one would find differences in their conceptions of intelligence.

Third, the present sample has some potential biases, which could have impacted the results. The representation of both practicing and preservice teachers in the sample was restricted by the relatively low return rate (approximately 34%) of the questionnaires. Preservice and practicing teachers who chose to return the questionnaires had characteristics that set them apart from the general population of teachers and teacher education students. For example, this sample of teachers was more educated than the provincial average. Thirty-eight percent of practicing teachers in this sample had Master's degrees, compared to only 22.9% of teachers provincially (British Columbia Ministry of Education, 2002). It is likely that teachers who volunteered to participate had more interest in intelligence, potentially impacting the findings.

Although several possible explanations have been given to account for why the second hypothesis was not supported, it is of course possible that elementary and secondary teachers actually have similar conceptions of intelligence. Elementary and secondary teachers are exposed to similar schooling and therefore it is reasonable that they would have similar theories of intelligence. Also, teachers have implicit theories of intelligence prior to ever becoming a teacher and these theories may remain stable once they become elementary or secondary teachers. The stability of individuals' implicit theories of intelligence may be worth investigating to determine if implicit theories remain constant once they are formed.

Sex, Age, and Years of Experience

Characteristics of teachers did not play much of a role in their implicit theories of intelligence. Males and females appear to have similar conceptions of children's intelligence. There were also no differences based on age for implicit theories of intelligence. As stated in the third hypothesis, based on the results of Lynott and Woolfolk (1994), no differences were expected relative to sex or age and hence this part of the third hypothesis was supported. Although no significant differences were found between males and females, it may be an avenue of research to explore further. There were far fewer males ($n = 30$) than females ($n = 114$) in the study so there is the possibility that a larger, equally representative sample size might have yielded significant results.

Regarding the impact of years of experience on implicit theories of intelligence, for practicing teachers, no relationship was found between their implicit theories of intelligence and their years of teaching experience. In contrast, there were significant findings for preservice teachers. Prospective teachers who had more practicum experience, were more likely to rate social skills as being important in describing an intelligent student ($r = .24, p < .05$). As noted earlier, this could be due to a lack of differentiation between the "good conduct student" (one with good social skills) and the intelligent student (Lynott & Woolfolk, 1994). As preservice teachers enter the classroom and encounter difficulties with classroom management, they may recognize the importance of students' social skills. It is likely that in their early teaching experiences, teacher education students appreciate children with effective social skills and thus place higher value on this trait than they did previously.

Beliefs About the Stability of Intelligence

As predicted, the majority (73.6%) of teachers in this study were incremental theorists. In fact, among elementary, secondary, and preservice teachers, there were significantly more incremental theorists than entity theorists. Overall, teachers appear to be more likely to believe intelligence is a modifiable attribute, not a trait that remains constant. As expected, no differences were found between elementary and secondary teachers.

There were some significant trends identified for practicing teachers. Practicing teachers were the only group of teachers who did not have a statistically significant higher percentage of incremental theorists than entity theorists. Practicing teachers also had a higher percentage of entity theorists (39.0%) compared to preservice teachers (13.8%). As predicted, significantly more practicing teachers than preservice teachers were identified as entity theorists. It is difficult to compare practicing and preservice teachers without including the affect of age and years of experience. Therefore, the implications and possible explanations related to these findings will be addressed in the next section, which is devoted to the impact of sex, age, and years of experience. The remainder of this section will concentrate on measurement limitations and theoretical implications related to beliefs about the stability of intelligence.

The Beliefs About the Stability of Intelligence Questionnaire has some noteworthy drawbacks. One obvious critique is that it has only three items. Longer versions have been developed, but as indicated previously, Dweck recommended use of the three-item version for teachers (Dweck, personal communication, May 10, 2002). Dweck explains the reasoning behind so few items, “only three items are used because

implicit theory is a construct with a simple unitary theme, and repeatedly rephrasing the same idea may lead to confusion and boredom on the part of the respondents” (Dweck, Chiu, & Hong, 1995, p. 269). There are a limited number of ways you can ask the question, ‘do you believe intelligence is stable or not’. Hong et al. (1999) state that measures that include incremental items tend to elicit a strong tendency toward agreement with these statements suggesting that an incremental perspective may be more compelling and socially desirable than the entity theory.

Another measurement issue raised by Hong et al. (1999) is whether disagreement with the entity theory statements does in fact represent an incremental theory of intelligence. According to Dweck, Chui, and Hong (1995), in an unpublished “study by Henderson (1990), respondents were given the implicit theory of intelligence measure and asked to explain their answers. Those who disagreed with the entity statements gave clear incremental theory justifications for their responses” (p. 290). Hence, it would appear that the simple three-item scale is able to capture the construct it is intended to measure.

Anderson (1995) questions whether individuals utilize different theories depending on the context and are thus both entity and incremental theorists simultaneously. What about those who believe intelligence has a stable, genetic component but that it can also increase somewhat based on environmental influences? It is well documented, and most experts in the area of intelligence would agree, that both genes and environment significantly contribute to the development of intelligence (Neisser et al., 1996). Individuals who believe intelligence is both stable and modifiable would not be able to express this view when responding to the forced-choice format of the Beliefs About the Stability of Intelligence Questionnaire. Dweck would argue that

individuals who believe intelligence is both stable and modifiable would lean either toward an entity or an incremental view of intelligence.

Are these middle-ground individuals the respondents who were dropped from the analyses altogether? Recall that 9.15 % of the participants were removed from the analyses for responding with an “unclear” theory of intelligence; Dweck has found that typically about 15% are dropped from further analysis (Dweck, Chiu, & Hong, 1995). The three items on the BASIQ essentially make the same statement, “intelligence is stable”, to which respondents must either agree with or disagree with (the 6-point scale is anchored with the notations: 1: Strongly Agree; 2: Agree; 3: Mostly Agree; 4: Mostly Disagree; 5: Disagree; and 6: Strongly Disagree). Individuals with a mean score between 3.0 and 4.0 are considered to have an unclear theory of intelligence because they agreed with some items and disagreed with others.

Nonetheless, some individuals may consciously choose to agree with some questions and disagree with others because they believe intelligence is both stable and modifiable. Conversely, individuals with an “unclear” theory may have simply not read the items carefully and should therefore be excluded from further analyses, as Dweck would suggest. A qualitative study would be useful to determine respondents' interpretations of the measure as they complete it. The fact that individuals with both entity and incremental beliefs cannot be represented by the BASIQ is a limitation. However, it may also be true that Dweck is correct in assuming that the majority of people lean toward one theory or another, this is another avenue for future research.

