

**AGE IN GRADE ONE AND ACADEMIC SUCCESS**

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## Abstract

Alberta provincial legislation allows each School District to establish a specific cut-off date, within a given range, that regulates when a student may start Grade one. A child must turn six years of age between September 1<sup>st</sup> and February 28<sup>th</sup> of the school year. The range of start dates granted by the Provincial Government spans 180 days. It would be reasonable to anticipate that this range could have a direct impact on almost fifty percent of the student population. Given family mobility, children are able to start school in one jurisdiction and move to another jurisdiction often with no regard for the age of entry. If a child moved from a district with a February 28 cut-off date, to a district with a September 1 cut-off date, the age difference between two students in the same class could be as extreme as one day short of 18 months! This study presents quantitative research that examines the question, “Does the age of entry into grade 1 have an influence on the academic success of students at the conclusion of their first year in grade 3.” Provincial Achievement Test results in Language Arts and Math of 40 grade 3 students have been examined to determine relationships between age of school entry into grade 1 as well as achievement between genders. Contrary to previous studies, age has little effect on achievement. Among the 21 girls in the group, younger students outperformed their older classmates, yet not at a statistically significant level. Among the 19 boys in the group, older students outperformed their old younger classmates, yet not at a statistically significant level. Gender achievement appears to be a greater issue than does the difference in age.

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## Introduction

Alberta provincial legislation allows each School District to establish a specific cut-off date, within a given range, that regulates when a student may start grade one. A child must turn six years of age between September 1st and February 28th of the school year. For example the Lethbridge School District has selected December 31 as its cut-off date. The Holy Spirit Roman Catholic Separate School District has chosen February 28, thus allowing even younger children to start in their programs.

These two school districts serve students in the city of Lethbridge. Holy Spirit, however, is geographically a much larger district. It has schools in communities from Pincher Creek to Taber. The potential exists that Holy Spirit may have grade one starting dates that vary from the many other school districts with whom they geographically share boundaries. I have often been asked by parents to consider accepting their under age student into grade one. Because I have had to enforce policy, it is entirely possible that parents may have enrolled their children in the Catholic School system for reasons of age alone. School budget is almost entirely dependent upon the number of students who attend the school, and funding follows the child. Is a decision regarding the school district a child will attend educationally sound when based on the age of that child rather than other educational indicators?

The range of start dates granted by the Provincial Government spans 180 days. It would be reasonable to anticipate that this range could have a direct impact on almost fifty percent of the student population. Given family mobility, children are able to start school in one jurisdiction and move to another jurisdiction often with no regard for the age of entry. The only prerequisite is that the child was previously in one specific grade

and will continue in that grade if transfer is mid-year, or progress to the next grade if transfer is between grades. If a child moved from a district, with a February 28 cut-off date, to a district with a September 1 cut-off date, the age difference between two students in the same class could be as extreme as one day short of 18 months!

If student success is affected by the age of the child's entry into grade one, we should carefully consider the optimum date of entry to allow every child the greatest chances of academic success.

## Literature Review

An understanding of student success based upon age of entry into grade one and measured by student success on Provincial Achievement Tests necessitates an examination of several areas of literature including the success of younger children entering school, high stakes testing, developmental stages and provincial achievement tests.

### *Success of Younger Children*

A literature review has been conducted from 9 studies and one news release and a business cover story representing both American and Canadian research dating from 1915 to 2003. With few exceptions, all eleven sources agree that very few five-year olds are ready for first grade. Uphoff (1986) claims that children younger at school entrance often have damaging academic problems that last throughout their school careers. He feels that changing cut-off dates for school entrance and using better developmental assessments may help determining children's readiness for school.

Barnsley (1988) contends that younger children entering grade one achieve significantly less than their older classmates and that this effect continues for several years, possibly until age thirteen. Barnsley also notes that early entrants to grade one were more likely to be classified as learning disabled and less likely to be classified as gifted. He concludes that chances are increased that children entering school early will be placed at a disadvantage simply because of their relative age.

Klein (1965) conducted a longitudinal study of fifty-six children in Somerset County, Pennsylvania. The study followed children from grade one through grade twelve. Two groups met early admission criteria based on a mental age of at least six years as

measured by the Sanford Binet. One of these two groups obtained a mental age of seven years of higher. These two groups were compared to a third group of children who did not meet the criterion. Klein concluded that high I.Q. did not assure school success under regular classroom conditions, and that early admission produced educational, social and emotional impairment in many children, with girls being less adversely affected by early entrance. He felt that advantages would have accrued if eligible children had not entered school early. However, Klein's sample size is quite small. In such a small grouping, fifty-six, his conclusions may show a tendency yet his findings may not be conclusive.

In contrast to Klein, Koep (1980) conducted a study with 1 341 pupils in grades three, four, six, and eight to determine whether their age at school entrance made any difference to their academic achievement in later years. He felt his results were inconclusive and indicated the need for an in-depth, longitudinal study. Koep found that in some subject areas early starters scored at least as well on average as late starters by the time they reached grades six and eight. These findings are contrary to every other study of this type although, with the size of Koep's sample, some credence is lent to the findings.

Hedges (1978) describes the scope and findings of a separately published comprehensive review of research on optimum age of entry into first grade covering literature from 1915 to 1976. He notes the inadequacy of chronological age as a predictor, and indicates an optimum mental age of six and a half years for most cases. Hedges also reports the following findings:

- a visual inability to decode printed words;
- disadvantage to children younger than their peers;

- variations of as much as five years in reading readiness at age six;
- ineffectiveness of early intensive drill in learning to read;
- correlation between maturity and learning to read;
- higher incidence of social, emotional and scholastic problems among younger children than among comparable children a year older;
- benefits from additional kindergarten experience.

In a second study by Hedges (1976), reviews of findings on criteria used to determine age of entry into first grade were presented. Various criteria included chronological age, mental age, I.Q., gender and physical development. The review supports later entry, especially for children with below average intelligence. It is suggested that children profit from waiting until they are able to perform at a mental age of six years six months. The review concludes that no one criterion of those reviewed is effective in judging the appropriate age of entry into grade one.

The "Study of Early Entry into First Grade" (1974) analyzed the academic achievement and behavioral and social adjustment of 148, Broward County, Florida, kindergarten children who qualified to enter first grade early. Admission was dependent upon children completing kindergarten, passing a reading readiness test and attaining the age of six during the school year. The above group was compared to a group of children who qualified to enter first grade early but were kept in kindergarten by their parents. Results indicated that early entrants may be able to do well academically, but will be less self-reliant and less socially accepted by their peers than either their bright kindergarten counterparts or their brighter first grade classmates.

Hebbeler (1983) studied 301 five year olds who entered one of two early entry classes. One group entered regular grade one. The other group attended school full days with the intention that they would cover both kindergarten and grade one curricula by year's end. Only a total of 21 students in either group actually qualified to be placed in grade two at the conclusion of the first year of schooling. The remaining 280 children were placed in grade one. This group of 280 found higher academic and social development than non-early entry students with them in grade one. These findings indicate that very few five year olds are ready for first grade, but that many children could benefit from a more enriched program than kindergarten presently provides.

In the 1999 Alberta news release "School boards to continue to set own early Grade 1 entrance age", legislative confirmation is given to individual school districts setting an entrance age. Some school boards have set the entrance age at six by September 1, while others can accept children as young as six before the following March. The Alberta Teachers' Association (ATA) says this means that in grade one in Alberta there may be an age variation of eighteen months. For children in their early years this is a substantial age gap, producing great variations in levels of social maturity and readiness. The ATA claims this significant difference can actually hinder rather than help early development.

The prevailing issue in each of the articles used in this review is success of young students entering grade one. Nine of the ten articles reports that early entrants to grade one are placed in a position of disadvantage. The only dissenting study, a study with 1341 pupils, shows the results were inconclusive. The chief concern of many educators is that younger children, as in many Alberta classrooms, will be forced to struggle for

both academic and social recognition with peers who have a significant age and developmental advantage. It is possible that many of these children may not reach their full potential.

*The New Gender Gap* says,

schools are pressured to show kids achieving the same standards by the same age or risk losing funding. [This] is also far more damaging to boys, according to Lilian G. Katz, co-director of ERIC Clearinghouse on Elementary and Early Childhood Education. Even the nerves on boys' fingers develop later than girls', making it difficult to hold a pencil and push out perfect cursive. These developmental differences often unfairly sideline boys as slow or dumb, planting a distaste for school as early as the first grade. (Conlin, 2003, May Cover Story)

Conlin continues by saying, "Girls have more intricate sensory capacities and biosocial aptitudes to decipher exactly what the teacher wants". Conlin contends that, "From kindergarten to graduate school, boys are fast becoming the second sex". This alerts us to a concern shared by Klein (1965) and Hedges (1976), that gender may have a role in determining students' readiness for school.

My research question has a focus on academic results. Each of the eleven articles in the review address the issue of academics, yet do not focus exclusively on it. The most current of the literature is twelve years old. Much of it is twenty-five years old; yet the same questions about the appropriate age for entering grade one are still being asked. Within a school district that employs many early intervention practices, yet allows

children as young as five years nine months of age to start grade one, I hope to determine if the same findings will remain constant.

### *High Stakes Testing and Provincial Achievement Tests*

The Alberta Achievement Tests were chosen to provide the data for student performance indicators. These tests are administered in June of every year. Grade three students write two tests, language arts and math. These controversial tests are considered by many educators to be high stakes tests. This section examines literature regarding high stakes testing.

Several studies, as well as literature prepared by Alberta Learning and available through their Web site, have been examined in this section of the literature review, the purpose of which is to examine Alberta achievement testing, the design and development of the achievement tests, the marking procedures, and the general nature of high stakes testing.

Achievement testing has been a prominent instrument of educational reform in the past two decades. In many states and provinces testing programs have been transformed from a method of monitoring the progress of students into a mechanism for holding students, teachers and school administrators publicly accountable. Historically, systematic testing of students is far from unique. Britain, Germany, and Australia have longstanding practices of nationally standardized student testing programs. In North America, the systematic procedure of standardized achievement testing was given political strength in 1983 with the National Commission's policy guiding document *A Nation at Risk*. In this document, functional literacy levels, higher order thinking skills, and basic numeracy levels of American children were found inadequate. This provided

clear and strong direction for an educational system that had until then been receiving passing grades. The following decade witnessed the recreation of accountability policies in many American states as well as in Alberta, British Columbia, and Ontario. In Alberta during the 1990s, the Ministry of Learning explored international policies that claimed to improve student learning and which coupled “good “ schools, and “good” teachers with those who produced “good” student test results on standardized evaluation instruments. Logic followed that increased testing would produce indicators about what students did and did not know and what they had or had not learned. As Popham (1999) points out, “...if a school’s standardized test scores are high, people think the school’s staff is effective [and that students are learning]. If a school’s standardized test scores are low, they see the school’s staff as ineffective” (p. 8). Radwanski (1987) appears to support this concept when he states that, “there can be no effective pursuit of excellence in educational outcomes without meaningful accountability, and there can be no meaningful accountability without measurable standards of accomplishment” (p. 227).

As pointed out by Burger, Aitken, and Brandon (2001), “Evaluation is the cornerstone of the accountability system, which requires every school authority to establish student evaluation policies and to enact cyclical teacher and school evaluation programs”(p. 3). Chomsky (2000) would agree, suggesting that, “The ultimate arbiter of whether we have been successful...[is] gains on achievement tests” (p.1). Scafidi, Freeman, and DeJarnet (2001) similarly suggest that, “These accountability systems are based on ‘high-stakes’ standardized testing of state curriculum. Rewards and interventions for local educators are based largely upon students’ performance on these tests” (p.1).

Koretz (1991), in a comparison of results from high stakes testing to other tests on grade three students of a large, high-poverty urban district with large numbers of Black and Hispanic American students, notes that achievement on the high-stakes test did not generalize well to other tests for which students had not been specifically prepared. The paper issues serious criticism of test-based accountability and raised concerns about the effects of high stakes testing on instruction. Several researchers (: Barth, 2000, 1990; DuFour, 1998; Fullan, 2001) have explored school reform and achievement-based accountability and concur with Koretz's contention that high scores on accountability tests are not, by definition, synonymous with student learning. Koretz observed that teachers in the specific district evidently focus on content specific to the test used for accountability rather than attempting to improve achievement in the broader, more desirable nature. Lynd (2000), in *The New Generation of Standardized Testing*, offers support for this concept. Lynd noted that although most states use some form of testing, less than half administer criterion-referenced tests linked to state education standards and goals.

