# CTBS Normative Data Developed for Use With First Nation-Operated Schools: A Case for Local Norms

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Abstract

The low academic achievement of First Nation students is a concern for many educators. Testing the achievement of students from cultures other than the culture in which a test was developed poses the problem of invalid results for a number of reasons. A solution has been to renorm tests to a local standard of performance. The Canadian Tests of Basic Skills (CTBS) was administered in two First Nation communities to 388 subjects in grades 3 to 8 for the purposes of establishing local norms and examining the psychometric properties of selected tests for the sample. A 2 x 11 x 6 repeated measures analysis of variance revealed main effects for percentile type and subtest, a percentile type x subtest interaction, and a percentile type x subtest x grade interaction. The results indicated that achievement lags at least 2 years below grade level. For all CTBS subtests and all grades the mean performance according to national percentile norms was significantly lower than mean performance according to local percentile norms. The results showed that local norms are justified for all subtests, especially for the language tests. The CTBS subtests were found to be internally consistent, and valid, to a certain degree. Educators are cautioned, despite the development of culturally relevant norms, against employing a single measure for educational placement decision making or judging students' potential.

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# CTBS Normative Data Developed for Use With First Nation-Operated Schools: A Case for Local Norms

Past literature has revealed that the education of First Nation students has been unsuccessful (Rhodes, 1990). Specifically, their academic achievement has been of concern to many educators in North America (Cameron, 1990). The academic achievement of the First Nation student is described as low, whether assessed by standardized math and English proficiency exams (Gipp & Fox, 1991), rates of dropping out (Ledlow, 1992; Eberhard, 1989), or post-secondary completion rates (Astin, 1982). It has been these measures of academic achievement, particularly standardized tests, that have posed problems in cross-cultural assessment. Comparisons made between children from ethnic groups not included in the norming procedures of tests with those who were included are not meaningful nor are they fair (Seyfort, Spreen, & Lahmer, 1980). The standardization procedures of such tests have raised the question of whether the existing norms can be applied to First Nation children and still serve as a useful tool for comparison. It was the primary objective of the present thesis to rectify some of the problematic issues in standardized testing by developing local normative data for use with the Canadian Tests of Basic Skills (CTBS) achievement battery in First Nation-operated schools.

The thesis begins with a broad description of the First Nation People of Canada. Next, the question as to why the CTBS should be renormed is discussed. Previous literature on the performance of First Nation children on intelligence and achievement tests is then addressed. Researchers have posed a number of hypotheses regarding reasons for the patterns of performance of these children on various standardized tests. It was not within the scope of this study to provide a comprehensive review of all of the literature on these issues, thus, a few were chosen on which to focus. These included: socioeconomic and familial explanations; cultural incongruence; attitudes, self-concept, and motivation; the language barrier; learning styles, cognitive styles and hemispheric dominance; and test

bias. Description of the CTBS and its standardization procedures are then provided followed by the rationale for the study, namely, the development of local CTBS norms for use with First Nation students.

In the methodology section of this paper, descriptions of the participating communities, students, a description of the CTBS subtests, and a review of the CTBS are provided. The method section also illustrates the administration and scoring procedures incorporated in this study. The findings, with respect to two main research objectives are presented in the third section of the paper. The results are then discussed in terms of language background, motivation, and socioeconomic status which appeared particularly relevant when observing the participants. Directions for future research and limitations of the present study are examined.

## The First Nation People of Canada

There are numerous terms employed in referring to and describing Canada's First Nation people. The term "Indian" is a misnomer but has been widely used in the past to refer to the heterogeneous group now collectively referred to as First Nation or Aboriginal Canadians. In the year 1492, Columbus landed on the shores of North America and assumed he had reached his destination, India. Based on this misconception he mistakenly referred to the inhabitants as Indians (Emerson, 1987).

The Canadian Constitution categorizes Aboriginal or Indigenous peoples into the following groups: Indian, Inuit, and Metis (Dickason, 1992). Within the category of Indian a further distinction was made between status and non-status. The distinction of status is primarily legal in nature, and essentially means that this group falls under the provisions of the Indian Act and has access to reserve lands and federally funded programs, such as housing and education. There are an estimated 500,000 Aboriginal people who are considered to have Indian status (Dickason, 1992). Within this paper, the

terms First Nation, Aboriginal and Native are used interchangeably, and should be considered synonymous.

It is imperative in any discussion concerning people of non-majority cultures to consider the context in which they live. The following statements and statistics are broad descriptions of Native Canadians as a collective, from the 1996 Census data conducted by Statistics Canada. In terms of demographics, Aboriginal or Native people comprise about 3% of Canada's total population. In 1996, the Aboriginal (i.e., those who reported as identifying with at least one Aboriginal group: North American Indian, Metis, or Inuit) population of Canada was reported as being 799,010. This group of Canadians is growing at a significantly higher rate than the general population (Currie, 1998).

According to Currie (1998), economically, the average employment income of Native Canadians is approximately $17,382, which is 34% below the national average income of $26,474. The average of Native earnings, on reserve, was reported as $14,055. In terms of family income, Currie reported that 60% of Native children under the age of 6 were in what was termed a low-income family, as compared to the national rate of 25%. The incidence of low-income was 48% for Native children between the ages of 6 and 14. This rate was more than double the national rate of 22%. In terms of family structure, Currie reported that almost one third of all Native children under the age of 15 lived in a lone-parent family, that is, twice the rate of the general population.

The statistics obtained from Canadian 1996 Census data provide some insight into the socioeconomic and familial background of the Native child, and how his or her background differs from that of a non-Native child. Just as it is important not to generalize about the socioeconomic and cultural backgrounds of non-Native Canadians, not all Native Canadians are of the same socioeconomic background. Although it is inappropriate to make generalizations about any cultural group, the majority of Native people in Canada have been characterized by the above statistics. In comparison to the non-Native child, the Native child appears to be from an economically disadvantaged

background, in addition to having a higher chance of living in a single parent household. These differences may render any comparisons between the Native and non-Native child inadequate, especially with the use of test instruments developed for use within the non-Native, mainstream population (Darou, 1982).