Although it may be methodologically convenient to dichotomize participants into entity and incremental categories, there are definite drawbacks to dividing respondents

into two mutually exclusive groups, as it leaves no room for examining those who are not extreme in their views. Dweck counters such criticism by stating, "because only 15% of the participants are excluded, the two theory groups do not represent extreme groups" (Dweck, Chiu, & Hong, 1995, p. 269). It seems clear that Dweck is aware of the critiques of the three-item scale but this is the only statement she offers in defense of the dichotomizing nature of the measure. Although the measure has limitations, it still appears to have the power to capture beliefs about the stability of intelligence, or what Dweck refers to as the implicit theory of intelligence construct.

Beliefs about the stability of intelligence are theoretically related to beliefs in the potential for change. The importance of teachers' beliefs with regard to the potential for change were recognized early in teacher education research; Brophy and Good (1974) stated:

Teachers who believe that IQ or achievement data represent accurate and unchanging characteristics of the student are likely to adapt their teaching to what they believe the student can handle and are unlikely to experiment with methods to get him (or her) to do better, on the grounds that such attempts would be fruitless. In contrast, teachers who see IQ and achievement tests as indications of the student's present performance, which are subject to change, rather than as measures of permanent characteristics, are more likely to experiment with different methods and to persist in trying to get the student to master the material. (p. 124)

This point is critical to the potential implications of teachers' beliefs about the stability of intelligence. Incremental theorists believe that all students have the potential to increase

their competence and would therefore encourage all students to succeed; they would also persist with students who are encountering difficulties. Entity theorists, on the other hand, may not recognize all students' potential and thus not encourage them to succeed to the same extent that incremental theorists would. The potential impact of this construct on how teachers approach their role is immense. Surprisingly, and unfortunately, although research related to Dweck's model has been extensive, it has not been widely applied to teachers.

A related implication regarding teachers' beliefs about the stability of intelligence is the relationship between their beliefs and the goals they create for their students and themselves. Recall that in Dweck's model, incremental beliefs about intelligence are the more adaptive pattern. Hence, it is a positive finding that the majority of teachers are incremental theorists. Given that research has shown that beliefs about the stability of intelligence affect goal orientations and behaviour patterns, it is likely that teachers' goals are impacted by their theory of intelligence.

Teachers with an entity theory may be creating a learning environment centered upon performance goals. Entity theorists, with their belief that intelligence is a stable trait, are driven to document how much intelligence they possess (Dweck & Leggett, 1988). Performance goals involve a concern with gaining positive judgments and avoiding negative assessments. Performance goals can have a negative impact on motivation because the focus is on proving one's intelligence and avoiding looking unintelligent, as opposed to focusing on learning. Performance goals are associated with a helpless pattern, in which challenges are avoided and performance deteriorates when obstacles are encountered. Teachers holding an entity theory of intelligence potentially

encourage performance goals in the students they teach by emphasizing the stability of intelligence, expecting students to demonstrate their ability, and defining success in terms of social comparison and who has the “right answer” (Stipek, 1996).

Learning goals are contrasted with performance goals; incremental theorists have been found to predominantly focus on increasing their competence, which is the central feature of learning goals (Dweck, 1986). Incremental theorists are less focused on documenting their intelligence and more concerned with developing it. Learning goals are associated with a mastery-orientation, which involves seeking challenges and a willingness to sustain engagement even when encountering potential failure (Dweck & Leggett, 1988). Teachers with an incremental view of intelligence would likely convey the message that learning is rewarding and valuable, and would define success in terms of individual improvement rather than social comparison. A classroom centered upon learning goals would have a positive impact on students' motivation (Stipek, 1996). Further research is needed to clarify the relationship between teachers' implicit theories of intelligence, beliefs about the stability of intelligence, and goals.

A final implication is that teachers' beliefs probably influence the beliefs of their students, thus impacting their motivation. For example, Mueller and Dweck (1998) found that praising children's intelligence had negative consequences for their achievement motivation. After failure, children praised for *effort* displayed more task persistence, more task enjoyment, less low-ability attributions, and better task-performance than those praised for intelligence. Moreover, children praised for effort perceived intelligence to be a modifiable trait, whereas those praised for intelligence perceived it to be stable.

Sex, Age, and Years of Experience

What is the impact of sex and age on beliefs about the stability of intelligence? As predicted, males and females did not differ in their beliefs about the stability of intelligence. A low but significant correlation was, however, found for age; as teachers' age increases, so does the likelihood of being an entity theorist ($r = -.20, p < .02$). This is consistent with the fact that more practicing teachers than preservice teachers were entity theorists. Younger teachers, as well as preservice teachers, appear to be more flexible in their beliefs about intelligence and perhaps more optimistic about their potential to influence student learning and competence. Older teachers may be more cynical about student's potential for change and their own ability to impact students' competence. This notion will be explored further in the section addressing the relationship between beliefs about the stability of intelligence and teacher efficacy.

Why is it that older teachers and practicing teachers are more likely to be entity theorists? One would think that older teachers and practicing teachers are more likely to be entity theorists because of their added experience as teachers. Based on the results related to experience, however, this is not a plausible explanation. So, what role does amount of teaching experience play? Surprisingly, no statistically significant trends were identified in relation to years of experience for either preservice or practicing teachers. This is in contrast to what was expected. Given that as age increases so does the likelihood of being an entity theorist, and that more practicing teachers than preservice teachers were entity theorists, it is interesting that experience was not found to be a significant variable.

Given that teaching experience does not account for the finding that older teachers and practicing teachers are more likely to be entity theorists, a cohort effect is the most reasonable explanation. Preservice teachers of all ages, as well as younger teachers are recently exposed to theories related to intelligence, these theories likely focus on a more incremental view than theories previous cohorts of preservice teachers would have been taught. At the same time, cultural norms have probably changed regarding beliefs about intelligence, leaning toward a more incremental perspective. Younger people, and teacher education students, would be more influenced by cultural norm shifts than older and practicing teachers.

There are several other explanations for why older and practicing teachers are more likely to believe intelligence is stable. First, since experience is not a significant contributing factor, teachers will not “become” entity theorists with added teaching experience. Nevertheless, it is possible that teacher education students believe intelligence is modifiable but once they encounter the realities of the classroom, they shift toward a trait view of intelligence. This would explain why more practicing teachers than preservice teachers are entity theorists and why years of experience do not play a significant role. It could be that the transition from being a teacher education student to becoming a practicing teaching is the key factor.

Second, the generational difference in beliefs about the stability of intelligence, with older teachers being more likely to believe intelligence is stable could be the result of added *life* experiences, not necessarily teaching experiences, which change one's beliefs about the nature of intelligence.