Cheng and Couture (2000) are critical of high stakes testing. They claim that effects include loss of teacher autonomy, a focus on teaching to tests, increased use of commercial cramming schools, increased external control over educational systems, and reduced emphasis on critical thinking. According to Ananda and Rabinowitz (2000), the drawbacks are that they can: increase student failure and retention rates to unacceptably high levels; narrow the focus of instruction and assessment; lead to inappropriate inferences about student performance; and overburden students and teacher.

Kohn and Booi (2000) feel that standardized testing contributes to a narrowing of the curriculum. They explain, “What is easy to measure usually consists of narrow knowledge objectives, with the result that more complex, harder-to-measure objectives are not tested,” (p.41) An additional concern is the cost of maintaining the accountability system.

One need look no further than the Department of Learning budget in Alberta, where the spending totals are very instructive: \$12 million for student assessment compared to \$4 million for curriculum development and implementation. In other words, Alberta spends three times as much assessing student learning as it does on generating, implementing, and supporting the curriculum. (Kohn & Booi, 2000, p. 41)

Aitken (2000) refers to authors such as Fullan (1999), Hargreaves (2000), Joyce (1998), Townsend (1998), and Webber and Townsend (1997) make the following claim about governments and societies.

only demand more accountability from teachers without supplying them the tools, they are destined for fail... While initiatives demand more accountability from teachers, they seldom address ways to improve, increase or fund staff development. The effects of improved staff development are not readily apparent, but if it is not a key component, the failure rate of projects will be apparent. (p. 30)

McConaghy (2000) in a review of Kohn’s book *The Case Against Standardized Testing: Raising the Scores, Ruining the Schools* notes that standardized tests fail to measure initiative, creativity, imagination, conceptual thinking, curiosity, effort, irony,

judgment, commitment, nuance, good will, ethical reflection or a host of other valuable dispositions or attributes. Kohn notes that what they can measure and count are isolated skills, specific facts and functions, the least interesting and least significant aspects of learning.

“Despite their widespread use, the evidence that standards-based reform and the accompanying large scale assessment efforts improve instruction and achievement in general education is sparse” say Schulte, Villwock, Whichard and Stallings (2001, p. 487). In their work to gather evidence to support the effects of large scale testing programs on (a) curriculum and instruction, (b) teacher behavior, (c) motivation and self-concept of students, and (d) student achievement, it was concluded that there was a lack of sufficient research on the effects of testing, and the quality of evidence that was available did not permit causal inferences. Schulte et al felt there was good evidence that student scores on large-scale assessments increase over time, but less evidence that these gains represent true improvements in student skills.

Robert L. Linn, a researcher in education testing and assessment, feels that in most cases the instruments and technology of testing have not met the demands placed on them by high stakes accountability. “Assessment systems that are useful monitors lose much of their dependability and credibility for that purpose when *high stakes* are attached to them. The unintended negative effects of the *high-stakes* accountability uses often outweigh the intended positive effects”. (Linn, 2000, p.14)

In offering an alternative view Jim Brackenbury, Former Director, Learner Assessment Branch, Alberta Learning says of Provincial Achievement Testing, “This is an extraordinary Canadian success story.” Commenting on international testing in which

Alberta student scores were the highest in reading and among the top three in science and math, Brackenbury exclaims, “In 2000, we finally made it, absolutely number one in the world” ([www.learning.gov.ab.ca](http://www.learning.gov.ab.ca)).

Standardized testing that is linked to accountability incentives may be seen as a vehicle by which useful feedback and information about schools can be provided to schools and educators. Within some systems, incentives provide recognition, a sense of purpose, and motivation for the accomplishment of goals. Within others, they may provide the opportunity for leaders to grasp an opportunity to create professional teams in ways to facilitate strengthening of curricular and instructional practice, addressing challenges and acting on concerns of the students or community. The Alberta Initiative for School Improvement (AISI) has given rise to numerous system and school projects that have chosen to re-focus educational vision and structure through an action research model that facilitates the empowerment of teachers and schools as they make internal assessments of strengths, and establish action plans based on collaborative problem solving. Cimbricz (2002) contends that achievement testing can increase the likelihood that administrators and staffs will engage in this type of positive goal-setting by encouraging a common focus and purpose for all members of the school community.

Alberta Learning says that the tests that are often mentioned in published articles critical of large-scale testing are commercial tests developed without substantial involvement of teachers and are not representative of the provincial or state curriculum. “To help ensure that tests are aligned with the provincial curriculum, classroom teachers from across Alberta are involved in all aspects of the development and implementation of the achievement tests” ([www.learning.gov.ab.ca](http://www.learning.gov.ab.ca)). Alberta teachers are: involved in

writing, revising and reviewing questions; developing standards; validating the French translation of questions; developing scoring guides; field testing; validating the tests in terms of the curriculum; administering the tests; and marking the tests.

Arguments exist on both sides of this debate. Schmoker (2000) suggests that educators proactively seize the opportunity to create the structure and instruments that will reflect the multiplicity of student learning, while simultaneously collecting data that unequivocally identifies areas which policy makers need to rectify. He argues, “Let us ensure that these new systems are data-driven. Let’s ensure that they can clearly reveal both measurable and annual progress as well as areas where improvement is needed. This could go a long way toward winning public trust...” (p. 65).

Despite the high stakes nature of Alberta Achievement Tests, they provide meaningful data regarding student achievement in that they are locally constructed, locally field tested, referenced to the curriculum, and standardized in the province.

### *Developmental Stages*

Educational programs and student performance should not only be based on sound research but should have as its foundation the needs of the student. Any discussion of achievement is incomplete without reference to the unique developmental characteristics of the client.

Some theories of child development view the child as active in relation to the environment; others see the child as passive. In learning theory environmental events are the main determinants of the child’s behavior and responses. What becomes of the child depends on what happens to the child. In contrast, cognitive theorists such as Piaget believe that psychological development is essentially self-generating, activated by

inherent, innate tendencies toward adaptation. Cognitive theorists believe that behavior and learning are a product of the child's activity in the environment; the child's curiosity, searching, probing and problem-solving. The world will place forces on the child but the child will perceive the environment in his or her own way and impose structure and meaning on it. Simply stated the contrasting views regard development as happening *to* the individual as compared to happening *in* the individual.

Jean Piaget was one of the influential researchers in the area of developmental psychology during the 20th century. He was mainly interested in the biological influences on how we come to know. He believed that what distinguishes human beings from other animals is our ability to do abstract symbolic reasoning. According to Piaget's theory, cognitive development occurs through a number of stages and substages. The knowledge structures or schemes of individuals differ depending on their current stage of development. Stages are generally hypothesized when behavioral development appears to swell by means of striking and constructive changes in complex patterns of behavior. A stage is defined in terms of a complicated set of characteristics or fragments of behavior that occur together and may therefore be conveniently clustered.

Developmental stages are central to Piaget's theory of cognitive development. Based on systematic observations in many types of thinking and tasks, Piaget (as cited in Blum, 1964) concludes, "whereas somatic and perceptual development seem to be continuous, intellectual development seems to take place in stages" (p. 23).

Each stage involves a time period of formulation and a time period for attainment that is exemplified by progressive organization of cognitive abilities. The sequence of stages from early, relatively simple thinking to more mature and complex abilities is

constant. Each movement from stage to more advanced stage involves a process of integration where earlier cognitive abilities become part of later activities. “The accomplishments of earlier stages are carried into later ones, but they are also integrated with new elements that appear to arise spontaneously in later stages” (Mussen, Conger & Kagan, 1969, p. 24). Piaget identified these stages as sensorimotor, from birth to 18 months; concrete operations, from 18 months to about 11 or 12 years of age (including preoperational from 2 to 7); and formal operations, from 11 or 12 years to 15 years of age.

During the pre-operational stage (toddler and early childhood), “intelligence is demonstrated through the use of symbols, language use matures, and memory and imagination are developed, but thinking is done in a nonlogical, nonreversible manner. Egocentric thinking predominates” (Huitt & Hummel, 2003).

Several pre-school and primary programs are modeled on Piaget's theory. Discovery learning and supporting the emerging interests of the child are two central instructional techniques. Development can be encouraged by parents and teachers through challenging the child's abilities, while not presenting material or information that is excessively beyond the child's level. “It is also recommended that teachers use a wide variety of concrete experiences to help the child learn (e.g., use of manipulatives, working in groups to get experience seeing from another's perspective, field trips, etc)” (Huitt & Hummel, 2003).

Piaget's views are often compared with those of Lev Vygotsky and Jerome Bruner who looked more to social interaction as the primary source of cognition and behavior. Vygotsky (1978) and Bruner both developed cognitive theories that placed a larger

emphasis on the importance of language, culture and social activities in human cognitive development. A major theme of Vygotsky's theory is that social interaction plays a fundamental role in the development of cognition.

Every function in the child's cultural development appears twice: first, on the social level, and later, on the individual level; first, between people (interpsychological) and then inside the child (intrapsychological). This applies equally to voluntary attention, to logical memory, and to the formation of concepts. All the higher functions originate as actual relationships between individuals. (Vygotsky, 1978, p. 57)

A secondary theme of Vygotsky's theory is the idea that the potential for cognitive development is limited to a certain time span, which he calls the *zone of proximal development*. Greatest development during the zone of proximal development depends upon full social interaction. Moreover, the range of skill that can be developed with adult guidance or peer collaboration exceeds what can be achieved alone.

Bruner also was in agreement with Piaget (as cited in Huitt & Hummel, 2003) that human learning actively constructs knowledge, as opposed to the behaviorist notion of gaining knowledge through trial and error. A major theme of Bruner's theory is that learning is an active process in which learners construct new ideas or concepts based upon their current and past knowledge. The learner selects and converts information, constructs hypotheses, and makes decisions, relying on a cognitive structure. Cognitive structure provides meaning and organization to experiences and allows the individual to think beyond the information given.

Bruner believes that a theory of instruction should address four major aspects: predisposition towards learning; the ways in which a body of knowledge can be structured so that it can be most readily grasped by the learner; the most effective sequences in which to present material; and the nature and pacing of rewards and punishments (Huitt & Hummel, 2003).

Clearly, in recognizing that one of education's important functions is to address the developmental needs of the child, our classrooms may help facilitate enhanced academic achievement.

## Research Methodology

An explanation of the problem being studied, the null hypotheses, and the dependent and independent variables are provided in this chapter. Descriptions of the instrument used, the research population, the sample and the data collection procedures are also included.

### *Statement of the Problem*

Does the age of entry into grade one have an influence on the academic success of students at the conclusion of their first year in grade three?

### *Null Hypotheses.*

$H_0:1.$  There are no relationships between the age of students entering grade one and overall combined student achievement at the conclusion of their first year in grade three.

$H_0:2.$  There are no relationships between the age of students entering grade one and overall achievement by gender at the conclusion of their first year in grade three.

$H_0:3.$  There are no relationships between the age of students entering grade one and combined student achievement in mathematics at the conclusion of their first year in grade three.

$H_0:4.$  There are no relationships between the age of students entering grade one and student achievement by gender in mathematics at the conclusion of their first year in grade three.

$H_0:5.$  There are no relationships between the age of students entering grade one and combined student achievement in language arts at the conclusion of their first year in grade three.

H<sub>0</sub>:6. There are no relationships between the age of students entering grade one and student achievement by gender in language arts at the conclusion of their first year in grade three.

*Definition of Terms in the Hypotheses*

*Age* will be calculated as the full number of months of chronological age of the student. A student of exactly 6 years of age will be considered to be 72 months old. A student of 6 years, and any portion of the next full month of age, will also be considered to be 72 months old. A student of 6 years, and one full month of age will be considered to be 73 months old.

The *age of entry into grade one* will be considered to be the age of a student on the first day of grade one.

The *conclusion of their first year of grade three* is assumed to be after Reporting Period 3 evaluation has been completed, by the classroom teacher, on the Student Report Card during the first year that a student attends the third grade.

*Academic Success* refers to the score a student achieves on the Alberta provincial achievement test in math and language arts.

*Relationship* refers to a statistically significant correlation (alpha levels of .05 or lower based on Pearson product-moment correlation coefficients).

*Combined student achievement* is the score a student achieves on the Alberta provincial achievement test adding the math and language arts raw scores together.

*Overall combined student achievement* refers to the full group of males and females combined student achievement.