Why Renorm the Canadian Tests of Basic Skills?

Since the introduction of Ontario province-wide testing of Grade 3 students, in 1997, educators in both the provincial and band-operated educational systems, are becoming increasingly aware of the academic performance of Canadian school children (D. Moore, personal communication, October 15, 1997). Standardized tests have been employed in local band-operated schools for a number of years in order to examine the academic standing of Native students in comparison to their Canadian agemates. Some band-operated schools are presently using the scores from the Canadian Tests of Basic Skills to examine where Native children stand on the Canadian scale. These standardized tests serve to measure a school's relative worth. The results are useful in improving the curriculum and ensuring that students attending band-operated schools are on par with Canadian standards (D. Moore, personal communication, October 15, 1997).

However, the literature on standardized tests suggests that when attempting to compare two different groups or cultures within the population, problems often arise. Cross-cultural testing is complex (Janzen, Skakum & Lightning, 1994) and drawing comparisons from the results of such testing is often questionable. Researchers have argued against the use of standardized tests among cultural groups for which they have not been normed. Specifically, measures currently employed to assess the achievement and intelligence of Native children have been criticized because they have not been standardized on Native populations (Darou, 1982). This study was designed to address some of these concerns through the development of First Nation normative data for the Canadian Tests of Basic Skills. A review of the literature has revealed that First Nation

students have frequently not performed at norm levels on tests of achievement and intelligence which is the focus of the next section.

The Performance of First Nation Students on Achievement and Intelligence Tests

Most of the literature on Native intelligence is drawn from studies of both American Indian and Native Canadian intelligence assessment conducted between the late sixties and early nineties. Very little research has been published on Native performance on the most recent edition of the Wechsler Intelligence Scale (WISC-III). Indeed, only one study was found on the development of WISC-III normative data for Tohono O'odham Native American children (Tanner-Halverson, Burden, & Sabers cited in Bracken & McCallum, 1993). As such, the information provided within this section focuses on Native assessment with the WISC and the WISC-R.

Patterns on intelligence tests suggest that Native people score below average in verbal performance, and average to above-average in non-verbal performance with significant discrepancies between the two (McShane & Plas, 1988; Common & Frost, 1988). A study of 100 seven to fifteen year old Cree and Ojibwa students with the WISC revealed that the mean Performance IQ was 101 which is in the normal range, however, mean Verbal IQ was lower at 70 (St. John, Krichev, & Bawman, 1976). St. John et al. also reported that the Performance-Verbal IQ differences lowered with age. In a study of Navajo intelligence using the WISC-R, Hynd, Quackenbush, Kramer, Conner, and Weed (1979) examined a nonreferred sample of 44 primary grade students and reported a mean Verbal IQ of 64, a mean Performance IQ of 95 and a mean Full scale IQ of 77. Hynd et al. indicated that the WISC-R verbal subtests tapping into the skills of receptive and expressive English were lowest and further suggested that some Performance subtests (i.e., Picture Completion, Block Design, Object Assembly, and Coding) appear to provide a non-biased estimate of learning potential. McShane (1980) noted a similar Verbal

IQ-Performance IQ discrepancy of 11- to 14 points between the scales for 68 Ojibwa and Sioux students in a study employing the WISC.

The findings of such studies using the Wechsler scales were further substantiated by McCullough, Walker, and Diessner (1985) who studied 75 Native American high school students in the Columbia River Basin. All students attended the Tribal school. Forty-two students were administered the WISC-R, the remaining thirty-three were administered the WAIS, and all 75 students were administered the STEP achievement tests for validity purposes. Verbal scale scores of the Wechsler tests (WISC-R and WAIS) were found to be significantly below the normative mean. The Performance scale scores were at or above the normative mean. The predictive validity of the Wechsler tests was examined by comparing those scores to the scores on the STEP achievement tests. It was found that the WISC-R Full Scale score was the strongest predictor of reading achievement. With such results McCullough, Walker, and Diessner (1985) suggested that the Verbal Scale may not be assessing verbal ability, rather, some cultural difference in knowledge acquisition.

It has been assumed that the diagnostic utility of the Wechsler Intelligence Tests with Native populations could be enhanced if typical patterns of scoring could be identified and thus associated with academic underachievement (McShane & Plas, 1982). This process of identification initiated the recategorization of subtests into factored abilities. Bannatyne (1974) recategorized the subtests of the WISC-R into four categories: (1) Spatial Ability based on Picture Completion, Block Design, and Object Assembly; (2) Sequential Ability based on Arithmetic, Digit Span, and Coding; (3) Verbal Conceptual Ability based on Similarities, Vocabulary, and Comprehension; and (4) Acquired Knowledge Ability based on Information, Arithmetic, and Vocabulary.

When employing the Bannatyne scheme, Smith, Coleman, Dokecki & Davis (1977) found a WISC pattern which emerges typical of learning disabilities: Spatial > Conceptual > Sequential > Acquired Knowledge. Similarly, Scaldwell, Frame and

Cookson (1986) investigated the scoring patterns of 18 Chippewa, Muncey, and Oneida children employing Bannatyne's recategorization and found that a high proportion of their subjects exhibited the learning disabled pattern. Scaldwell et al. added, however, that the difference between the order of the second and third abilities was not significant.

However, other studies employing Bannatyne's notion of regrouping the WISC-R subtests into four separate categories have found a pattern of strengths and weaknesses that differs from the learning disabled pattern (Diessner & Walker, 1989; McShane & Plas, 1982; Zarske & Moore, 1982). Spatial Ability was found to be more well developed than Sequential Ability, which were greater than both Verbal Conceptual Ability and Acquired Knowledge Ability. This pattern of performance is different from that found in normal and learning disabled groups which suggests a Native pattern of performance.