Third, perhaps older teachers, and practicing teachers, are preoccupied with their own intellectual performance and have a desire for it to remain constant. Berg and Sternberg (1992) found that the majority of their participants (63%), ranging in age from 17 to 83, believed that certain intellectual abilities, mainly memory, decline with age. It is possible that older, practicing teachers believe intelligence is stable because it is a more optimistic view of their own intellectual capacity.

Finally, Lynott and Woolfolk (1994) suggest that younger people tend to be more idealistic than older people and that younger people would not accept a stable notion of intelligence because of the implied limitations it places on one's intellectual capacity. Longitudinal studies are required to determine the developmental contributions to beliefs about the stability of intelligence. Will today's younger teachers and preservice teachers remain incremental theorists throughout their careers?

Teacher Efficacy

Teacher efficacy refers to teachers' beliefs about how much influence they have over their student's ability to learn (Ashton, 1985; Guskey & Passaro, 1994). Overall, both preservice ($M = 7.16$, $SD = .79$) and practicing ($M = 7.01$, $SD = 1.22$) teachers had high levels of teacher efficacy. The Ohio State Teacher Efficacy Scale (OSTES) contains a 9-point scale; a score of seven is anchored with the notation "quite a bit". Hence, this sample of teachers feel they have "quite a bit" of influence over instructional strategies, classroom management, and student engagement, the three subscales measured by the OSTES. Tschannen-Moran and Woolfolk Hoy (2001) found that preservice ($n = 103$) and inservice ($n = 255$) teachers in their sample had a mean teacher efficacy score of 7.1 ($SD = .94$). Thus, participants in the present study scored similarly to another sample of

preservice and practicing teachers. Given the benefits associated with high levels of teacher efficacy, such as positive student achievement (Ashton & Webb, 1986) and motivation (Midgley, Feldlaufer, & Eccles, 1989), the relatively high levels of teacher efficacy found in this study are a positive discovery.

Elementary teachers and secondary teachers had similar levels of teacher efficacy, and for the most part, preservice and practicing teachers tended to have the same levels of teacher efficacy. There was one exception, however; on the Student Engagement subscale, preservice teachers reported higher efficacy than practicing teachers. It appears that teacher-education students believe that they have the ability to engage students more effectively than practicing teachers. One could argue that practicing teachers are more realistic, whereas preservice teachers have unrealistic expectations about their ability to engage students. It is also possible that preservice teachers, with their enthusiasm and exposure to new theories, believe they have the ability to engage students better than practicing teachers who are perceived to be out-dated in their teaching methods.

Preservice teachers' sense of efficacy may be qualitatively different from practicing teachers'. Preservice teachers, with little or no practical experience teaching, tend to base their efficacy beliefs on their expectations of what teaching will entail. In contrast, practicing teachers base their beliefs primarily on knowledge gained from actual experience in the classroom. Although practicing teachers and preservice teachers have similar levels of efficacy overall, their beliefs are based upon different types of information. Although preservice teachers have relatively high levels of efficacy regarding Student Engagement, once they enter a school, they may be surprised by the

limitations of their ability to maintain students' interest, in which case their efficacy will balance out to the levels of practicing teachers'.

Where do teacher efficacy beliefs originate? Tschannen-Moran, Woolfolk Hoy, and Hoy (1998) believe that "self-perceptions of teaching competence (including an assessment of internal resources and constraints) and beliefs about the task requirements of a particular teaching situation (including an assessment of resources and constraints external to the teacher) contribute to teacher efficacy" (p. 233). The OSTES is based on this conceptualization of the sources of teacher efficacy and therefore considers specific teaching tasks and contexts. The developers of the OSTES avoided a global measure of teacher efficacy, instead tapping into specific teaching tasks and therefore increasing the predictive capabilities of this instrument. Clearly, teachers' sense of efficacy varies across the many tasks involved in teaching and by creating a measure that evaluates efficacy across specific tasks, a more complete understanding of teacher efficacy results. As indicated earlier, the development of the OSTES was thorough, with three studies involving both inservice and preservice teachers, including interviews addressing the important tasks required for teaching. Although this is a new measure and more research is needed to further confirm its validity as a measure of teacher efficacy, it shows promise for capturing the complexity of this construct.

Results related to the subscale scores of the OSTES should be interpreted with caution. In the development of the scale, Tschannen-Moran and Woolfolk Hoy (2001) found three strong interpretable factors (Instructional Strategies, Classroom Management, and Student Engagement) for inservice teachers. Conversely, for preservice teachers, a single factor allowed a better interpretation of the data; thus suggesting that the total score

is probably the best measure of teacher efficacy for preservice teachers. However, in the present study, no significant results were found for the total score for either preservice or practicing teachers.

Sex, Age, and Years of Experience

Males and females did not differ in their levels of teacher efficacy, and age did not appear to impact teacher efficacy. For practicing teachers, years of teaching experience did not impact their levels of teacher efficacy. For the preservice teachers, efficacy for Instructional Strategies was impacted by amount of practicum experience. Preservice teachers with *more* practicum experience tended to have *lower* efficacy for Instructional Strategies ($r = -.26, p < .03$). Amount of practicum experience did not impact any other form of teacher efficacy, including the total scale score.

Teacher education students may have inflated beliefs about their ability to implement instructional strategies and may find that they experience a “reality shock” when they begin their practica. No differences were found between practicing teachers’ and prospective teachers’ levels of efficacy for instructional strategies, so it is likely that preservice teachers eventually gain the required skills and experience necessary to return their efficacy to their prepractica levels. This is consistent with Soodak and Podell’s (1997) findings; elementary teachers’ personal efficacy was elevated during the preservice years, fell drastically in the first years of teaching, and then increased as they gained experience.

The decline in teacher efficacy during the practicum experience could be problematic for several reasons. First, low teacher efficacy may have a negative impact on novice teachers’ effectiveness in the classroom. Recall that low teacher efficacy has been

associated with several negative outcomes, such as teachers' persistence, commitment, and instructional behaviour, as well as students' achievement, motivation, and self-efficacy (Tschannen-Moran, Woolfolk Hoy, & Hoy, 1998). Second, low teacher efficacy for instructional strategies found in preservice teachers with more practicum experience may impact new teachers' decisions to remain in the profession. Some prospective teachers, after limited practicum experience, may decide that they are not "cut out" for teaching because of their low efficacy for Instructional Strategies. It is possible that one reason that no relationship exists between teacher efficacy and experience for practicing teachers may be that novice teachers with low efficacy have decided not to continue with a career in teaching.