*Student achievement by gender* refers to the group of girls and the group of boys scores in math, language arts and combined raw scores achieved on the Alberta provincial achievement tests.

#### *Dependent Variables*

The dependent variables in this study are the raw scores and the combined score of students on each of the two grade three Provincial achievement tests. These scores have been calculated in four fashions: as grouped male and female combined scores; as separated male and female combined scores; as grouped male and female subject scores; and as separated male and female subject scores. The results of the provincial achievement tests were released in August 2002 and were obtained from student files with permission of individual parents. As I approached this study, I was interested in determining if the age of entry into grade one has a greater effect on achievement in one grade three subject but not the other. In separating the scores by gender, I hope to gather data regarding gender-specific aspects of age of entry into grade one on third grade achievement and answer questions such as: Do girls achieve at the same level as boys of the same age? Although the scores were the dependent variables in this study, gender was viewed as an intervening variable in that it might have had an effect on student achievement that was exclusive of any relationship between age and student achievement.

#### *Independent Variable*

The independent variable in this study was the age of students entering grade one.

#### *Population of the Study*

The population for this study was the group of grade three students from Senator Buchanan School in Lethbridge, Alberta who completed grade three in June of 2002.

*Instrument Used*

The provincial achievement tests are developed by Alberta Learning and administered to all grade 3, 6 and 9 students in the Province. Third grade students are tested in math and language arts. Sixth and ninth grade students are tested in math, language arts, science and social studies. The purpose of the achievement testing program is to determine if students are learning what they are expected to learn, report to Albertans how well students have achieved provincial standards at given points in their schooling, and to assist schools, jurisdictions, and the province in monitoring and improving student learning. The Alberta government has declared achievement standards that a minimum number of students are expected to meet. Eighty-five percent of students are expected to meet the acceptable standard and 15% are expected to meet the standard of excellence. Alberta Learning also provides a process for the setting of assessment standards, the scores that the students must achieve for their test performances to be judged acceptable or excellent. Teachers are consulted through a variety of committees. Parents, post-secondary institutions and the business community are also all involved in some capacity. National and international tests influence the assessment standards. Test equating, a statistical procedure that is used to determine equivalent scores on tests, also aids in the setting of standards. The results of the tests are released in late summer or early fall and provide detailed reports that include comparisons of schools to jurisdictions and to the province. Reports are generated for the number of students that participate, for the number of students that meet standards by test section (skills versus knowledge, for example), for raw scores, and for results by test item.

### *The Research Tradition*

I set out to discover how the dependent and independent variables that I identified related to one another. My research purpose was, therefore relational. My strategy was determined by this desired purpose, to discover if a relationship existed between the starting age of children in grade one and their academic success. I felt it would be appropriate to collect reliable measures from a desired sampling group, then attempt to infer properties from the sampling group to a larger set of the population. The larger population, in this case, would be future students from the same school under the same policy governing the age that a child may begin grade one. This places my research tradition within a positivist, inferential, quantitative paradigm. Statistical methods using SPSS 11.5 helped me to describe the sets of data, to make statements about populations from information samples and to establish causal relationships among variables. I selected an inferential approach in an attempt to find out information that could be generalized to a population of grade three students based upon a sample of that population.

### *The Sample*

The sample group of students were members of the two fourth grade classes at Senator Buchanan School. To be included in the sample group, they had to submit permission forms from their parents granting approval for the student's age and Provincial Achievement Test results to be examined and used within the study. From the total group of fifth two fourth grade students, six families withheld permission, three students transferred to the school from out of Province and had no Achievement Test results, two students did not write the Provincial Achievement Tests at the request of

their families, and one student was excused from writing the tests with permission from Alberta Learning. The results of forty students have been used in the study; all wrote Provincial Achievement Tests in the 2001-2002 school year

Student age of entry into grade one averaged 76.69 months; therefore the average student was six years, four months and twenty-one days old on the first day of first grade. Ages ranged from 69 months, five years and nine months, to 86 months, seven years and two months. This created a range of 17 months age difference within the same grade.

### The Test

The Alberta Achievement Tests were chosen to provide the data for the dependent variables. These tests are administered in June of every year. Grade three students write two tests, language arts and math. The provincial government, in 1982, implemented these tests. Committees of teachers experienced with the curriculum develop the tests. The achievement tests are blueprinted to reflect the Alberta curricula.

Students with special needs supported by an Individual Program Plan (IPP) and entered in the provincial student information system as an exceptional student may be granted one or more test accommodations following approval by the superintendent of schools. These accommodations include: audiotape version for students with visual impairment; audiotape version for students with learning or physical disability; additional writing time; scribe; large print version; Braille version; reader; sign language interpreter; and a taped response. A student may also be excused from writing the achievement test, by the superintendent, if it is determined that the student is not capable of responding to the original approved test or the modifications provided or if it is considered harmful to the student to participate in the testing procedure.

Each test has two sections. Part A Math is written in May and is based on timed number facts, Part B Math is written in June and is multiple choice. The Language Arts tests are composed of a written section requiring narrative and functional writing, completed in May, and a multiple-choice section written in June. Multiple-choice items are machine-scored and teachers seconded for a week in the summer score written questions. The teachers use rubrics made available to the students at the time of test writing in the scoring of the written sections of the tests.

Criticisms leveled against the tests include concerns over the practice of publishing scores in some newspapers, listing schools by achievement; the perception that the standards are arbitrarily set from one year to the next; the high cost of testing in relationship to new funds provided for education; the lack of standardization in the administration of the tests; and questions regarding the necessity of such a comprehensive annual testing program that may fail to measure initiative, creativity, imagination, conceptual thinking, curiosity, effort, irony, judgment, commitment, nuance, good will ethical reflection and reduced emphasis on critical thinking. These criticisms notwithstanding, the Alberta Achievement Tests provide meaningful data for the dependent variables in that they are locally constructed, locally field tested, referenced to the curriculum, and standardized in the province.

## Background

### *The School, Programs and Services*

Senator Buchanan School, “Where Children Come First”, was built in 1954 with an addition in 1973. The school serves all of northwest Lethbridge. With a high transience rate, thirty to forty percent of the students are new to the school each year. The students perform well academically as indicated by students in grades three and six generally scoring above district and provincial averages on Provincial Achievement Tests. Beginning in the 2003-2004 school year, kindergarten to grade 5 classes were offered at the school.

The School believes in a philosophy that students, parents and staff share responsibility for learning. Commitment to meeting the needs of each student are served by: Promoting and supporting academic, social and emotional growth; Fostering caring, cooperative, respectful and responsible behaviours; Developing problem-solving skills and thinking skills; Instilling an appreciation for lifelong learning; Creating a positive school climate; and ensuring the appropriate use of human and technical resources.

The staff of Senator Buchanan School is committed to working with students and their parents to ensure that each child develops to his or her full potential. Some of the programs offered include: *Kindergarten*, a 475-hour program with separate morning class and afternoon classes; *Early Intervention (PEP) Program* is available for selected Kindergarten and selected Grade One students to receive additional small group support to develop academics, social and motor skills; *Early Literacy Program* provides one half hour of individual assistance each day for twelve weeks to selected children in grades one and two for reading and writing; *Emerging Literacy* is an additional literacy program,

which is designed for grade three children; *Later Literacy* is a sixteen-week program, which provides individual assistance to students in grades four and five who are experiencing difficulties in reading and writing; *Making Connections*, offered in partnership with Galbraith School, a neighboring North Side School, gives community support to families through education, intervention and interagency collaboration; *Speech Language Assistance* for students from kindergarten to grade three; and a *Lunch Program* providing supervision for approximately 175 students who enjoy lunch together each day.

The school also has the services of a school psychologist, elementary liaison counsellor, and native liaison worker on a weekly basis. For several individual students, the school works closely with CARE and REACH with services for visually impaired, hearing impaired, occupational and physiotherapy and speech therapy.

#### *Issues and Trends*

During the 2002-2003 school year Senator Buchanan School had 14.68 teachers, 21 student support staff, 2 caretakers, one secretary, one .25 FTE counsellor and 7 lunch supervisors. As of September 30, 2003, 250 students were enrolled at the school. The transience rate was high with eighty-seven students new to the school from Kindergarten to Grade 5. Overall, parents appear to be pleased with the school, and are actively choosing to send their children as indicated from the count of Out of Boundary Students. As of April 2003, fifty-five out-of-boundary students attended, a dramatic increase from previous years.

Response to students with special needs continues to be the school's greatest challenge as the number of special needs students continues to grow and diversify. The school has traditionally had a large number of assistants assigned to special students. The

school finds that problem solving with parents regarding both academic and social situations takes an increasing amount of time.

Lethbridge School District #51 has tried in several ways to address the needs of smaller schools and is discussing ways to support schools in economically disadvantaged areas. Senator Buchanan School is located in a lower socio-economic area of Lethbridge. According to the '*Baragar Demographics*', a computer program used by the Lethbridge School District that analyses data from the Canada Census, the average income for households in the Senator Buchanan area is \$41,737 which is the second lowest in Lethbridge. In the school seventy-eight families and 107 students live in single parent families.

The School is encouraged to see that community outreach has becoming part of the school culture. Strong support for food bank, the clothing exchange, and environmental issues are part of the school's yearly endeavours and are included within the school's annual plan

## Data Analysis and Findings

Data has were analyzed, using the program SPSS 11.5, to determine relationships that exist between the age of entry into grade one and academic success of students at the conclusion of their first year in grade three. Pearson Correlation was used to relate age to achievement in the combined student group (table 1), in all girls (table 2) and in all boys (table 3). Means were calculated for the combined student overall achievement (table 9), the group of girls overall achievement (table 10) and the group of boys for overall achievement (table 11), as well as gender based achievement in language arts (table 5 and 6) and for math (table 7 and table 8). In other sections of the analysis, student groupings were also sorted into halves, based upon age, to compare the achievement of the younger half of the study group (table 15) to the oldest half (table 16). Student groupings were also sorted into quarters, based upon age. These quarter groupings were students aged sixty-nine to seventy-three months, seventy-four to seventy-six months, seventy-seven to seventy-nine months and eighty to eighty-six months. These groups have been called the youngest quarter (table 17), second youngest quarter (table 18), second oldest quarter (table 19) and oldest quarter (table 20). Within the groupings, means were calculated for combined achievement, language arts achievement and mathematics achievement.

Table 1

## Correlations of All Student Ages with L.A, Math, and Combined Scores

		age in months at the start of grade 1	L. A. Score	Math Score	Combined Score
age in months at the start of grade 1	Pearson Correlation	1	-.071	-.197	-.133
	Sig. (2-tailed)	.	.665	.223	.414
	N	40	40	40	40
L. A. Score	Pearson Correlation	-.071	1	.507**	.932**
	Sig. (2-tailed)	.665	.	.001	.000
	N	40	40	40	40
Math Score	Pearson Correlation	-.197	.507**	1	.784**
	Sig. (2-tailed)	.223	.001	.	.000
	N	40	40	40	40
Combined Score	Pearson Correlation	-.133	.932**	.784**	1
	Sig. (2-tailed)	.414	.000	.000	.
	N	40	40	40	40

\*\* . Correlation is significant at the 0.01 level (2-tailed).

Table 1, Correlations of All Student Ages with L.A, Math, and Combined Scores presents the Pearson product moment correlation coefficient dimensionless index that ranges from -1.0 to 1.0 inclusive and reflects the extent of a linear relationship between the data sets: age in months at the start of grade 1; L.A. Score; Math Score; and Combined Score. Forty students are included in the data set. Correlation between age in months at the start of grade 1 and L.A. Score was -.071, between age in months and Math Score was -.197, and between age in months and Combined Score was -.133. The correlation between L.A Score and Math Score is .507, and between L.A. Score and Combined Score is .932; both were significant at the 0.01 level. The correlation between Math Score and Combined Score was .784, which was also significant at the 0.01 level. A strong correlation was noted between the test scores but not between age in months at the start of grade 1 and the test scores.

Table 2

## Correlations of Girls Ages, L.A, Math, and Combined Scores

		age in months at the start of grade 1	L. A. Score	Math Score	Combined Score
age in months at the start of grade 1	Pearson Correlation	1	-.428	-.298	-.421
	Sig. (2-tailed)	.	.053	.190	.057
	N	21	21	21	21
L. A. Score	Pearson Correlation	-.428	1	.591**	.937**
	Sig. (2-tailed)	.053	.	.005	.000
	N	21	21	21	21
Math Score	Pearson Correlation	-.298	.591**	1	.835**
	Sig. (2-tailed)	.190	.005	.	.000
	N	21	21	21	21
Combined Score	Pearson Correlation	-.421	.937**	.835**	1
	Sig. (2-tailed)	.057	.000	.000	.
	N	21	21	21	21

\*\* . Correlation is significant at the 0.01 level (2-tailed).