Other types of tests assessing intellectual skills demonstrate similar results. Connelly (1985) studied the receptive and expressive vocabularies of 100 Indian children and 106 non-Indian children by employing the Peabody Picture Vocabulary Test-Revised (PPVT-R) and the WISC-R vocabulary subtest. It was hypothesized that Indian children would be weaker on language measures because of their manner of communication (i.e., soft spoken, shy, hesitant, less spontaneous verbal interaction; and shorter and less detailed responses), and therefore, they should attain higher scores on the PPVT-R where little verbal expression is required than on one which requires more verbal expression (WISC-R). It was found that the Indian students scored significantly poorer on both the PPVT-R and the WISC-R vocabulary subtest than the non-Indian students. In addition, the Indian participants did significantly better when the vocabulary task was presented in the PPVT-R format rather than the WISC-R vocabulary subtest format. The author suggests that most tests measuring understanding vocabulary may underestimate the Indian student's ability. However, the results of this study support the assertions made earlier that Indian students perform at a lower level than the non-Indian students in the verbal domain (Connelly, 1985).

Culture and language free testing measures have been proposed as the answer to cultural and language test bias. Dana (1984) has contended that when compared to non-Natives, Natives demonstrate better performance on such measures. The Test of Nonverbal Intelligence (TONI) has been employed to investigate the intellectual performance of Native children. This test is considered less biased because it is a language free measure of nonverbal cognitive ability which allows for fair intellectual assessment of children from dissimilar cultures (Kowall, Watson & Madak, 1990). Kowall et al. (1990) investigated the concurrent validity of the TONI by comparing the performance of 30 suburban and 22 Canadian Native children referred for learning difficulties on both the TONI and the WISC-R. Their findings indicated that the suburban group of children had a higher Verbal IQ, but they were not higher in terms of Performance IQ or Full Scale IQ for the WISC nor did they score higher in terms of the TONI quotient. Thus, the suggestion was made that the ability to solve nonverbal problems does not significantly differ between the Native and non-Native subjects. However, again, it is demonstrated that the verbal performance of Natives is lower than that of non-Natives.

Although, Native achievement test performance has not been studied as extensively as Native intelligence, it has been accepted, although not widely documented that Native students have low achievement (Bowd, 1972; McShane & Plas, 1988; Cameron, 1990). In a study conducted by Byrde (1968 as cited in McShane & Plas 1988), it was reported that by the end of the third grade, the achievement levels of the American Indian lag at approximately one-half to one and one-half years below grade level. By the twelfth grade, achievement levels lag at approximately two to three and a half years below grade level. McShane and Plas (1988) investigated the relationship of intellectual and psycholinguistic abilities to the achievement of Natives. Their results further demonstrated an average one and a half to two and a half year lag in achievement in their sample of Ojibwa children. They also found the typical Native scoring pattern with

respect to low verbal and average performance scores on both the WISC-R and the Illinois Test of Psycholinguistic Abilities (ITPA).

Most of the research on Native achievement and intelligence performance has been conducted on Native American children. The results of the few Canadian studies of Native achievement and intelligence have mirrored those found in the United States (Bowd, 1972). Bowd (1972) cited Hawthorne's *Survey of Contemporary Indians of Canada* (1967) which reported an average achievement lag of 2.5 years behind grade level among Native Canadian children. Bowd (1972) examined the importance of vocabulary, intelligence, language and socioeconomic status in determining the grade level achieved by 95 Native, 42 Metis, and 35 non-Native boys. All subjects were administered the Standard Progressive Matricies and the Mill Hill Vocabulary Scale. Additional information concerning parental employment and language background was collected via a questionnaire. In this study, the apparent lag in achievement was attributed to the child's cultural background and lack of opportunity for the development of English language skills in the home. Poor English vocabulary was found to be the prime determinant of grade level achievement in the Native groups, while general intelligence determined grade level achievement in the non-Native group. Furthermore, Bowd suggested that the school determined whether the Native child failed or succeeded and that the criteria for success ultimately differed between the two cultural groups.

There are a number of possible reasons for these patterns of performance on measures of achievement and intelligence. There is no consensus concerning the explanations of these patterns of performance on achievement and intelligence tests with respect to Natives (McShane & Plas, 1988). It was not within the scope of this study to provide a review of all of the explanations cited in the literature which include, among others, degree of acculturation to the dominant culture, physiological factors (i.e., otitis media (middle ear disease), fetal alcohol syndrome, lead poisoning), and neurological differences between Natives and non-Natives. To illustrate, a few were chosen:

socioeconomic and familial explanations; cultural incongruence; attitudes, self-concept, and motivation; the language barrier; learning styles, cognitive styles and hemispheric dominance; and test bias. The explanations are discussed in the following sections.

Socioeconomic and Familial Explanations

Various societal and familial factors have been proposed which may have an influence on academic achievement and intelligence. To avoid making sweeping generalizations, it should be stressed that all Native people are not of the same socioeconomic or cultural group. However, the majority of the Native population has been described as economically deprived. The Canadian Association in Support of Native Peoples describes the Native population in general as being the most economically deprived group in Canada and far behind other Canadians in every respect (Wheldon, 1994).

The relationship between socioeconomic status and achievement has been documented in past research (Douglas & Ross, 1965; Fogelman, 1978). In a study by Bolz and Varrati (1981) socio-economic status and academic achievement were strongly related in all areas of an Arizona state-mandated standardized achievement test, and for all grade levels tested. Students classified as having high socioeconomic status outperformed the students classified as having low socioeconomic status on the achievement test. School attendance had an effect on achievement, as did stability within the school. Students who consistently remained within the school district and had the best attendance averages also had the higher achievement scores (Bolz & Varrati, 1981).