The lack of a relationship found between experience and teacher efficacy is evidence that teacher efficacy is somewhat stable. Longitudinal studies are needed to confirm the stability of this construct. Other researchers have suggested that once efficacy beliefs are established, they are somewhat resistant to change (Tschannen-Moran & Woolfolk Hoy, 2001; Woolfolk Hoy, 2000). An implication, therefore, is that teacher education programs have a responsibility to develop and enhance prospective teachers' efficacy because once it is established, it may not be altered easily.

Beliefs About the Stability of Intelligence and Implicit Theories of Intelligence

Entity and incremental theorists appear to have similar conceptions of intelligence, as the present study detected no differences between the two groups on the implicit theories of intelligence measure. This contrasts the seventh hypothesis that incremental theorists would rate social skills as more important characteristics of

intelligent students when compared to entity theorists. It also contrasts Lynott and Woolfolk's (1994) findings, in which incremental theorists placed more importance on social skills as characterizing intelligence when compared to entity theorists. They found a weak, but significant correlation ($r = .12, p < .05$) between emphasis placed on social skills and beliefs about the stability of intelligence as modifiable. Future research is needed to clarify the relationship between conceptions of intelligence and beliefs about the stability of intelligence to determine if entity and incremental theorists differ in their implicit theories of intelligence.

Beliefs About the Stability of Intelligence and Teacher Efficacy

For the most part, preservice and practicing teachers had the same levels of teacher efficacy. When teachers view intelligence as stable (and therefore presumably less impacted by teacher intervention), they do not see their efforts as less efficacious than those who believe intelligence is modifiable. Entity and incremental theorists differed, however, on one subscale of the teacher efficacy measure, the Student Engagement subscale. Consistent with the direction predicted in the final hypothesis, incremental theorists had higher levels of efficacy for Student Engagement when compared to the entity theorists.

Teachers' implicit theories may be based on an underlying belief in the potential for change. Although Tschannen-Moran, Woolfolk Hoy, and Hoy (1998) are not explicitly discussing the relationship between teacher efficacy and beliefs about the stability of intelligence, the connection is clear:

Whether the person believes that these abilities and strategies are either fixed and immutable or can be acquired and improved through additional

training and experience affects a person's efficacy beliefs (Bandura, 1993).

A teacher who is aware of deficits in his or her capabilities in a certain circumstance but has a belief about how those deficits can be addressed will have a resilient sense of teacher efficacy. (p.233)

If teachers view intelligence to be a stable trait, it could be reasoned that they believe it to be less impacted by teacher interventions and hence, feel that they personally are less able to influence students' learning. This seems to be the case, at least for the Student Engagement subscale of the OSTES.

Hong et al. (1999) explored the relationship between beliefs about the stability of intelligence and attributions for poor performance. Using undergraduate students, Hong et al. provided participants with negative feedback on a test that allegedly measured intelligence. Participants were subsequently asked to answer the question, "What factors do you believe most influenced your performance on the test?" (effort, conceptual ability, luck, or skill). Interestingly, even though the test purportedly assessed intelligence, incremental theorists attributed their poor performance more to effort, when compared to entity theorists. Incremental theorists assigned approximately equal weight to effort and ability. Entity theorists, on the other hand, primarily used ability to account for their performance. Hong et al. point out that this could be due to differences in the way entity and incremental theorists define ability. Similar to beliefs about intelligence, entity theorists may define ability as a stable intellectual trait while incremental theorists may believe it is a level of current functioning that can potentially improve.

If Hong and colleagues' (1999) conclusions are applied to teachers, one could reason that if a student is performing well, a teacher with an entity theory would explain

the student's success as being the result of the student's intelligence and therefore take little credit for the student's accomplishments. On the other hand, an incremental theorist would focus more on external factors, such as their own teaching ability, and therefore feel more responsible for the student's success.

An obvious implication of the findings is that teachers' belief systems and implicit theories impact their understanding, evaluation, and expectations of students. Moreover, teachers' beliefs are imposed upon and impact the beliefs of their students. Children likely infer the meaning of intelligence based on teachers' feedback and behaviours.

Directions for Future Research

Although the benefits of a quantitative approach are numerous, qualitative research methods would offer a wealth of information about teachers' conceptions of intelligence and their levels of efficacy that the present study was unable to access. Interviewing teachers and asking the following types of questions would provide useful information regarding their beliefs about intelligence: what traits does an intelligent student possess; does an intelligent elementary student have different characteristics than a secondary student or adult; are social traits an important part of intelligence; what is your definition of intelligence; and is intelligence stable or modifiable?

The same is true for teacher efficacy. Interviewing teachers would provide insight into their efficacy beliefs that is not available using questionnaires. For example, asking teachers to explain their beliefs about how much they feel they can impact students' learning, motivation, engagement, behaviour, and competence. It would also be useful to ask them how effective they are at different tasks required of them as teachers and what factors influence how effective they feel they are.

The present study did not replicate the findings of Fry (1984), hence, further research is needed to clarify if elementary school teachers have different conceptions of intelligence, which emphasize social skills, when compared to secondary teachers. As suggested previously, primary elementary school teachers (grade one to three teachers) may stress social skills as being indicative of intelligent students if compared to senior high school teachers (grade ten to twelve teachers) and hence such a comparison should be made in the future.

Furnham has used an interesting method to determine individuals' conceptions of intelligence. Participants are first asked to estimate their overall intelligence, followed by self-estimates of seven specific multiple intelligences. Scores on the seven multiple intelligences (Gardner, 1983) can then be regressed onto the overall intelligence estimate, providing insight into which types of intelligence are most closely associated with overall general intelligence. Furnham, Reeves, and Budhani (2001) found that verbal, spatial, and mathematical intelligences were most statistically associated with general intelligence. Utilizing this method with teachers could provide further insight into their implicit theories of intelligence.

Although no significant findings were discovered related to sex differences in the present study, it would be interesting to compare the emphasis that males versus females place on cognitive, verbal, and social traits in their conceptions of intelligence. Previous studies have found sex differences in self-estimates of intelligence, with males consistently rating their intelligence higher than females (see Furnham, 2001, for a review). This variability in estimates of intelligence could be related to conceptions of intelligence. Perhaps females have lower estimates of intelligence because conceptions of

intelligence focus more on areas where men stereotypically excel, such as spatial ability. Determining the relationship between conceptions of intelligence, gender-stereotypes, and estimates of intelligence should be explored further.