Table 2 Correlations of Girls Ages, L.A., Math, and Combined Scores presents the Pearson product moment correlation of the twenty-one girls in the data set. The correlation between age in months at the start of grade 1 and L.A. Score was  $-.428$ , between age in months and Math Score was  $-.298$ , and between age in months and Combined Score was  $-.421$ . The correlation between L.A Score and Math Score was  $.591$ , and between L.A. Score and Combined Score was  $.937$ ; both were significant at the  $0.01$  level. The correlation between Math Score and Combined Score was  $.835$ , which was also significant at the  $0.01$  level. A strong correlation was noted between the test scores but not between age in months at the start of grade 1 and the test scores.

Table 3

## Correlations of Boys Ages, L.A, Math, and Combined Scores

		age in months at the start of grade 1	L. A. Score	Math Score	Combined Score
age in months at the start of grade 1	Pearson Correlation	1	.348	.058	.286
	Sig. (2-tailed)	.	.144	.814	.235
	N	19	19	19	19
L. A. Score	Pearson Correlation	.348	1	.515*	.949**
	Sig. (2-tailed)	.144	.	.024	.000
	N	19	19	19	19
Math Score	Pearson Correlation	.058	.515*	1	.759**
	Sig. (2-tailed)	.814	.024	.	.000
	N	19	19	19	19
Combined Score	Pearson Correlation	.286	.949**	.759**	1
	Sig. (2-tailed)	.235	.000	.000	.
	N	19	19	19	19

\*. Correlation is significant at the 0.05 level (2-tailed).

\*\*. Correlation is significant at the 0.01 level (2-tailed).

Table 3 Correlations of Boys Ages, L.A., Math, and Combined Scores presents the Pearson product moment correlation of the nineteen boys in the data set. The correlation between age in months at the start of grade 1 and L.A. Score was .348, between age in months and Math Score was .058, and between Age in months and Combined Score was -.286. The correlation between L.A Score and Math Score was .515 significant at the 0.05 level, and between L.A. Score and Combined Score was .949 significant at the 0.01 level. The correlation between Math Score and Combined Score was .759, which was also significant at the 0.01 level. A strong correlation was noted between the test scores but not between age in months at the start of grade 1 and the test scores.

Figure 1

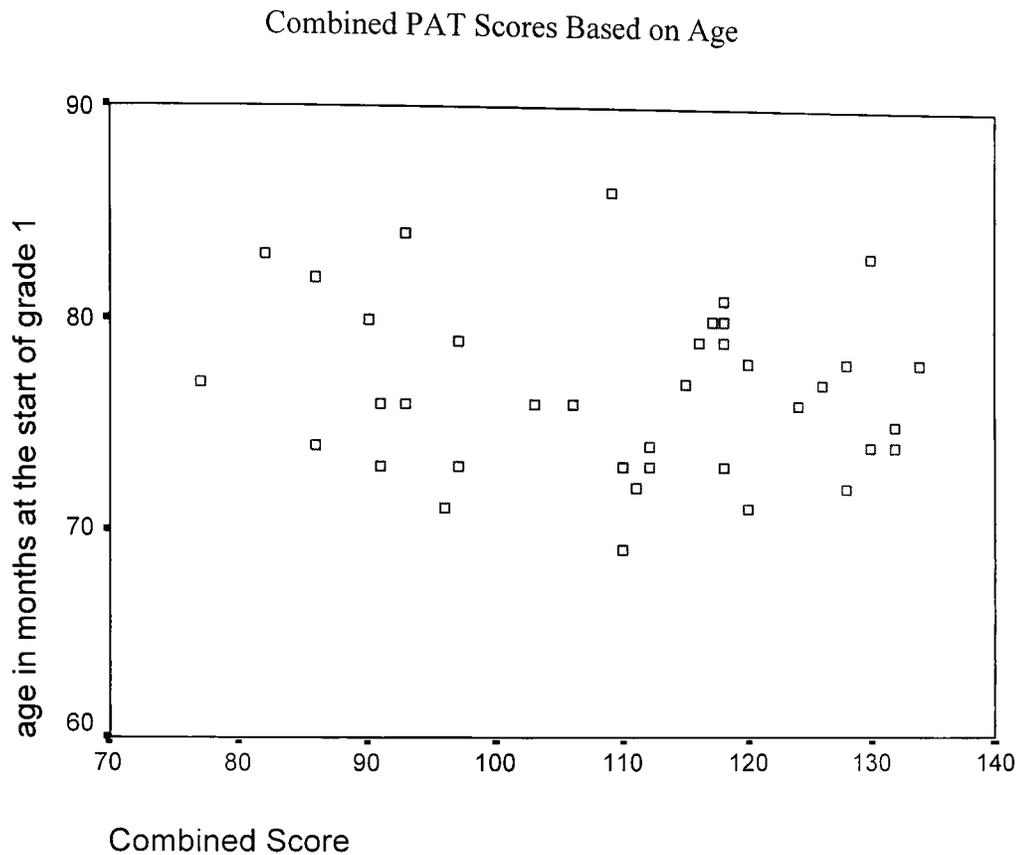


Figure 1, Combined PAT Scores Based on Age, plots the intersects of age in months at the start of grade 1 and the Combined PAT scores for each of the forty students within the data set. It can be observed that the youngest student, starting age of 69 months, scored approximately the same as the oldest student, starting age of 86 months; both scores were close to 110. Also of note is the similarity of the starting ages of students with the lowest combined score, 77 months old, and the highest combined score, 78 months old. Although they were only one month apart in age, their scores were at the extreme ends of the achievement ranges.

Table 4

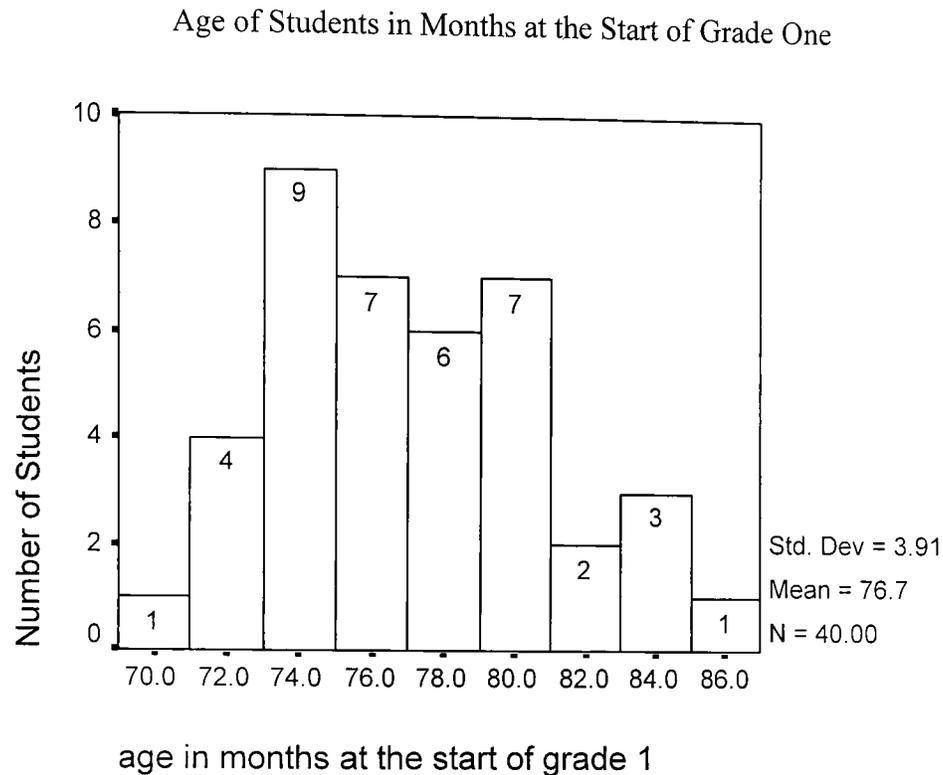


Table 4, Age of Students in Months at the Start of Grade One, indicates the number of students within each of the starting age groupings. One student was in the grouping of 69-71 months of age at the start of grade 1. Four students were between 71 and 73 months, nine students were between 73-75 months, seven students between 75-77 months, six students between 77-79 months, seven were between 79-81 months, two students between 81-83 months, three between 83-85 months and one student was older than 85 months. The mean age of the forty students was 76.7 months at the start of grade one. The standard deviation was 3.91 months.

Figure 2

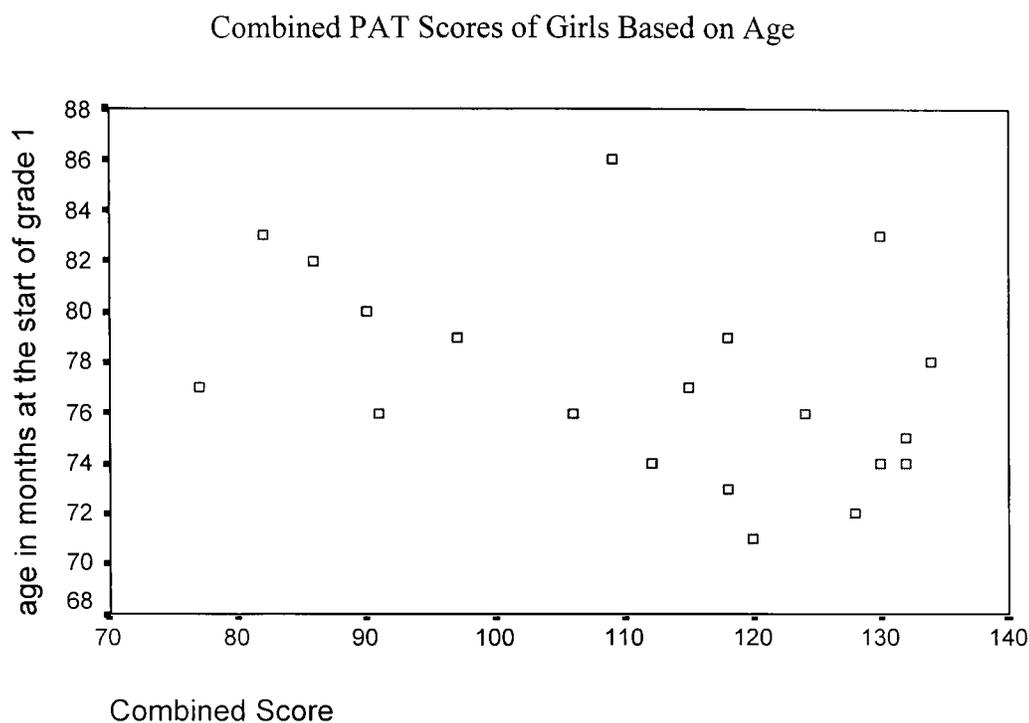


Figure 2, Combined PAT Scores of Girls Based on Age, plots the intersects of age in months at the start of grade 1 and the Combined PAT scores for each of the twenty-one girls within the data set. It can be observed that the youngest student, starting age of 71 months, achieved a combined score of 120. The oldest student, starting age of 86 months, achieved a combined score 109. Also of note is the similarity of the starting ages of students with the lowest combined score, 77 months old at school start, and the highest combined score, 78 months old. Although they were only one month apart in age, their scores were at the extreme ends of the achievement ranges. A negative relationship between age and achievement can be observed by noting a trend that the older students generally had lower achievement than the younger students. The slope from top left to bottom right indicates this.