A non-empirical study by Hull (1988) confirmed the consistent finding of poor socioeconomic conditions and the lack of academic success of Canadian Native children. His analysis of Statistics Canada 1981 Census data brought him to a number of conclusions concerning socioeconomic status and Native education which included the fact that Native students are behind other Canadians in terms of education. This lagging of Native students was related to family status and income among other factors. When

these factors were held constant, the Native and non-Native students were comparable. Hull concluded that any assistance provided to parents to improve income, training and employment was likely to improve the education of their children. This finding is consistent with literature on family or parental involvement in schools.

The importance of parental involvement in student's academic success has also been investigated. Research indicates that when parents are involved in the educational process they tend to promote the academic progress of their children (Salend & Taylor, 1993). The apparent lack of parental involvement in Native schools often has to do with the fact that many parents find schools alienating which, in turn, has resulted in lack of participation, and an apparent lack of interest in their child's education (St. Dennis, 1991). Programs designed to encourage parental involvement have been aimed at English speaking families who have sufficient economic resources, and whose culture allows them to feel comfortable in the educational realm (Salend & Taylor, 1993). This notion of cultural differences as a factor in children's development and socialization has been well supported (Pepper & Henry, 1987; Berry, 1986; Sternberg, 1985).

Cultural Incongruence

There is a specific cultural hypothesis, often referred to as cultural discontinuity that has been posed to explain the findings that First Nation students are academically delayed. This hypothesis basically states that, if Native students are to succeed academically they must adapt to cultural values that do not coincide with their own. The school presents a new type of socialization which is different from the type of socialization experienced in the home, and thus presents discontinuity in experience (Cooley, 1977). As stated earlier, it should not be assumed that all Native people are from a single homogenous group; thus, the degree of cultural incongruence experienced by each Native child will be different. Some areas of cultural incongruence or discontinuity are examined below.

Although there are some similarities between people of different cultures and the ways that they think, each culture values and fosters certain capacities or modes of thinking. In doing so, these cultures define intelligence in terms of their own values and needs. In other words, intelligence does not mean the same thing in every culture, nor do all cultures consider the same behaviours to be intelligent (Sternberg, 1988). In addition, some cultures provide different environments which demand different adaptations (Berry, 1986).

For example, the tasks on the Wechsler tests were suited to meet the needs of non-Native North Americans. Consequently, variations in performance are not necessarily due to difference in intelligence, but rather may be representative of what each culture values in certain tasks involved in the Wechsler tests (Chrisjohn & Peters, 1986). Currently, there is no model for Native intelligence and the tests designed to measure intelligence, like the Wechsler tests, may not adequately measure this construct in a Native sense (Chrisjohn & Peters, 1986; Senior, 1993). Consequently, testing by conventional means, especially in the verbal domain, may put Native people at a disadvantage by providing an underestimation of performance (Connelly, 1985; McCullough, Walker, & Diessner, 1985).

The underestimation of test performance may be attributed to a number of sources. For instance, Native students may not exhibit the required test taking behaviours, such as reading the questions accurately or being unable to provide appropriate verbal responses (Brescia & Fortune, 1989). This problem is compounded if the Native student's reading achievement is low. Tests which emphasize verbal instructions, reading or other language measures may present a greater source of underestimation of student performance. Others include a lack of Native student experience in responding to some test items, and a lack of opportunity for the Native student to practice test-taking behaviours. These reasons for the underestimation of ability reflect cultural difference rather than lack of intelligence, or knowledge (Brescia & Fortune, 1989).

However, it should be noted that on certain tasks on intelligence tests, particularly the performance subtests, these cultural differences may work in favour of Native people. The variations in test performance on intelligence tests may be due to differences in the extent and nature in which people from different cultures experience certain tasks on intelligence tests. Native people are found to perform at average to above-average levels on the performance tests of the Wechsler Scales (St. John, Krichev, & Bawman, 1976; McCullough, Walker, & Diessner, 1985), because these spatial, perceptual tasks are highly valued in Native cultures (Chrisjohn & Peters, 1986).

Darou (1992) presented a case where a Native male's score exceeded the top of the scale on all examples of the Kohs Blocks test. Darou suggested that the test was biased in his favour since he had a profound ability to recognize patterns. This subject's lifestyle involved recognizing patterns in the everyday task of hunting. Such an example demonstrates some of the cultural differences between Native people and the greater society on which most test instruments are standardized. This cultural incongruence is evident in other areas.

One area that school systems promote that is incongruent with the values and styles of learning that characterize Natives is competition (Swisher, 1990; Trimble, 1976). Schools promote challenges for all students to reach their potential, and children must assert themselves to reach that potential. Students are often schooled in an atmosphere of individualism and competition although the literature on Native students states that their culture promotes cooperation and de-emphasizes competition (Swisher, 1990). Trimble (1976) also noted that Native children value group cooperation rather than competition. In 1979, Brown investigated the relationship between cultural values and academic achievement. He reported that only one study, that by Hess (1974 cited in Brown 1979), addressed this issue, and found that high levels of competition were negatively related to the achievement of Natives.

Educational institutions also have a tendency to take control from the student and place it in the hands of the instructor; this is also in opposition to traditional Native values. It has been said that the Native child is reared by way of Baumrind's permissive parenting style (Rohner, 1965; Williams, Radin, Coggins, 1996). The child's relatively unstructured, permissive daily routine is drastically changed upon entering school, where a time oriented schedule of events occurs. This often poses behavioural problems by which Native students appear to demonstrate resistance and lack of participation (Wheldon, 1994).

Another area in which cultural incongruence is evident is the value placed on time in both cultures. Time is valued highly in non-Native culture, but is generally unimportant in Native culture. Schools place much emphasis on time, routines and deadlines, some things that the Native student has difficulty dealing with (Shannon, 1976). Shannon (1976) also stated that school officials have reported that lack of temporal awareness and the attitude toward time contribute to the poor achievement levels in Native children. These results provide support for differences in time conception and its relation to academic achievement.