Another interesting avenue to explore would be the relationship between teachers' conceptions of intelligence and those of their students to determine if teachers' beliefs influence their students'. Recall that Mueller and Dweck (1998) found that children praised for intelligence were more likely to believe it is stable and have lower achievement motivation. Hence, teachers' beliefs may impact children's beliefs and this impact could have negative consequences. Also, looking at the relationship between children's and parents' conceptions of intelligence would likely prove interesting. Parents' implicit theories may influence those of their children with the same potential negative effects found in the Mueller and Dweck study.

Lynott and Woolfolk's (1994) findings, in which incremental theorists placed more importance on social skills as characterizing intelligence when compared to entity theorists, were not replicated in the present study. More research is needed to determine if incremental theorists characterize intelligence by social skills more than do entity theorists.

Given that the methods and measures utilized by Dweck and her colleagues are critiqued for being too simplistic and for dichotomizing respondents, what methods would capture the construct of beliefs about the stability of intelligence better? Is there a measure that would be able to capture the beliefs of people who believe intelligence is both stable and modifiable?

Hong et al. (1999) explored the relationship between beliefs about the stability of intelligence and attributions for poor performance. Future studies could examine the attribution styles of entity and incremental theorists, exploring attributions for both successes and failures and in relation to their own performance as well as to the performance of others. One could examine how teachers explain the successes and failures of their students to determine if teachers with an entity theory of intelligence are more likely to attribute students' successes and failures to ability, as opposed to external factors such as effort or teaching ability.

Several other interesting research questions related to plasticity of beliefs should be explored. To what extent do people's implicit theories of intelligence shift? How stable are people's beliefs about the stability of intelligence and can they be experimentally manipulated? Given that experience was not found to significantly impact beliefs about the stability of intelligence, but age was a contributing factor, it is important to determine if individuals' beliefs change over time and if there are any cohort effects. How stable is the construct of teacher efficacy? Longitudinal studies are needed to determine if teachers' level of efficacy changes over the course of their careers.

The picture that emerges from this study is that teachers' beliefs are complex and based on many different factors. Overall, teacher school-level (elementary versus secondary) did not play a role in teacher beliefs and gender was not a contributing variable. Experience, on the other hand, was in some way significant for all three variables: implicit theories of intelligence, beliefs about the stability of intelligence, and teacher efficacy. This study contributes to our understanding of teacher beliefs by

exploring the impact of teacher demographic variables and the relationship between three important educational constructs.

REFERENCES

- Ablard, K. E., & Mills, C. J. (1996). Implicit theories of intelligence and self-perceptions of academically talented adolescents and children. *Journal of Youth and Adolescence, 25*, 137-148.
- Anderson, C. A. (1995). Implicit theories in broad perspectives. *Psychological Inquiry, 6*, 286-289.
- Ashton, P. T. (1985). Motivation and teachers' sense of efficacy. In C. Ames & R. Ames (Eds.), *Research on motivation of education: The classroom milieu* (Vol. 2, pp. 141-174). Orlando, FL: Academic Press.
- Ashton, P. T., & Webb, R. B. (1982, March). *Teachers' sense of efficacy: Toward an ecological model*. Paper presented at the Annual Meeting of the American Educational Research Association, New York.
- Ashton, P. T., & Webb, R. B. (1986). *Making a difference: Teachers' sense of efficacy and student achievement*. New York: Longman.
- Bandura, A. (1977). Self-efficacy: Toward a unifying theory of behavior change. *Psychological Review, 84*, 191-215.
- Bandura, A. (1997). *Self-efficacy: The exercise of control*. New York: Freeman.
- Bempechat, J., London, P., & Dweck, C. S. (1991). Children's conceptions of ability in major domains: An interview and experimental study. *Child Study Journal, 21*, 11-36.
- Berg, C. A. & Sternberg, R. J. (1992). Adult's conceptions of intelligence across the adult life span. *Psychology and Aging, 7*, 221-231.

- Berman, P., & McLaughlin, M. W. (1977). *Federal programs supporting educational change, Vol. III: Factors affecting implementation and continuation* (Rep. No. R-1589/7 HEW). Santa Monica, CA: Rand Corporation. (ERIC Document Reproduction Service No. 140 432).
- British Columbia Ministry of Education (2002). Teacher qualification reports [On-line]. Available: http://www.bced.gov.bc.ca/k12datareports/qual_reports.htm.
- Brophy, J. E., & Good, T. L. (1974). *Teacher-Student Relationships: Causes and Consequences*. New York: Holt, Rinehart & Winston.
- Brousseau, B. A., Book, C., & Byers, J. L. (1988). Teacher beliefs and the cultures of teaching. *Journal of Teacher Education, 35*, 33-39.
- Cain, K. M., & Dweck, C. S. (1995). The relation between motivational patterns and achievement cognitions through the elementary school years. *Merrill-Palmer Quarterly, 41*, 25-52. C
- Canadian Psychological Association (2000). *Canadian code of ethics for psychologists, (3rd ed.)*. Ottawa, ON: Canadian Psychological Association.
- Deemer, S. A., & Minke, K. M. (1999). An investigation of the factor structure of the Teacher Efficacy Scale. *Journal of Educational Research, 93*, 3-10.
- Dweck, C. S. (1986). Motivational processes affecting learning. *American Psychologist, 41*, 1040-1048.
- Dweck, C. S. (1996). Implicit theories as organizers of goals and behavior. In P. M. Gollwitzer & J.A. Bargh (Eds.), *The psychology of action: Linking cognition and motivation to behavior* (pp. 69-90). New York: Guilford.

- Dweck, C. S. (1999). *Self-theories: Their role in motivation, personality, and development*. Philadelphia, PA: Psychology Press.
- Dweck, C. S., Chui, C., & Hong, Y. (1995). Implicit theories and their role in judgments and reactions: A world from two perspectives. *Psychological Inquiry*, 6, 267-285.
- Dweck, C. S., & Henderson, V. L. (1989, April). *Theories of intelligence: Background and measures*. Paper presented at the Biennial Meeting of the Society for Research in Child Development, Kansas, MO. (ERIC Document Reproduction Service No. ED 312 057).
- Dweck, C. S., & Leggett, E. L. (1988). A social-cognitive approach to motivation and personality. *Psychological Review*, 95, 256-273.
- Faria, L. (1996). Personal conceptions of intelligence: A developmental study in Portugal. *Psychological Reports*, 79, 1299-1305.
- Faria, L., & Fontaine, A. M. (1997). Adolescents' personal conceptions of intelligence: The development of a new scale and some exploratory evidence. *European Journal of Psychology of Education*, 12, 51-62.
- Fitzgerald, J. M., & Mellor, S. (1988). How do people think about intelligence? *Multivariate Behavioral Research*, 23, 143-157.
- Fry, P. S. (1984). Teachers' conceptions of students' intelligence and intelligent functioning: A cross-sectional study of elementary, secondary and tertiary level teachers. *International Journal of Psychology*, 19, 457-474.
- Furnham, A. (2001). Self-estimates of intelligence: Culture and gender difference in self and other estimates of both general (g) and multiple intelligences. *Personality and Individual Differences*, 31, 1381-1405.