Figure 3

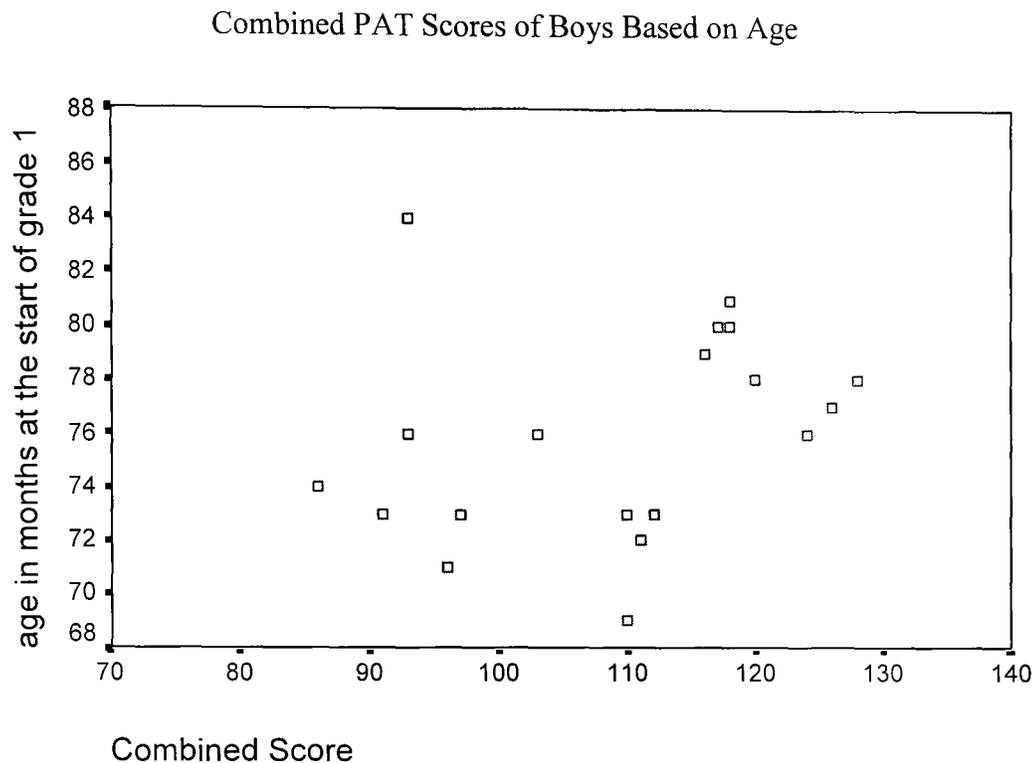


Figure 3, Combined PAT Scores of Boys Based on Age, plots the intersects of age in months at the start of grade 1 and the Combined PAT scores for each of the nineteen boys within the data set. The youngest boys achieved a combined score of 110, the oldest a combined score of 93. A general tendency is observed in a slope from bottom left to top right. The bottom left of the chart contains the frequently lower scores of the younger boys. The top right of the chart represents higher scores of older students. These are indicators of a positive relationship between greater age of boys on the combined test and higher levels of achievement.

Table 5

## Language Arts Scores of Girls on Grade 3 PAT

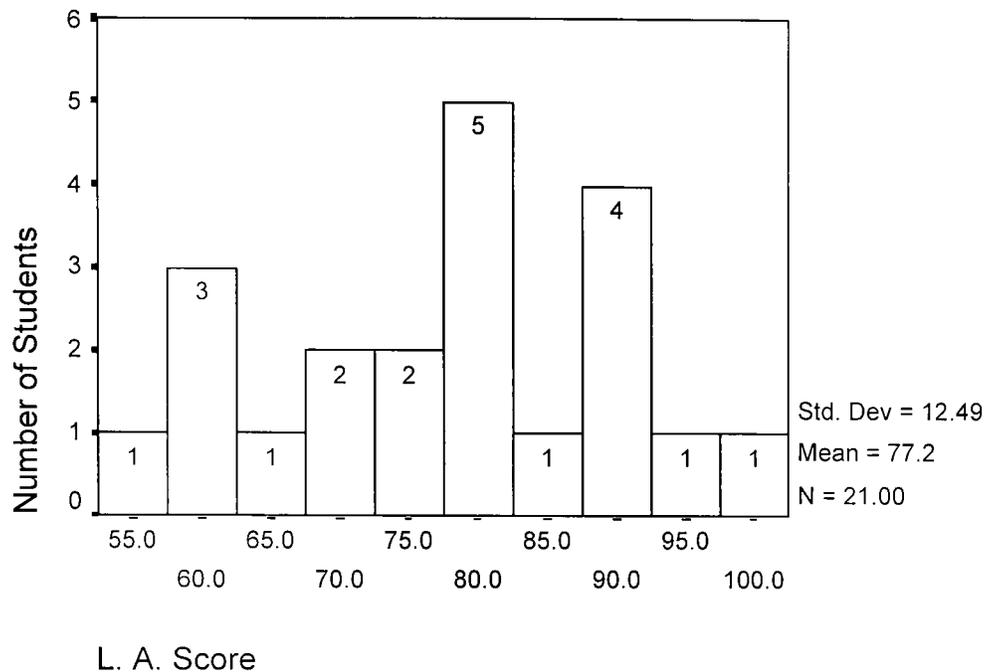


Table 5, Language Arts Scores of Girls on Grade 3 PAT, shows the number of girls within each of the Language Arts achievement groupings. The mean achievement of the twenty-one students was 77.2 with a standard deviation of 12.49. There was one student in the group “55” range with a score lower than the midway point between 55 and 60. One student was in the “100” range with a score greater than the midway point between 95 and 100. The largest cluster of student scores fell within the “80” range, with scores greater than the mid point between 75 and 80 and lower than the mid point between 80 and 85.

Table 6

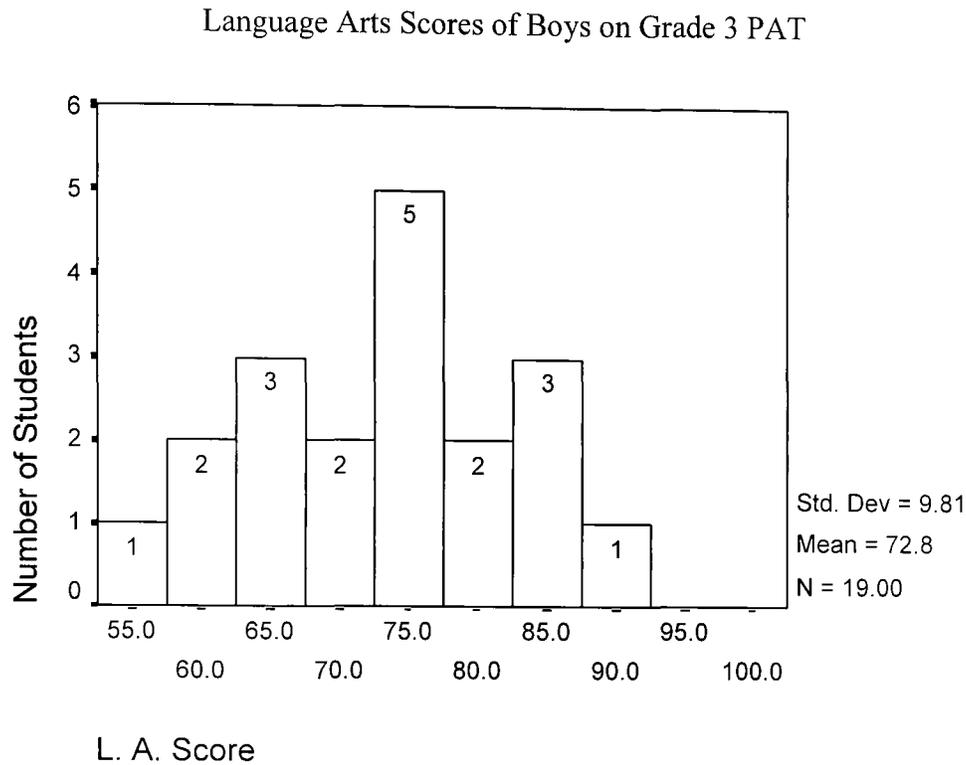


Table 6, Language Arts Scores of Boys on Grade 3 PAT, shows the number of boys within each of the Language Arts achievement groupings. The mean achievement of the nineteen students was 72.8 with a standard deviation of 9.81. There was one student in the group “55” range with a score lower than the midway point between 55 and 60. One student was in the “90” range with a score greater than the midway point between 85 and 90 and lower than the midpoint between 90 and 95. No student in the grouping scored higher than the midpoint between 90 and 95. The largest cluster of student scores fell within the “75” range, with scores greater than the mid point between 70 and 75 and lower than the mid point between 75 and 80.

Table 7

## Math Scores of Girls on Grade 3 PAT

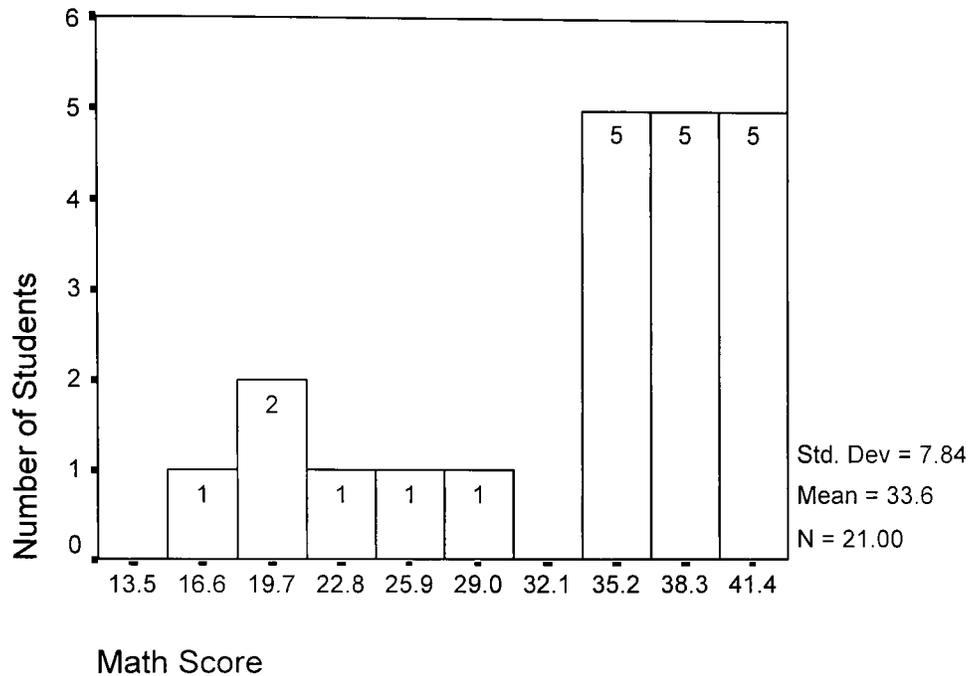


Table 7, Math Scores of Girls on Grade 3 PAT, shows the number of girls within each of the Math achievement groupings. The mean achievement of the twenty-one students was 33.6 with a standard deviation of 7.84. There was one student in the group “16.6” range with a score higher than the midway point between 13.5 and 16.6 but lower than the midway point between 16.6 and 19.7. Five students achieved scores in each of the “35.2”, “38.3” and “41.4” ranges. A pronounced gap can be seen between the highest 15 student scores and the lowest 6 student scores.

Table 8

## Math Scores of Boys on Grade 3 PAT

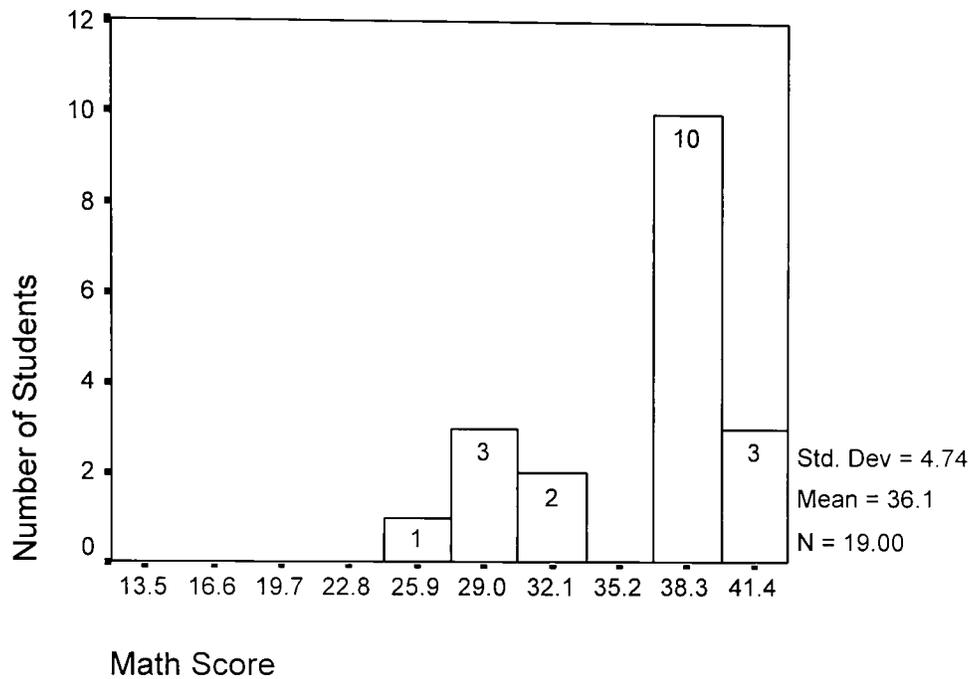


Table 8, Math Scores of Boys on Grade 3 PAT, shows the number of boys within each of the Math achievement groupings. The mean achievement of the nineteen students was 36.1 with a standard deviation of 4.74. There was one student in the group “25.9” range with a score higher than the midway point between 22.8 and 25.9 but lower than the midpoint between 25.9 and 29. There were no student scores in a lower range grouping. A total of thirteen students achieved scores in the upper ranges of “38.3” and “41,4”. A gap was apparent between the highest 13 student scores and the lowest 6 student achievement scores.