Anderson, Burd, Dodd, and Kelker (1980) make reference to the lack of punctuality of Native peoples - called "Indian time". Time estimation has been a factor in differentiating high from low achievers in a number of age groups. In the Anderson et al. study Native Americans and non-Natives in Montana estimated the time it would take to complete a number of tasks (e.g., cutting trees through completion of building a canoe) in terms of hours, days, months, or years. The results indicated that the two cultural groups were not of the same population with regards to time estimation (Anderson et al., 1980).

These findings may pose further school-related difficulties. For instance, the use of speed in standardized tests may put Native students at a disadvantage. Sternberg (1984) stated that the importance of speed to intelligence is evident in only some cultures, and that in others it plays no role. Therefore, standardized tests that place great importance on speed put some cultures at a disadvantage (Sternberg, 1984). The test in question, the

Canadian Tests of Basic Skills, is a timed test in which time to complete the test ranges from twelve minutes to forty-two minutes for various subtests. The ability to estimate time may have an impact on the performance of Native students on this achievement test.

The aforementioned areas are examples of the apparent cultural incongruence between Native and non-Native cultures. However, some researchers criticize the use and acceptance of the cultural discontinuity hypothesis as the sole explanation for poor academic achievement in First Nation children. Ogbu (1982) claimed that the cultural discontinuity hypothesis failed to explain the academic success of other minority children who may have experienced differences between home and school socialization. Ledlow (1992) also cautioned that the acceptance of this hypothesis without criticism precluded the study of other explanations contributing to the poor achievement of Natives.

Attitudes, Self-Concept and Motivation

Other explanations for the poor academic achievement of Native students may be classified as passive test bias (Chrisjohn & Peters, 1986) and may include attitudes toward school, self-concept and motivation. The Native child has difficulty identifying with the educational system for various reasons. The resistance to educational process is likely to have an effect on the academic achievement of the Native child. In a cross-cultural study which focused on reading, Ellermeyer (1988) found that children have a desire to learn to read when reading is perceived as enjoyable, interesting and suited to their needs. If children perceive reading as tedious and unrelated, then early reading experiences will have a deficit which remains over their years as students. This type of experience can develop negative attitudes toward reading that are difficult to replace (Ellermeyer, 1988). It has been suggested that changes directed at creating positive reading attitudes may not only promote reading but also increase reading achievement (Groff, 1962; Healy, 1965).

There is evidence to suggest that the Native student is plagued with some of the problems which tend to develop negative attitudes toward reading and learning outlined by Ellermeyer (1988). For instance, the content of most curricula taught in North American

schools is not related to Native lifestyles or values. The Indian has traditionally been portrayed in literature and other media as the "noble savage", in full regalia, or as violent, drunken, beaten, homeless or helpless (Whyte, 1986). The cultural contributions of Native writers have not been included in language curriculum in the past, however, recently works including Native content have been introduced in band-operated schools (teacher, personal communication, July 10, 1998). Furthermore, the difficulties the Native student faces in the verbal domain (McCullough, Walker, & Diessner, 1985; Connelly, 1985) add to reading problems (Downing, Ollila & Oliver, 1975), which also contribute to negative attitudes toward reading and school learning (Ellermeyer, 1988).

Besides attitudes toward school, self-concept is another issue that has been addressed as a reason for low levels of achievement and intelligence for Native learners. Many empirical research studies have shown a positive correlation between a student's self-esteem or self-concept and academic achievement (Rampaul, Singh, & Didyk, 1984; Williams & Cole, 1968; Fink, 1962). The research on age-grade displacement suggests that Native students show a decrease in their self-concept as they progress in school (Senior, 1993). These findings have been corroborated by Martin (1978) who concluded that Native and non-Native students do not differ in level of self-esteem until the junior high school grades (Grades 7 and 8). Students in these grades are lower in self-esteem and this trend continues into high school. He attributed the low levels of self-esteem to feelings of alienation, anxiety, and inadequacy experienced by Native students.

The issue of low self-esteem, in turn, affects the motivation of students which has been an equally important issue in explaining patterns of Native achievement. Smith (1992) stated a number of factors contributing to low motivation in Navajo children. When there is a high rate of unemployment, it is difficult to find suitable role models for any type of employment which requires an education. Likewise, motivational factors, reasons for learning and the belief that education and learning make a difference, do not exist for the Native child (Smith, 1992).

However, the system of rewards and punishment in one culture may not be what motivates people in another culture. It was assumed that those factors which motivate non-Native students to learn to read, that is, grades, desire to achieve academically and financially, career goals and upward mobility, are also motivating factors for Native students. The academic achievement of Native students over the past 100 years demonstrates that this was a false assumption (Byrde, 1968 as cited in McShane & Plas 1988). The motivation for achieving and learning to read in Native learners is either lacking, or has yet to be tapped into by educators. Thus, performance on reading measures continues to suffer.

The Language Barrier

It is apparent that language plays an integral role in intelligence and achievement testing (Hynd, Quackenbush, Kramer, Conner, & Weed, 1979; Chrisjohn & Peters, 1986; Dana, 1984). A common finding in intelligence testing has shown a typical pattern of average Performance scores and poor Verbal scores for the Native person (St. John, Krichev, & Bawman, 1976; Seyfort, Spreen, & Lahmer, 1980; McCullough, Walker, & Diessner, 1985; Diessner & Walker, 1989). It was stated earlier that the verbal portions of standardized tests of intelligence put the Native student at a disadvantage, not only because they tend to assess a different fund of knowledge than that which is usually acquired in Native cultures, but the unfairness of such tests may be rooted in the language that is used, that is, standard English. Seyfort et al. (1980) add that problems experienced in language arts are compounded by varying degrees of bilingualism in First Nation children. The bilingualism factor is relevant in those communities where elders frequently converse in their Native language. Although most Native students speak English, the dialect of English that they speak, "Indian English", is not the standard English employed within educational institutions (Whyte, 1986).