- Furnham, A., Reeves, E., & Budhani, S. (2001). Parents think their sons are brighter than their daughters. *Journal of Genetic Psychology, 163*, 24-39.
- Gardner, H. (1983). *Frames of mind: a theory of multiple intelligences*. New York: Basic Books.
- Ghaith, G., & Shaaban, K. (1999). The relationship between perceptions of teaching concerns, teacher efficacy, and selected teacher characteristics. *Teaching and Teacher Education, 15*, 487-496.
- Gibson, S., & Dembo, M. H. (1984). Teacher efficacy: A construct validation. *Journal of Educational Psychology, 76*, 569-582.
- Greenwood, G. E., Olejnik, S. F., & Parkay, F. W. (1990). Relationships between four efficacy belief patterns and selected teacher characteristics. *Journal of Research and Development in Education, 23*, 102-106.
- Guskey, T. R., & Passaro, P. D. (1994). Teacher Efficacy: A study of construct dimensions. *American Educational Research Journal, 31*, 627-643.
- Hebert, E., Lee, A., & Williamson, L. (1998). Teachers' and teacher education students' sense of efficacy: Quantitative and qualitative comparison. *Journal of Research and Development in Education, 31*, 214-225.
- Henson, R. K. (2002). From adolescent angst to adulthood: Substantive implications and measurement dilemmas in the development of teacher efficacy research. *Educational Psychologist, 37*, 137-150.
- Hong, Y., Chiu, C., Dweck, C. S., Lin, D. M., & Wan, W. (1999). Implicit theories, attributions, and coping: A meaning system approach. *Journal of Personality and Social Psychology, 77*, 588-599.

- Hoy, W. K., & Woolfolk, A. E. (1993). Teachers' sense of efficacy and the organizational health of schools. *Elementary School Journal, 93*, 355-372.
- Imants, J.G. M., & DeBrabander, C. J. (1996). Teachers' and principals' sense of efficacy in elementary schools. *Teaching and Teacher Education, 12*, 179-195.
- Jones, C. H., Slate, J. R., Blake, P. C., & Sloas, S. (1995). Relationship of study skills, conceptions of intelligence, and grade level in secondary school students. *The High School Journal, 79*, 25-32.
- Jones, C. H., Slate, J. R., Marini, I., & DeWater, B. K. (1993). Academic skills and attitudes toward intelligence. *Journal of College Student Development, 34*, 422-424.
- Kovach, K., Wilgosh, L., & Stewin, L. (1999). Relationship between study skills and conceptions of intelligence for postsecondary students. *The Korean Journal of Thinking and Problem Solving, 9*, 21-30.
- Lynott, D. J., & Woolfolk, A. E. (1994). Teachers' implicit theories of intelligence and their educational goals. *The Journal of Research and Development in Education, 27*, 253-264.
- Midgley, C., Feldlaufer, H., & Eccles, J. (1989). Change in teacher efficacy and student self- and task-related beliefs in mathematics during the transition to junior high school. *Journal of Educational Psychology, 81*, 247-258.
- Mueller, C. M. & Dweck, C. S. (1998). Praise for intelligence can undermine children's motivation and performance. *Journal of Personality and Social Psychology, 75*, 33-52.

- Murphy, N.A., Hall, J.A., & Smith LeBeau, L. (2001). Who's smart? Beliefs about the expression of intelligence in social behavior. *Representative Research in Social Psychology, 25*, 34-42.
- Murrone, J., & Gynther, M. D. (1989). Implicit theories or halo effect? Conceptions about children's intelligence. *Psychological Reports, 65*, 1187-1193.
- Murrone, J., & Gynther, M. D. (1991). Teachers' implicit "theories" of children's intelligence. *Psychological Reports, 69*, 1195-1201.
- Neisser, U. (1979). The concept of intelligence. In R. J. Sternberg & D. K. Detterman (Eds.), *Human intelligence: Perspectives on its theory and measurement* (pp. 179-189). Norwood, NJ: Ablex.
- Neisser, U., Boodoo, G., Bouchard, T. J., Jr., Boykin, A. W., Brody, N., Ceci, S. J., Halpern, D. F., Loehlin, J. C., Perloff, R., Sternberg, R. J., & Urbina, S. (1996). Intelligence: Known and unknowns. *American Psychologist, 51*, 77-101.
- Pajares, F. (1992). Teachers' beliefs and educational research: Cleaning up a messy construct. *Review of Educational Research, 62*, 307-332.
- Pajares, F. (1996). Self-efficacy beliefs in academic settings. *Review of Educational Research, 66*, 543-578.
- Paulhus, D. L., & Landolt, M. A. (2000). Paragons of intelligence: Who gets nominated and why. *Canadian Journal of Behavioural Science, 32* (3), 168-177.
- Siegler, R. S., & Richards, D. D. (1982). The development of intelligence. In R. J. Sternberg (Ed.), *Handbook of human intelligence* (pp. 897-971). Cambridge: Cambridge University Press.

- Soodak, L. C., & Podell, D. M. (1997). Efficacy and experience: Perceptions of efficacy among preservice and practicing teachers. *Journal of Research and Development in Education, 30*, 214-221.
- Sternberg, R. J., Conway, B. E., Ketron, J. L., & Bernstein, M. (1981). People's conceptions of intelligence. *Journal of Personality and Social Psychology, 41*, 37-55.
- Sternberg, R. J., & Powell, J. S. (1982). Theories of intelligence. In R. S. Sternberg (Ed.), *Handbook of human intelligence* (pp. 977-1005). Cambridge: Cambridge University Press.
- Stipik, D. J. (1996). Motivation and instruction. In D. C. Berliner & R. C. Calfee (Eds.), *Handbook of educational psychology* (pp. 85-113). London: Simon & Schuster MacMillan.
- Tabachnick, B. G., & Fidell, L. S. (1989). *Using multivariate statistics*. New York: Harper & Row.
- Tschannen-Moran, M., & Woolfolk Hoy, A. (2001). Teacher efficacy: Capturing an elusive construct. *Teaching and Teacher Education, 17*, 783-805.
- Tschannen-Moran, M., Woolfolk Hoy, A., & Hoy, W. K. (1998). Teacher efficacy: It's meaning and measure. *Review of Educational Research, 68*, 202-248.
- Woolfolk Hoy, A. E. (2000, April). *Changes in teacher efficacy during the early years of teaching*. Paper presented at the annual meeting of the American Educational Research Association, New Orleans, LA.