Table 9

## Combined Girls and Boys Overall Achievement on Grade 3 PAT

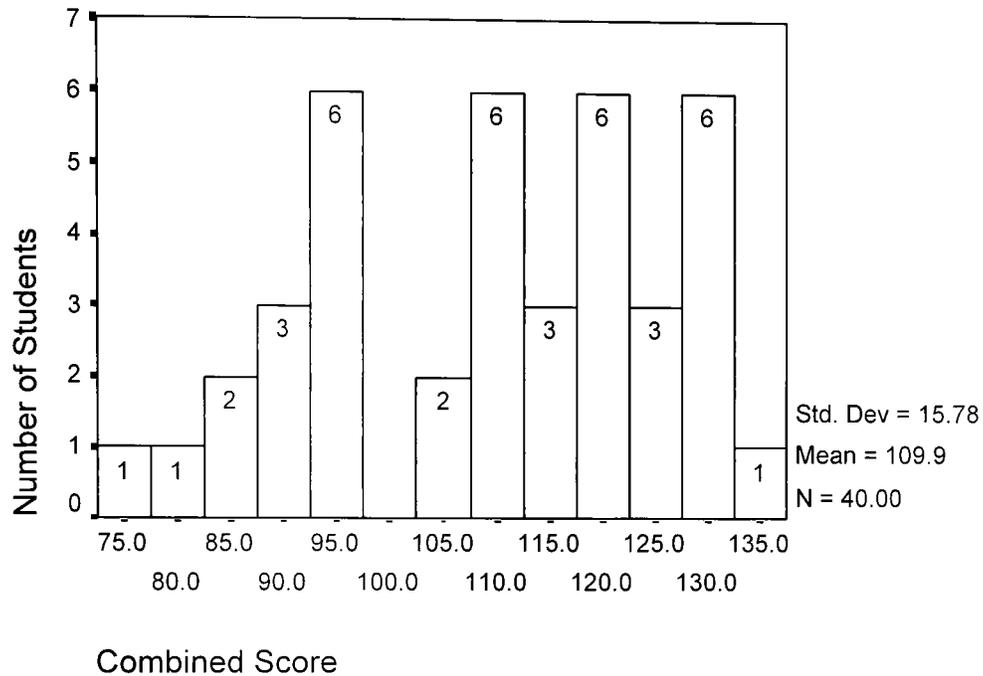


Table 9, Combined Girls and Boys Overall Achievement on Grade 3 PAT, shows the combined Language Arts and Math scores of students within each of the achievement groupings. The mean achievement of the forty was 109.9, with a standard deviation of 15.78. One student scored in each of the “75”, “80” and “135” ranges, these being the low and high extremes of achievements. Six students had scores in each of the “96”, “110”, “120” and “130” achievement ranges.

Table 10

## Combined Girls Achievement on Grade 3 PAT

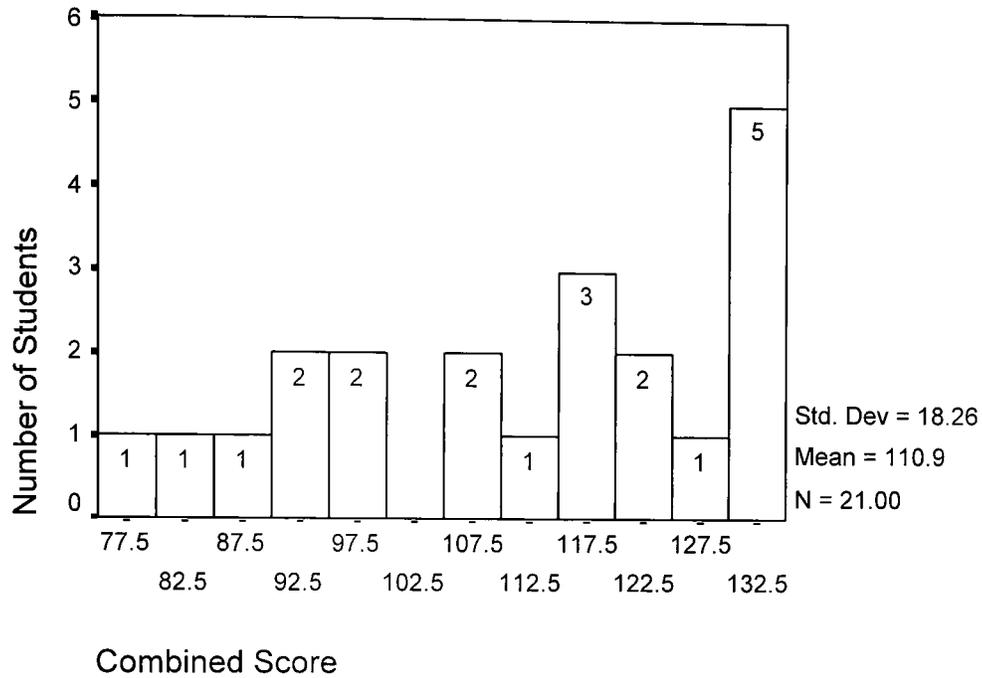


Table 10, Combined Girls Achievement on Grade 3 PAT, shows the combined Language Arts and Math scores of girls within each of the achievement groupings. The mean achievement of the twenty-one girls was 110.9, with a standard deviation of 18.26. One student scored in each of the lowest three group ranges and five students scored in the highest group range. There was a wide distribution of scores, with clustering only at the high achievement level above the midpoint between 127.5 and 132.5.

Table 11

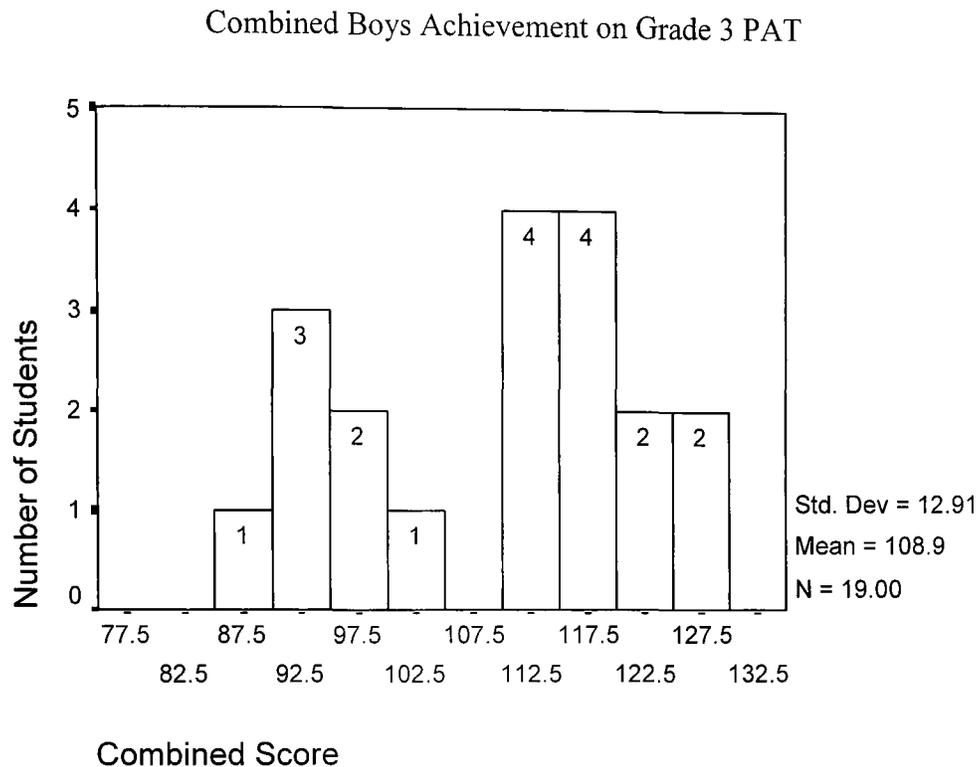


Table 11, Combined Boys Achievement on Grade 3 PAT, shows the combined Language Arts and Math scores of boys within each of the achievement groupings. The mean achievement of the nineteen boys was 108.9, with a standard deviation of 12.91. No students scored in the lowest grouping of “77.5” and “82.5” or in the highest achievement group range of “132.5”. Four students scored in each of the “112.5” and “117.5” ranges, forming a small cluster at and above the mean. No student scores were in the “107.5” range, creating a gap between the highest twelve student scores and lowest seven student scores.

Table 12

## T-Test 1 All Students Combined Scores

	N	Mean	Std. Deviation	Std. Error Mean
age in months at the start of grade 1	40	76.68	3.912	.619
L. A. Score	40	75.13	11.371	1.798
Math Score	40	34.78	6.589	1.042
Combined Score	40	109.93	15.778	2.495

Table 12 T-Test 1, All Students Combined Scores, describes the number of student scores in the group, the mean, standard deviation and the standard error mean of the age in months of the students at the start of grade 1, the Language Arts scores on the grade 3 PAT, the Math scores on the grade 3 PAT, and the Combined Language Arts and Math scores on the grade 3 PAT.

Mean, or arithmetical mean, gives a concept of the mid point of the group of scores. For example, the mean grade one starting age was 76.68 months, and the mean combined score was 109.93. Mean, however, describes very little about the distribution of scores within each grouping. The standard deviation is a measure that tells how tightly the various scores are clustered around the mean in each set of data. When scores in a data set are tightly grouped, the standard deviation will be low; when scores are widely spread the standard deviation will be larger. One standard deviation away from the mean, both lower and greater accounts for 68% of the scores; two standard deviations account for about 95% of the scores. Accordingly 68% of the students would have been either 3.912 months older or younger than 76.68 months of age at the start of grade one and 68% of students would have a combined score of 15.778 either greater than or less than the mean of 109.93. The standard error is a random variable, the standard deviation of

the sample mean, as opposed to the standard deviation of sample values. The standard error is a measure of the variability of the sample mean around the true population mean, inasmuch as the sample mean is an estimate of the population mean.

Table 13

## T-Test 2 Girls Mean, Standard Deviation

	N	Mean	Std. Deviation	Std. Error Mean
age in months at the start of grade 1	21	77.33	3.929	.857
L. A. Score	21	77.19	12.492	2.726
Math Score	21	33.62	7.839	1.711
Combined Score	21	110.86	18.263	3.985

Table 14

## T-Test 3 Boys Mean, Standard Deviation

	N	Mean	Std. Deviation	Std. Error Mean
age in months at the start of grade 1	19	75.95	3.865	.887
L. A. Score	19	72.84	9.811	2.251
Math Score	19	36.05	4.743	1.088
Combined Score	19	108.89	12.909	2.962

Table 16, T-Test 2 and Table 17, T-Test 3 describe the means, standard deviations and standard error means of all girls in the group (T-Test 2) and all boys in the group (T-Test 3). The mean age of the girls' group was 77.33 months at the start of grade one; the boys' mean age was 75.95. Standard deviations were similar between the girls, 3.929, and boys, 3.865. The girls' L.A Score mean was 77.19; the boys' L.A Score mean was 72.84. The girls' L.A Score standard deviation was widely spread at 12.492. The boys' L.A Score standard deviation was more tightly grouped at 9.811. Girls had a Math Score mean of 33.62 while the boys had a mean of 36.05. Standard deviation was again widely spread in the girls' group at 7.839, as compared to the boys' group at 4.743. The girls' Combined Score had a mean of 110.86, with a standard deviation of 18.263. The boys' Combined Score mean was 108.89, with a standard deviation of 12.909.