Leap (1982 cited in Whyte 1986) has described Indian English as resembling the phonemic patterns and phonological constraints of each community's Native language. In

addition, the grammatical structure, word formation, and sentence formation processes (i.e., the notion of what a sentence is and what it should accomplish) of the Native language may override the conventional rules of standard English. Thus, the needs of the Native student parallel the needs of anyone learning English as a second language (Whyte, 1986). Acquiring the standard English of school use presents special challenges in learning to read and write in the traditional school system, which include the teacher's acceptance of the nonstandard dialect and addressing certain needs, especially unlearning habits built up in using Indian English from the time the child learned to speak (Whyte, 1986).

The educational difficulties Native children experience in the area of language also relate to the socioeconomic status of the majority of Native people. The homes of most Native people are not characterized by literature such as that of books or magazines that characterize middle-class society (Reyhner & Garcia, 1989). It has been suggested that students who are raised in a culture which provides less written literary background tend to experience greater difficulty with the verbal items on intelligence tests and tend to have more difficulty with reading and writing (Downing, Ollila & Oliver, 1975). Downing, Ollila and Oliver (1975) examined the reading skills of Native children in kindergarten from two Native bands using the Canadian Reading Readiness Test. The Native children scored lower on orientation to literacy, understanding of literacy behaviour, technical knowledge of literacy, visual letter recognition, and phonemes. Such findings are not suprising for children from communities where traditions of written language do not exist (Osborne, 1985).

The language barrier is one of the main reasons why there is a need to reevaluate the usefulness of standardized tests among Natives. It has been cited in the educational research that Native children are weaker on language measures, especially vocabulary and reading (McCullough, Walker, & Diessner, 1985; Connelly, 1985). Despite the value of achievement batteries such as the Canadian Tests of Basic Skills, it is a concern of

educators that the verbal nature of these tests may be biased against First Nations children. The poor verbal performance on standardized intelligence tests adds credence to this notion.

Explanations regarding the apparent Native pattern of scoring on intelligence measures where performance in the verbal domain is poor (McCullough, Walker, & Diessner, 1985; Connelly, 1985) have raised controversy. Brandt (1984) suggests that it is not that the Native child is nonverbal but, rather that different cultures place emphasis on the use of verbal versus visual systems in their daily interactions. In fact, during the early school years Native children display high degrees of language activity, are active in their learning, have positive self-concepts and are open to new experiences. However, as Native children get older and progress through school, they appear passive and show less verbal interaction in the classroom setting (Foerster & Little Soldier, 1980). Other researchers have offered explanations which are concerned with learning style, cognitive style, and whether or not hemispheric dominance exists for the majority of Native people.

Learning Styles, Cognitive Styles and Hemispheric Dominance

Educators have long realized that not all children learn in the same way and as a result began looking at individual differences in a variety of ways such as through learning styles (More, 1987). Learning style essentially refers to the method by which one comes to know about the world, that is, the characteristic strategies by which a person learns (Swisher & Deyhle, 1987). It has been suggested that when the teaching and learning styles do not coincide, the result can be an inability to learn effectively (Dunn, 1983). The learning style of the Native student has been characterized as being of a primarily visual or observational manner (Swisher & Deyhle, 1987; Kaulback, 1984).

Cognitive styles are another manner in which educators have attempted to study and explain individual differences. Cognitive style has a number of definitions but the term basically refers to "the way one perceives and thinks about the world and includes thinking, perceiving, remembering, and problem solving" (Swisher & Deyhle, 1987).

Most studies on cognitive style and the Native student refer to patterns of performance on the Wechsler Intelligence Scales previously described. Such studies lead researchers to suggest that Natives have patterns of cognitive strengths in spatial and sequential abilities (Diessner & Walker, 1982; Zarske & Moore, 1982; Diesner & Walker, 1989).

More (1987) found Native children to be simultaneous (perceiving as a whole) rather than sequential processors; more field independent rather than field dependent (i.e., more able to create order in disorganized observations, less able to separate parts from wholes, and more socially intuitive), and more concrete (i.e., process better when they can use their five senses) rather than abstract. More's review also included the dimension of "impulsive/reflective" which was undetermined at the time. However, Rhodes (1990) followed up and found that Native children were reflective (i.e., they respond more slowly and have fewer errors) rather than impulsive in learning. This cognitive style may impact test performance in specific ways. For example, the Native child was said to be reflective, where they responded more slowly to questions. Although they might have fewer errors on those questions attempted, working more slowly implies that they took more time to finish the test, and the probability of an incomplete test is greater in the reflective rather than the impulsive test-taker.

The typical pattern of intellectual performance of Native children, as well as their styles of learning and cognitive strengths and weaknesses, have been further explained by conflicting interpretations concerning hemispheric dominance. Many researchers take the stance that there may be culturally specific ways of processing information, or that processing through different hemispheres of the brain results in a different perception of the world (Cattey, 1980; Ross, 1989). The left brain is seen as the moderator of academic success while the right brain manages creativity and holistic thinking (Cattey, 1980).

Some researchers argue that the Native person perceives the world visually, and holistically, and processes information through the right hemisphere, and therefore needs special teaching techniques adapted to the Native learning style (Dunn, 1983; Swisher &

Deyhle, 1987). Others argue that this is not the case, and in fact the myth of the "right-brained Indian" is simply not true (Chrisjohn & Peters, 1986; Stellern, Collins, Gutierrez & Patterson, 1986). Despite the previous findings on learning styles, in a recent review of the literature it has been stated that the authors "fail to find support for the common conclusion that adapting instruction to Native Americans' learning styles - defined in terms of visual cognitive abilities - will increase achievement" (Kleinfeld & Nelson, 1991: 273). In other words, the Native learning style assumption is dangerous as a sole explanation for differing levels of achievement.