Woolfolk, A. E., & Hoy, W. K. (1990). Prospective teachers' sense of efficacy and beliefs about control. *Journal of Educational Research, 82*, 81-91.

APPENDIX A - Consent Form

You are being invited to participate in a study entitled Prospective and Practicing Teachers' Beliefs: A Study of Implicit Theories of Intelligence and Teacher Efficacy. I, Heather Wilson Strosher, am conducting this research project as part of the requirements for a Master's of Arts degree. I am a graduate student in the department of Educational Psychology and Leadership Studies at the University of Victoria. Please feel free to contact me at (250) 598-5368, or hlwilson@uvic.ca, if you have any questions or concerns regarding this study. This project is being conducted under the supervision of Dr. John Walsh, he can be contacted at (250) 721-7791 or walshj@uvvm.uvic.ca. In addition to being able to contact my supervisor and myself, you may verify the ethical approval of this study, or raise any concerns you might have, by contacting the Associate Vice-President, Research at the University of Victoria (250-472-4632).

The purpose of this research project is to gain a greater understanding of prospective and practicing teachers' conceptions of intelligence. Specifically, the goals include: (a) determining if teachers' beliefs about intelligence are impacted by what age group they teach; (b) examining differences between the beliefs of experienced teachers and teacher education students; (c) investigating the relationship between beliefs about intelligence and beliefs about teaching. This type of research is important because it contributes to our overall understanding of teachers' beliefs about intelligence. Teachers' beliefs influence their behaviour, which in turn impacts the learning environment they create. Beliefs about intelligence have been shown to impact people's goals and behaviours but research on teachers has been limited. By completing this questionnaire, you will contribute to the state of knowledge regarding teacher beliefs.

Both teacher education students (elementary and secondary) as well as practicing teachers (all grade levels) are being asked to participate in this study. If you agree to voluntarily participate in this research, you will be asked to fill out a brief questionnaire, which is expected to take approximately 20 minutes to complete. The first part of the questionnaire includes 37 traits and you will be asked to rate how characteristic each trait is of an intelligent child; the second part asks you to state how much you agree with each of 8 statements regarding beliefs about intelligence; the final section contains 24 items which ask you about your beliefs about teaching. There are no known inconveniences associated with participation other than the amount of time needed to complete the questionnaire.

It is important for you to be aware that participation in this research must be completely voluntary. If you do decide to participate, you may withdraw at any time without any consequences or any explanation. Also, do not answer any questions that you are not comfortable answering. Should you decide to withdraw from the study, all data that you have provided will be destroyed and not used for subsequent analyses. Although, there is a possibility that at the time you decide to withdraw, information you have previously provided has already been analyzed, in which case it is impossible to remove individual data.

In terms of protecting your anonymity, you will be asked to provide only limited personal information; you will be identifiable only by number and your name will not be included in any of the data analyses. A master list will be used to link participant names with identification numbers. Any information you provide will only be available to my supervisor and myself and will be compiled for overall analysis; no data will be analyzed on an individual basis. Following completion of this project, all questionnaires and records will be destroyed. It is possible that results from this study may be presented at scholarly meetings and published in academic journals.

Your signature below indicates that you understand the above conditions of participation in this study and that you have had the opportunity to have your questions answered by the researchers.

Name of Participant

Signature

Date

A copy of this consent will be left with you, and a copy will be taken by the researcher.

APPENDIX B - Demographic Information: Preservice Teachers

Please complete the following information. This sheet will be kept separately from the questionnaires and all information provided will be kept confidential.

Name: _____

Age: _____

Sex: Male Female (please circle one)

Years of post-secondary education: _____

Do you have an undergraduate degree? Yes No (please circle one)

If so, what degree do you have? _____

What university program are you currently in?

What grade level do you anticipate you will be teaching? (please check one)

_____ Primary elementary (grades 1 – 3)

_____ Intermediate elementary (grades 4 – 6)

_____ Middle School (grades 6 – 9)

_____ Senior High (grade 9 – 12)

Have you had any practicum experiences? Yes No (please circle one)

If so, what grade(s) did you teach and how long was the practicum(s)?

Grade: _____ Length: _____

Grade: _____ Length: _____

Grade: _____ Length: _____

Do you have any teaching-related experience or experience with children? If so, please describe:

Activity	Age of children	Length
_____	_____	_____

APPENDIX C - Demographic Information: Practicing Teacher

Please complete the following information. This sheet will be kept separately from the questionnaires and all information provided will be kept confidential.

Name: _____

Age: _____

Sex: Male Female (please circle one)

Years of post-secondary education: _____

Please list any degree(s) you have and the major:

Degree: _____ Major: _____

Degree: _____ Major: _____

Degree: _____ Major: _____

What grade do you currently teach? _____ Years of teaching experience: _____

What grade(s) have you taught in the past and for how long?