Table 15

T-Test 4 Youngest Half

	N	Mean	Std. Deviation	Std. Error Mean
age in months at the start of grade 1	21	73.67	1.983	.433
L. A. Score	21	75.43	11.187	2.441
Math Score	21	35.33	5.902	1.288
Combined Score	21	110.76	14.598	3.185

Table 16

T-Test 5 Oldest Half

	N	Mean	Std. Deviation	Std. Error Mean
age in months at the start of grade 1	19	80.00	2.560	.587
L. A. Score	19	74.79	11.868	2.723
Math Score	19	34.16	7.388	1.695
Combined Score	19	109.00	17.346	3.979

Table 15, T-Test 4 and Table 16 T-Test 5, describe the means, standard deviations and standard error means of all subjects after age groupings had been divided into groups depicting the youngest and oldest halves. It was observed that the mean age of the youngest half was 73.67 months at the start of grade 1 while the oldest half was 80.00 months at the start of grade 1. Standard deviations of age were 1.983 in the youngest half and 2.560 in the oldest half. L.A scores of the youngest half were 75.43, as the oldest half had a mean of 74.79. The youngest half's L.A Score standard deviation was 11.187. The oldest half's L.A Score standard deviation was a similar spread, 11.868. The youngest half was observed to have a Math Score mean of 35.33, as the oldest half had a mean of 34.16. Standard deviation in Math of the youngest group was 5.902, as compared to the oldest group at 7.388. The youngest group's Combined Score had a

mean of 110.75, with a standard deviation of 14.589. The oldest group's Combined Score mean was 109.00, with a standard deviation of 17.346. The youngest half had higher mean scores on each test with tighter standard deviations.

Table 17

## T-Test 6 Youngest Quarter, 69 to 73 months

	N	Mean	Std. Deviation	Std. Error Mean
age in months at the start of grade 1	10	72.00	1.333	.422
L. A. Score	10	73.00	9.603	3.037
Math Score	10	36.30	4.523	1.430
Combined Score	10	109.30	11.615	3.673

Table 18

## T-Test 7 Oldest Quarter, 80 months to 86 months

	N	Mean	Std. Deviation	Std. Error Mean
age in months at the start of grade 1	9	82.11	2.088	.696
L. A. Score	9	71.44	10.853	3.618
Math Score	9	33.33	7.599	2.533
Combined Score	9	104.78	17.254	5.751

Table 17, T-Test 6 and Table 18 T-Test 7, describe the means, standard deviations and standard error means of all subjects after age groupings have been divided into groups depicting the youngest and oldest quarters. It was observed that the mean age of the youngest quarter was 72.00 months at the start of grade 1, while the oldest quarter was 82.11 months at the start of grade 1. Standard deviations of age were 1.333 in the youngest quarter and 2.088 in the oldest quarter. L.A mean scores of the youngest quarter were 73.00, as the oldest quarter had a mean of 71.44. The youngest quarter's L.A Score standard deviation was 9.603. The oldest quarter's L.A Score standard deviation was 10.853. The youngest quarter was observed to have a Math Score mean of 36.30, as the oldest half had a mean of 33.33. Standard deviation in Math of the youngest group was 4.523, as compared to the oldest group at 7.599. The youngest group's

Combined Score had a mean of 109.30, with a standard deviation of 11.615. The oldest group's Combined Score mean was 104.78, with a standard deviation of 17.524. The youngest quarter had higher mean scores on each test with tighter standard deviations.

Table 19

## T-Test 8 Second Youngest Quarter, 74 to 76 months

	N	Mean	Std. Deviation	Std. Error Mean
age in months at the start of grade 1	11	75.18	.982	.296
L. A. Score	11	77.64	12.492	3.767
Math Score	11	34.45	7.034	2.121
Combined Score	11	112.09	17.340	5.228

Table 20

## T-Test 9 Second Oldest Quarter, 77 to 79 months

	N	Mean	Std. Deviation	Std. Error Mean
age in months at the start of grade 1	10	78.10	.876	.277
L. A. Score	10	77.80	12.479	3.946
Math Score	10	34.90	7.520	2.378
Combined Score	10	112.80	17.415	5.507

Table 19 T-Test 8 and Table 20 T-Test 9, describe the means, standard deviations and standard error means of all subjects after age groupings have been divided into groups depicting the second youngest and second oldest quarters. It was observed that the mean age of the second youngest quarter was 75.18 months at the start of grade 1, while the second oldest quarter was 78.10 months at the start of grade 1. Standard deviations of age were .982 in the second youngest quarter and .879 in the second oldest quarter. L.A mean scores of the second youngest quarter were 77.64, as the second oldest quarter had a mean of 77.80. The second youngest quarter's L.A Score standard deviation was 12.492. The second oldest quarter's L.A Score standard deviation was 12.479. The second youngest quarter was observed to have a Math Score mean of 34.45, as the second oldest half had a mean of 34.90. Standard deviation in Math of the second

youngest group was 7.034, as compared to the second oldest group at 7.520. The second youngest group's Combined Score had a mean of 112.09 with a standard deviation of 17.340. The second oldest group's Combined Score mean was 112.80 with a standard deviation of 17.515. The second youngest and the second oldest groups had similar means and standard deviations in each of the score categories.

## Discussion

In this chapter, I will review the research hypothesis, in order, with reference to the findings.

*H<sub>0</sub>:1*

It was hypothesized that, “There are no relationships between the age of students entering grade one and overall combined student achievement at the conclusion of their first year in grade three.”

Pearson Correlation indicated -.133 association between age of entry into grade one and combined achievement on Provincial Achievement Test scores at the end of grade 3 (table 1). An insignificant relationship was revealed between younger students achieving higher marks on the tests. This can be interpreted that within the sample group very little relationship exists between the two variables. Correlation lends support to the hypothesis that there was no relationships between the age of students entering grade one and overall combined student achievement at the conclusion of their first year in grade three.

The mean average combined score was 109.93 (table 12 t-test 1). The oldest quarter grouping of students had the lowest mean of 104.78 (table 18 t-test 7); 5.15 below the full group’s mean. The youngest quarter grouping had the second lowest mean of 109.30 (table 17 t-test 6); 0.63 below the full group’s mean. The second youngest quarter and the second oldest quarter had similar means of 112.09 (table 19 t-test 8) and 112.80 (table 20 t-test 9) respectively; 2.16 and 2.87 above the full group’s mean. The youngest half of the students had a mean average of 110.76 (table 15 t-test 4), while the oldest half

had a mean of 109.00 (table 16 t-test 5). The oldest group of students did most poorly of all groupings.

#### *H<sub>0</sub>:2*

It was hypothesized that, “There are no relationships between the age of students entering grade one and overall achievement by gender at the conclusion of their first year in grade three.”

Correlations using gender, age and overall achievement indicated that girls had a -.421 relationship (table 2), while the boys had a +.286 relationship (table 3). These moderate correlations showed that the younger girls in this sample group had a tendency to score higher than the older girls in the sample group and that the older boys scored higher than the younger boys in the sample group. It appeared that a low yet statistically insignificant relationship exists between the age of students entering grade one and overall achievement by gender at the conclusion of their first year in grade three.

Mean calculations of combined student achievement showed an average of 109.93 (table 12 t-test 1). Boys had an average of 108.89 (table 14 t-test 3); girls averaged 110.86 (table 13 t-test 2). Girls scored somewhat higher on overall achievement than did the boys.

#### *H<sub>0</sub>:3*

It was hypothesized that, “There are no relationships between the age of students entering grade one and combined student achievement in mathematics at the conclusion of their first year in grade three.” Correlations of age and achievement in mathematics indicate -.197 relationship (table 1). An insignificant relationship was revealed between younger students achieving higher marks on mathematics tests. This can be interpreted

that within the sample group very little relationship exists between the two variables. Correlation lends support to the hypothesis that there was no relationships between the age of students entering grade one and student achievement in mathematics at the conclusion of their first year in grade three.

The mean average student achievement in mathematics was 34.78 (table 12 t-test 1). The oldest quarter grouping of students had the lowest mean of 33.33 (table 18 t-test 7); 1.45 below the full group's mean. The youngest quarter grouping had the highest mean of 36.30 (table 17 t-test 6); 1.52 above the full group's mean. The second youngest quarter and the second oldest quarter had similar means of 34.45 (table 19 t-test 8) and 34.90 (table 20 t-test 9) respectively; 0.33 and 0.02 above the full group's mean. When the youngest half and oldest half were compared, younger students scored 35.33 (table 15 t-test 4), and older students scored 34.16 (table 16 t-test 5). The oldest group of students did most poorly of all groupings and the youngest students scored the highest of all groupings.

#### *H<sub>0:4</sub>*

It was hypothesized that, "There are no relationships between the age of students entering grade one and student achievement by gender in mathematics at the conclusion of their first year in grade three." Correlations using gender, age and achievement in mathematics indicated that girls had a -.298 relationship (table 2), while the boys had a +.058 relationship (table 3) between age of entry into grade one and achievement in mathematics on Provincial Achievement tests. Weak indicators were presented showing that younger girls in the sample group scored higher than the older girls in the group. No relationship was identified with the boys in the group.

Mean calculations of student achievement in mathematics showed an average of 34.78 (table 12 t-test 1). Boys had an average of 36.05 (table 14 t-test 3); girls averaged 33.62 (table 13 t-test 2). Boys scored somewhat higher on mathematics achievement than did the girls.

*H<sub>0</sub>:5*

It was hypothesized that, “There are no relationships between the age of students entering grade one and combined student achievement in language arts at the conclusion of their first year in grade three.” Correlations of age and achievement in language arts indicate -.071 association (table 1). No relationship was revealed between older students achieving higher marks on language arts tests. Correlation lends support to the hypothesis that there was no relationships between the age of students entering grade one and student achievement in language arts at the conclusion of their first year in grade three.

The mean combined student achievement in language arts was 75.13 (table 12 t-test 1). The oldest quarter grouping of students had the lowest mean of 71.44 (table 18 t-test 7); 3.69 below the full group’s mean. The youngest quarter grouping had the second lowest mean of 73.00 (table 17 t-test 6); 2.13 below the full group’s mean. The second youngest quarter and the second oldest quarter had similar means of 77.64 (figure 19 t-test 8) and 77.80 (table 20 t-test 9) respectively; 2.51 and 2.67 above the full group’s mean. When the youngest half and oldest half were compared, younger students scored 75.43 (table 15 t-test 4) and older students scored 74.79 (table 16 t-test 5). Again the oldest group of students did most poorly of all groupings.

*H<sub>0</sub>:6*

It was hypothesized that, “There are no relationships between the age of students entering grade one and student achievement by gender in language arts at the conclusion of their first year in grade three.” Correlations using gender, age and achievement in language arts indicated that girls had a  $-.428$  relationship (table 2), while the boys had a  $+.348$  relationship (table 3) between age of entry into grade one and achievement on Provincial Achievement tests in language arts. This was the greatest difference of all the comparisons. Indicators were presented showing that younger girls in the sample group scored higher than the older girls in the group and that older boys scored higher than the younger boys in the group.

Mean calculations of student achievement in language arts showed an average of 75.13 (Table 12 t-test 1). Boys had an average of 72.84 (table 14 t-test 3); girls averaged 77.19 (table 13 t-test 2). Girls scored higher on language arts achievement than did the boys.

## Conclusions

In this section I will discuss each hypothesis, and the study findings, with references to the literature and previous academic work. Suggestions for further study will be presented as well.

### *Conclusions Regarding the Null Hypotheses*

*Conclusion 1.* Relationships of the age of students entering grade one and overall combined student achievement at the conclusion of their first year in grade three (H<sub>0:1</sub>). Age of entry into grade one did not statistically significantly correlate with combined student achievement at the completion of grade three. Correlation was negative but statistically insignificant meaning no relationship existed between age and achievement in the sample group. The null hypothesis, H<sub>0:1</sub>, was retained.

*Conclusion 2.* Relationships of the age of students entering grade one and overall achievement by gender at the conclusion of their first year in grade three (H<sub>0:2</sub>). The girls in the study had a negative, statistically insignificant relationship between age and achievement. A tendency was observed that younger girls performed somewhat higher on Provincial Achievement Tests. The boys had a positive, statistically insignificant relationship. Younger boys in the group did not perform as well as the older boys. Both correlations were below statistical significance when measured at the 0.95 level. The null hypothesis, H<sub>0:2</sub> was retained.