In summary, the research on learning styles and cognitive styles describes specific areas of strengths and weaknesses for Native students. The strengths involved visual, perceptual, spatial, and sequential domains, while the weaknesses were found to be in the verbal, expressive, and acquired knowledge domains. However, to avoid stereotyping, the assumption should not be made that all First Nation students have particular strengths in only a few areas, while assuming non-Native students have separate strengths in other areas of processing or learning.

The literature reviewed to this point suggests that not one but several factors may influence the achievement level of First Nation students. These factors have not dealt with the problems inherent in the assessment techniques themselves. One of the main purposes of the present study is to identify if any subtests of the Canadian Tests of Basic Skills put First Nation students at a disadvantage. It is to this aim that the following discussion is focused.

Test Bias

Testing people from different cultures from the one in which the test was developed inevitably poses problems. Such problems may include subjects being unfamiliar with test demands, antagonism towards testing, and time constraints (Osborne, 1985). Sternberg (1988) argued that tasks designed to measure intelligence should be novel, but not so novel that they are outside the individual's experience. Even if a given

task requires the same mental processes for different cultures it may not be equal in its degree of novelty or automatization (Sternberg, 1988). Similarly, Worthen and Spandel (1991) have stated that unfamiliarity with the concepts and language of the dominant culture producing the tests usually results in cultural and social bias.

Bias can be defined as a factor which distorts the meaning of the results of a test for various groups (Shepard, 1981). It is generally agreed that no test is truly culture free and test performance differences between Native and non-Native samples may be meaningless because the properties of the tests have not been examined in different populations. Furthermore, Chrisjohn and Peters (1986) point out that it is not appropriate to take the intelligence test performance scores at face value because the psychometric properties, like difficulty progressions, item-total correlations, and internal factorial structure, have been examined in few Native populations It may be that these types of tests are not measuring the same construct within each group.

McShane and Plas (1984) reviewed studies of the WISC-R and found that some of the psychometric properties of the individual subtests did not hold up in Native samples. Guilliams (1975 as cited in McShane & Plas 1984) reported that the internal consistency for the Vocabulary subtest was found to be poor for the Apache and Navajo sample. In addition, in terms of validity, the few factor analytic studies revealed that the internal factorial structure may be different for this population (McShane & Plas, 1984). For instance, in two studies, one conducted by Reschly and another by Zarske, Moore & Peterson (as cited in McShane & Plas, 1984) the performance of the Native child could be interpreted in terms of a Verbal Comprehension factor (i.e., Information, Similarities, Vocabulary, and Comprehension subtests), and a Spatial Processing factor (i.e., Block Design, Object Assembly, and Mazes subtests) which was the area of strength across Native groups. Both studies indicated that it was inappropriate to interpret Native performance in terms of a Freedom from Distractibility factor and the Coding subtest since they were unrelated to the factor structures obtained for Native groups. However, the

findings of other factor analytic studies (McShane & Plas, 1988) on American Indian children were not consistent, and should be interpreted with caution since the factor analytic structure has been examined in a very limited number of Native groups.

Other tests have come under the similar criticism that the psychometric properties differ in various cultural groups. The test under investigation is the achievement battery, the Canadian Tests of Basic Skills. While there is little written about the Canadian Tests of Basic Skills, a number of studies have been conducted using its predecessor, the Iowa Tests of Basic Skills. Arguments about achievement tests have come under the same sort of criticism as intelligence tests. This criticism stems from the same consistent finding that people from different cultural groups score differently on these achievement tests. The question arises as to whether or not these achievement tests measure the same things within different populations.

Thompson, Alston and Say (1978) attempted to answer this question in a study employing the Iowa Tests of Basic Skills. The study tested whether three subtests of the ITBS measured the same constructs for Anglo American, Black American and Mexican American cultural groups. The authors caution educators in assuming that the Iowa Tests of Basic Skills measures the same constructs across cultural groups, that is, the ITBS does not measure the exactly the same constructs across these groups. With these problems in mind, the issue is whether the Canadian Tests of Basic Skills, and the accompanying normative data are sufficient tools for measuring the Native child's achievement with respect to the Canadian population.

## Major Purposes of the Canadian Tests of Basic Skills and its Standardization

The CTBS is a standardized achievement battery which covers a variety of basic skills which schools may be expected to develop in their students (King-Shaw, 1990). Within the realm of educational development these skills determine whether or not students will benefit from further instruction. The Canadian Tests of Basic Skills

achievement battery was designed to serve some basic purposes including to determine a level of a student's functioning in order to be better able to tailor instruction to the individual. The CTBS may be employed to assess strengths and weaknesses in a student's educational development. It provides insight into group performance which, in turn, may allow for improvement in curriculum. This battery provides an indication of the student's readiness for the next level of instruction. As such, the battery proves useful in making decisions about educational placement and programming. In addition to serving as an educational model, it may serve as a behavioural model to demonstrate expectations of students. Finally, the CTBS allows educators to report on the performance of their students in objective terms (King-Shaw, 1990).

The Canadian Tests of Basic Skills was normed on a stratified random sample of over 30,000 Canadian school-children whose first language was English. The sample was drawn from some 241 schools from every province in Canada (King-Shaw, 1990). The following, taken from The Canadian Tests of Basic Skills Manual for Administrators, Supervisors, and Counsellors, are some considerations which affected the procedures for selection of the sample and derivation of norms:

> 1. The sample should be selected with great precision to be representative of the English-speaking school population with respect to ability and achievement. The sample should be large enough to give adequate representation to many diverse elements in the population, but a sample of reasonable size, carefully selected, would be preferred over a larger sample less carefully selected.
> 2. While it would have been desirable to have employed a probability sample, stratified on the basis of community size and socio-economic status, such a plan was not considered feasible, because data necessary to implement such a plan were not available. Instead, it was decided to employ a stratified random sample of schools, selected on the basis of province and size of school as

indicated by the number of pupils in Grade 3.