Grade: _____ Years: _____

Grade: _____ Years: _____

Grade: _____ Years: _____

Grade: _____ Years: _____

Grade: _____ Years: _____

APPENDIX D – Beliefs About Students' Intelligence Scale

Beliefs about Students' Intelligence		Does not describe	Describes a little	Describes somewhat	Describes quite a bit	Describes a great deal
Directions: Consider how characteristic each of the following attributes is of an intelligent student in the age range that you teach. Please rate how important each of the following traits and behaviours are of describing an intelligent student that you may teach.						
1.	Speaks clearly	(1)	(2)	(3)	(4)	(5)
2.	Is gracious in dealing with others	(1)	(2)	(3)	(4)	(5)
3.	Shows creativity	(1)	(2)	(3)	(4)	(5)
4.	Studies hard	(1)	(2)	(3)	(4)	(5)
5.	Has good concentration	(1)	(2)	(3)	(4)	(5)
6.	Respects the judgment of adults	(1)	(2)	(3)	(4)	(5)
7.	Makes good decisions	(1)	(2)	(3)	(4)	(5)
8.	Has a good conversation ability, is interesting	(1)	(2)	(3)	(4)	(5)
9.	Displays interest in people around him/her	(1)	(2)	(3)	(4)	(5)
10.	Is diligent and anxious to please	(1)	(2)	(3)	(4)	(5)
11.	Reasons well	(1)	(2)	(3)	(4)	(5)
12.	Is persistent	(1)	(2)	(3)	(4)	(5)
13.	Responds rapidly	(1)	(2)	(3)	(4)	(5)
14.	Is very popular	(1)	(2)	(3)	(4)	(5)
15.	Is quick in decision-making	(1)	(2)	(3)	(4)	(5)
16.	Analyzes major points in the problem	(1)	(2)	(3)	(4)	(5)
17.	Reads widely	(1)	(2)	(3)	(4)	(5)
18.	Thinks deeply about issues	(1)	(2)	(3)	(4)	(5)
19.	Is prompt	(1)	(2)	(3)	(4)	(5)
20.	Is self-confident	(1)	(2)	(3)	(4)	(5)
21.	Is verbally fluent	(1)	(2)	(3)	(4)	(5)
22.	Has a very good command of language and vocabulary	(1)	(2)	(3)	(4)	(5)
23.	Is fair in dealing with others	(1)	(2)	(3)	(4)	(5)
24.	Thinks clearly and logically	(1)	(2)	(3)	(4)	(5)
25.	Is energetic	(1)	(2)	(3)	(4)	(5)
26.	Is highly motivated to do the best	(1)	(2)	(3)	(4)	(5)
27.	Is not afraid to speak the truth	(1)	(2)	(3)	(4)	(5)
28.	Respects law and order	(1)	(2)	(3)	(4)	(5)
29.	Is helpful	(1)	(2)	(3)	(4)	(5)
30.	Deals with problems maturely	(1)	(2)	(3)	(4)	(5)
31.	Is sensitive to other's needs	(1)	(2)	(3)	(4)	(5)
32.	Is objective in his/her judgment	(1)	(2)	(3)	(4)	(5)
33.	Is knowledgeable about a number of subjects	(1)	(2)	(3)	(4)	(5)
34.	Is organized and efficient	(1)	(2)	(3)	(4)	(5)
35.	Displays common sense	(1)	(2)	(3)	(4)	(5)
36.	Is friendly	(1)	(2)	(3)	(4)	(5)
37.	Has clear-cut goals and ambitions	(1)	(2)	(3)	(4)	(5)

APPENDIX E – Beliefs About the Stability of Intelligence Questionnaire

Theories of Intelligence Scale

This questionnaire has been designed to investigate ideas about intelligence. There are no right or wrong answers. We are interested in you ideas.

Using the scale below, please indicate the extent to which you agree or disagree with each of the following statements by circling the number that corresponds to your opinion about each statement.

1. Everyone has a certain amount of intelligence, and they can't really do much to change it.

1	2	3	4	5	6
Strongly Agree	Agree	Mostly Agree	Mostly Disagree	Disagree	Strongly Disagree

2. People's intelligence is something about them that they can't change very much.

1	2	3	4	5	6
Strongly Agree	Agree	Mostly Agree	Mostly Disagree	Disagree	Strongly Disagree

3. People can learn new things, but they can't really change their basic intelligence.

1	2	3	4	5	6
Strongly Agree	Agree	Mostly Agree	Mostly Disagree	Disagree	Strongly Disagree

APPENDIX F – Ohio State Teacher Efficacy Scale

Teacher Beliefs – How much can you do?										
Directions: This questionnaire is designed to help is gain a better understanding of the kinds of things that create difficulties for teachers in their school activities. Please indicate your opinion about each of the statements below. Your answers are confidential.		Nothing		Very Little		Some Influence		Quite A Bit		A Great Deal
		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
1.	How much can you do to get through to the most difficult students?	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
2.	How much can you do to help your students think critically?	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
3.	How much can you do to control disruptive behaviour in the classroom?	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
4.	How much can you do to motivate students who show low interest in school work?	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
5.	To what extent can you make your expectations clear about student behaviour?	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
6.	How much can you do to get students to believe they can do well in school work?	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
7.	How well can you respond to difficult questions from your students?	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
8.	How well can you establish routines to keep activities running smoothly?	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
9.	How much can you do to help your students value learning?	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
10.	How much can you gauge student comprehension of what you have taught?	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
11.	To what extent can you craft good questions for your students?	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
12.	How much can you do to foster student creativity?	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
13.	How much can you do to get children to follow classroom rules?	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
14.	How much can you do to improve the understanding of a student who is failing?	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
15.	How much can you do to calm a student who is disruptive or noisy?	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
16.	How well can you establish a classroom management system with each group of students?	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
17.	How much can you do to adjust your lessons to the proper level for individual students?	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
18.	How much can you use a variety of assessment strategies?	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
19.	How well can you keep a few problem students from ruining an entire lesson?	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
20.	To what extent can you provide an alternative explanation or example when students are confused?	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
21.	How well can you respond to defiant students?	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)

22. How much can you assist families in helping their children do well in school?	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
23. How well can you implement alternative strategies in your classroom?	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
24. How well can you provide appropriate challenges for very capable students?	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)

APPENDIX G - Letter to School District

Heather Wilson Strosher
University of Victoria
1734 Davie Street
Victoria, BC V8R 4W6
(250) 598-5368
hlwilson@shaw.ca

Dear _____:

Re: Research project

I am a graduate student in the department of Educational Psychology and Leadership Studies at the University of Victoria and I am interested in conducting a research project within your school district. The primary purpose of this study is to gain a greater understanding of prospective and practicing teachers' conceptions of intelligence. Specifically, the goals include: (a) determining if teachers' beliefs about intelligence are impacted by what age group they teach; (b) examining differences between the beliefs of experienced teachers and teacher education students; and (c) investigating the relationship between beliefs about teaching and beliefs about intelligence. Research of this type is important because Attached please find a research proposal, which outlines details of the project.

The proposed procedure for data collection is as follows: upon approval from yourself, I will gain consent from individual principals, at which point I would approach individual teachers (preferably during a staff meeting). Teachers who agree to participate would then be asked complete the questionnaire. I will hand deliver the questionnaires, along with consent forms, to the participating teachers and will return one week later to collect completed questionnaires or present a reminder letter. The questionnaire used in this study (see attached proposal) should take approximately twenty minutes to complete.

Thank you for your time and consideration. If you would like more information or have any questions, please do not hesitate to contact me, contact information is provided above.

Sincerely,

Heather Wilson Strosher

APPENDIX H - Reminder/Thank you letter to teachers

Hello!

I wanted to take this opportunity to let you know how much it means to me that you have agreed to participate in my study. I truly appreciate the time you have taken, or are still planning on taking, to complete the consent form and questionnaire.

For those of you who have completed the forms, thank you. For those of you who haven't yet found the time in your busy schedule, no problem, this is just a reminder and I will thank you in advance for your time.

Once again, thank you so much!

Sincerely,

Heather Wilson Strosher