*Conclusion 3.* Relationships of students age entering grade one and combined student achievement in mathematics at the conclusion of their first year in grade three (H<sub>0:3</sub>). Age of entry into grade one did not significantly correlate with student achievement in mathematics at the completion of grade three. Correlation was negative

but statistically insignificant meaning no relationship existed between age and achievement in the sample group. The null hypothesis,  $H_0:3$ , was retained.

*Conclusion 4.* Relationships of age of students entering grade one and student achievement by gender in mathematics at the conclusion of their first year in grade three ( $H_0:4$ ). The girls in the study had a negative, statistically insignificant relationship between age and mathematics achievement. A tendency was observed that younger girls performed somewhat higher on Provincial Achievement Tests. The boys had a positive, insignificant relationship. Boys as a group had higher achievement than the group of girls however both correlations were below statistical significance at the 0.95 level. The null hypothesis,  $H_0:4$  was retained.

*Conclusion 5.* Relationships of age of students entering grade one and combined student achievement in language arts at the conclusion of their first year in grade three ( $H_0:5$ ). Correlations between age and language arts achievement revealed no relationship within the study group. The null hypothesis,  $H_0:5$  was retained.

*Conclusion 6.* Relationships of age of students entering grade one and student achievement by gender in language arts at the conclusion of their first year in grade three ( $H_0:6$ ). The largest contrasts in the study were observed in language arts achievement gender groupings. The girls in the study had a negative, insignificant relationship between age and language arts achievement. A tendency was observed that younger girls performed somewhat higher on Provincial Achievement Tests than did older girls. The boys had a positive, insignificant relationship. Younger boys in the group did not perform as well as the older boys. Girls as a group had higher achievement than the

group of boys however both correlations were below statistical significance at the 0.95 level. The null hypothesis,  $H_0:6$  was retained.

This study examined the relationships that exist between age of entry into grade one and the Academic Success of Students at the conclusion of their first year in grade three. The six null hypotheses stated that there were no statistically significant relationships between the age of students at the start of grade one and student achievement at the conclusion of grade three in either of language arts or mathematics for girls and boys or girls and boys combined. All of the six null hypotheses were retained.

The finding in this specific study group were similar to that of Koep (1980) who conducted a study with 1 341 pupils in grades three, four, six, and eight to determine whether their age at school entrance made any difference to their academic achievement in later years. Koep felt results were inconclusive and indicated the need for an in depth, longitudinal study. In "Study of Early Entry into First Grade" (1974) results indicated that younger students may be able to do well academically, but will be less self-reliant and less socially accepted. Klein (1965) concluded that high I.Q. did not assure school success under regular classroom conditions, and that early admission produced educational, social and emotional impairment in many children with girls being less adversely affected by early entrance. The current study found girls less affected than boys by starting school at a young age. Younger girls in the current study performed equally if not better than their older counterparts while younger boys performed more poorly than their older counterparts. This had support of Conlin (2003) who found boys to be developmentally and physically delayed in comparison to girls of the same age. For example even the nerves on boys' fingers develop later than girls', making it difficult to

hold a pencil. Conlin feels these developmental differences often unfairly sideline boys as slow or dumb, planting distaste for school as early as the first grade. Conlin also contends that girls have greater sensory capacities and biosocial aptitudes to determine exactly what the teacher wants and needs, whereas boys tend to be more anti-authoritarian, competitive, and risk-taking.

Hedges (1978) noted the inadequacy of chronological age as a predictor of success and indicated an optimum mental age of six and a half years for most cases. The current study supports that chronological age shows no relationship with academic success. Hedges (1976), found that various criteria included chronological age, mental age, I.Q. sex and physical development each had influence upon achievement. Boys in the current study showed positive correlation to age and higher achievement while girls showed a negative correlation.

Several findings in the current study are contrary to other studies. Barnsley (1988) contends that younger children entering Grade 1 achieve significantly less than their older classmates. Hebbler (1983) felt that very few five year olds are ready for first grade. In the current study it was found through mean comparisons of the youngest half in relation to the oldest half and the youngest quarter in relation to the oldest quarter that younger students performed better however statistically insignificantly better than their older counterparts on language arts and math Provincial Achievement Tests.

The results of this study present encouraging news to parents and teachers of younger children. It appears that age of entry into first grade was a minor, perhaps statistically insignificant factor, in predicting academic success as measured by achievement on Provincial Achievement Tests in this sample group. Younger children

can achieve at a similar level as older children within the same grade. More prudent concern may exist in the area of gender inequity.

*Recommendations for Further Study*

The current group sample size was small, with forty students. A grouping of this size may have had an unanticipated influence on the observed results. Other published studies presented sample sizes varying from fifty-six to greater than one thousand three hundred. The study of a larger grouping lends greater statistical significance to a conclusion with the ability to generalize to future groups of students. An extension of this study using results of every child's grade three Provincial Achievement Test results in the Province of Alberta could yield a sample group of more than thirty-eight thousand students based on 2001-2002 testing. A group of this size could lend security to any conclusion and would provide a sample size much greater than available in any of the studies in the literature review. Support for the study would need to come from Alberta Learning. The Director of the Achievement Testing Program, Gilbert Guimont, has offered assistance where it is possible. Results of testing are presented publicly through the Internet and in various newspapers. Results are accessible in current year or multi year comparisons grouped by grade, subject, school and school district. Publicly accessible information does not contain gender, age or individual scores however Mr. Guimont feels that the Psychometrics Unit may be able to generate this data. A large grouping of this type would also eliminate the potential influence of special programs offered selectively by schools. The students in the current study group, for example, attend a school that offers several programs to support reading, Early Intervention, Early Literacy, Emerging Literacy, and Later Literacy and programs that support family

development, Making Connections. The influence of these programs and services may have had a compensatory or resultant influence upon the observed outcomes. In a study that encompassed the entire student body of the Province of Alberta, this type of influence may be negated.

An additional study that examined potential long-term relationships that may exist between age of entry into first grade and achievement at the conclusion of grades three, six, nine and twelve may have additional value. If age plays a role in influencing achievement, it would be of value to determine how long that relationship existed or if the influence was compensated for or overcome after a duration of time.

A final aspect to consider is the addition of a qualitative aspect to the study to ascertain parent and student perception regarding age, achievement relationships. Within the current study nine of the forty children were old enough to have started school a year earlier than they actually did. The questions must be asked, why did this group of children have a delayed start to first grade? Was there advice from a kindergarten teacher to delay entry to first grade, did the parent see some need in the child to delay first grade? Perhaps most importantly, did delaying the start of first grade have any beneficial aspect to the child and family?

## References

- Aitken, A. (2000). *AISI and the superintendent: Opportunities for new relationships*.  
Paper presented at the CSEE Symposium, Edmonton.
- Alberta Learning. *How are achievement tests developed?* Retrieved July 10, 2003, from  
[www.learning.gov.ab.ca](http://www.learning.gov.ab.ca).
- Ananda, S.& Rabinowitz, S. (2000). The high stakes of high-stakes testing. *WestEd*, San  
Francisco, Ca. (ERIC Document Reproduction Service No. ED 455254).
- Barnsley, R. (1988). *Annual meeting of the Canadian society for the study of education*.  
*Birthdate and performance: The relative age effect*. Windsor, Ontario.
- Barth, R. (1990). *Changing schools from within*. San Francisco: Jossey-Bass.
- Barth, R. (2000). *Learning by heart*. San Francisco: Jossey-Bass.
- Blum, R. (1964). *Utopiates: the use and users of LSD-25*. New York: Atherton Press.
- Broward County School Board. (1974). *A study of early entry into first grade, 1973-74*.  
Fort Lauderdale.
- Burger, J.; Aitken, A.; Brandon, J. (December 2001). The next generation of basic  
education accountability in Alberta, Canada: A policy dialogue. *International  
Electronic Journal for Leadership in Learning*, 5(19).
- Cheng, L.& Couture, J. (2000). Teachers' work in the global culture of performance.  
*Alberta Journal of Educational Research*, 46, 65-74.
- Chomsky, N. (2000). *Chomsky on miseducation*. New York: Rowan and Littlefield.
- Cimbricz, S. (2002). State mandated testing and teachers' beliefs and practices.  
*Educational Policy Analysis Archives*, 10(2).

Conlin, M. (2003, May 26). The Gender Gap (Electronic version). *Business Week online*.

[http://www.businessweek.com/magazine/content/03\\_21/b3834001\\_mz001htm](http://www.businessweek.com/magazine/content/03_21/b3834001_mz001htm)

Doufour, R. & Eaker, R. (1998). *Professional learning communities: Best practices for enhancing student achievement*. Virginia: Association for Supervision and Curriculum Development.

Fullan, M. (1999). *Change forces: The sequel*. London: Falmer.

Fullan, M. (2001). *The new meaning of educational change*. New York: Teachers College Press.

Hargreaves, A., & Fink, D. (2000). The three dimensions of reform. *Educational Leadership*, 55(7).

Hedges, W. (1976). When should parents delay entry of their child into the first grade?

*Florida educational research and development council research bulletin*, 11,

Florida educational research and development council, inc.

Hedges, W. (1978). *Annual meeting of the American educational research association. At what age should children enter first grade: A comprehensive review of the research*. Toronto, Ontario.

Hebbeler, K. (1983). *Follow-up study of students in the early admission program*.

Montgomery County Public Schools, Rockville, MD: Dept. of Educational Accountability. (ERIC Document Reproduction Service No. ED 228 360).

Huitt, W. & Hummel, J. (2003, January). Cognitive Development. Retrieved November

24, 2003 from Educational Psychology Interactive website:

<http://chiron.valdosta.edu/whuitt/col/cogsys/piaget.html>

- Joyce, B., & Showers, B. (1998). *Student achievement through staff development*. New York: Longman.
- Klein, J. & Breniman, E. (1965). *Longitudinal study of children in Somerset county who were permitted to enter school early under Act 312 of the 1949 Pennsylvania general assembly*. Somerset County Schools, Special Education Office. Somerset, Pa.
- Koep, R. (1980). *Staff study: unpublished, April 1980. 56p*. University of Lethbridge
- Kohn, A. & Booi, L. (2000). Standardized-tests; Student-evaluation; Educational-tests-and-measurements. *ATA-Magazine, 81 (1)*, p 41.
- Koretz, D. (1991). *Annual meeting of the American educational research association and the National council on measurement in education. The effects of high-stakes testing on achievement: Preliminary findings about generalization across tests*. Chicago, Illinois.
- Linn, R. (2000, March) Assessments and Accountability. *Educational researcher*, p. 14.
- Lynd, C. (2000). The new generation of standardized testing. *Center for Educational Reform*. Washington, DC.
- McConaghy, T. (2000). The case against tougher standards. *ATA-Magazine, 81 (1)*, p 20.
- Mussen, P. Conger, J. & Kagan, J. (1969). *Child Development and Personality third edition*. New York, Evanston and London: Harper & Row.
- Popham, J. (1999). Why standardized tests don't measure educational quality. *Educational Leadership. 56(6)*.
- Radwansky, G. (1987). *Ontario study of the relevance of education and the issue of dropouts*. Toronto: Ministry of Education.

- Scafidi, B.; Freeman, C.; DeJarnett, S. (October 2001). Local flexibility within an accountability system. *Educational Policy Analysis Archives*.
- Schnoker, M. (2000). The results we want. *Educational Leadership*, 57 (5).
- Schulte, A. Villwock, D. Whichard, S. & Stallings, C. (2001). High stakes testing and expected progress standards for students with learning disabilities: A five-year study of one district. *School psychology review*, 30 (4), p. 487.
- Svidal, S. (1999). School boards to continue to set own early grade 1 entrance age. *The Alberta Teachers Association*, 33 (18).
- Townsend, D. (1998). The impact of educational reforms on the operations of Alberta's public education system: A comparison of the perceptions of superintendents, principals, and teachers. *CARE Publications*, University of Lethbridge.
- Uphoff, J.& Gilmore, J. (1985). Pupil age at school entrance-how many are ready for success? *Educational leadership*, 43 (1), pp. 86-90.
- Uphoff, J. & Gilmore, J. (1986). Viewpoint 2. Pupil age at school entrance-how many are ready for success? *Young children*, 41 (2), pp. 11-16.
- Vygotsky, L. (1978). *Mind in Society*. Cambridge, MA: Harvard University Press.
- Webber, C., & Townsend, D. (1997). The comparative politics of accountability of New South Wales and Alberta. In R.J.S. Macpherson (Ed.), *The politics of accountability*. Thousand Oaks: Corwin.