3. The sample of attendance units should be sufficiently large, and selected in such a manner as to provide dependable norms for building averages.

4. When elementary schools were selected on the basis of Grade 3 criteria, the corresponding schools for Grades K-2 and 4-12 were to be selected in order to provide longitudinal comparability of norms.

5. To ensure comparability of the norms for the abilities tests and the achievement tests, both the abilities test battery and the achievement test battery for the appropriate grade level should be administered to the same pupils.

(King-Shaw, 1990: 46)

It should be noted that of the 30,000 school-children who participated in the standardization procedure, only 175 of those students tested were categorized as "Private-Native and Christian" in Grades 1-8. The Canadian Tests of Basic Skills Manual for Administrators, Supervisors, and Counsellors (King-Shaw, 1990) provides a list of the schools which participated in the standardization procedure. For this study, this list was cross-referenced with a current Indian Affairs Nominal Roll which is the annual registration system for Native elementary and secondary students residing on reserve. This list also contains band-operated schools in the Ontario region. It was determined that none of the band-operated schools in the Ontario region were represented in this standardization sample.

The Argument for Local Norms

It has been argued that even though a particular ethnic group is included in the standardization sample, the unique patterns or profile of that group is lost in the overall population variance, especially if that group's sample size was small. As a result, comparison of an individual's test scores with norms published for the total population is

meaningless (Common & Frost, 1988; Seyfort, Spreen, & Lahmer, 1980). The exclusion of certain ethnic groups in the standardization of intelligence and achievement tests raise the question as to whether the existing normative data is sufficient for comparison with those groups.

A solution to such a problem has been to renorm the tests on the Native population. However, this approach has been criticized because of the erroneous underlying assumption that all Native people are the same (Common & Frost, 1988). One way of addressing this problem is to renorm the test on each Native community, separately. The Special Education Handbook (1986 cited in Common & Frost, 1988) prepared by the Government of Canada for use within Department of Indian Affairs and Northern Development controlled schools, specifically states that in order to ensure fairness, the school performance of each child must be compared with age appropriate norms to the children in his/her community. In another article, Janzen, Skakum and Lightning (1994) mentioned that norms developed for use with various assessment instruments have no value unless they are community specific. Concerning the WISC and WISC-R the same authors recommend that local norms, separate for each band, be established and used for interpretation of individual differences. Finally, Darou (1992) recommended that tests administered to Natives be used with local norms or not at all, particularly because the norms established may not be appropriate for use with Native samples. The predictive validity in the non-Native context is missing in these tests, and the appropriateness of the tests for the overall goals within Native educational systems is questionable (Darou, 1992).

An argument for renorming a test was put forth in the development of Canadian norms for the WISC-III (Wechsler Intelligence Scale for Children-III). Despite the diagnostic value and popularity of the WISC and WISC-R, Canadian psychologists were worried that WISC test content may be biased against Canadian children (Beal, 1996). While their concern was not on the verbal nature of the test items, psychologists were

particularly worried about the Information subtest items believed to be high in American content. Studies have shown, however, that Canadian children did as well as the American normative sample on most of these items (Beal, 1996).

Researchers still found the need to develop Canadian norms. They argued the use of these norms reduced the threat of disadvantage to Canadian children. Furthermore, the true Canadian normative group was found to be more desirable for educational classification purposes (i.e., gifted, average, borderline, and intellectually deficient). This allowed for more precise predictions of the proportion of the population which require various educational programs (Beal, 1996).

It can be argued that, similar to the value of Canadian normative data for the WISC-III, First Nation normative data for the Canadian Tests of Basic Skills will be valuable information for First Nation-operated schools currently employing this achievement battery. Development of such norms would lessen the population differences inherent to the national norms when testing Native children. Educators in the band-operated school systems may also be able to make better predictions in classifying students for placement into programs, like special education or gifted programs.

## Rationale and Objectives of the Research

There has been some debate about renorming tests to a local standard of performance. Wiligosh, Mulcahy and Watters (1986) commented that constructing local norms does not solve the problem of bias in Native assessment. They explained further that if a child was being educated to remain within his or her own culture then comparison with national norms was irrelevant. However, if the goal was to educate the child to allow him to move beyond the local culture, then some comparison with national norms was relevant.

Comparison with national norms is relevant, especially when Native children have and will continue to be expected to compete with their non-Native counterparts with

respect to academics, employment opportunities, and the like. It is also imperative that local norms be developed for comparison within the First Nation communities. When children are educated with their peers, in a band-operated school, it makes sense to compare their performance to those within their own communities, that is, the local norms must be community specific. The goal of this thesis was not to argue that the child should be educated only to remain within his or her local culture, rather, it argues that there should be an option - whether or not the educational goal is to remain or move beyond the local culture, both local and national norms are necessary for "fair" comparison in Native assessment.

There were two main research objectives. The primary objective of the present investigation was one of establishing First Nations norms for the Canadian Tests of Basic Skills. The first step was to determine whether or not there was actually a difference between National and First Nation norms. A second objective of this thesis was to examine the psychometric properties of the individual subtests for Native students. A number of studies on achievement and intelligence have concluded that the psychometric properties of such tests do not hold up in minority samples (Darou, 1992; Common & Frost, 1988). The test performance differences between Native and non-Native samples seem meaningless because the properties of the tests have not been examined in different minority populations.

# Method

## Participating Schools

Two First Nation communities annually administering the Canadian Tests of Basic Skills were contacted through their respective Boards of Education in order to obtain consent to conduct the study (see Appendix A for letter of consent). The principals and teachers of the three band-operated, elementary schools within these First Nation communities were then contacted in order to obtain further consent (see Appendix A for letter of consent). Parental consent, per se, was not required as the Canadian Tests of Basic Skills was a part of the schools' normal battery of tests and was administered according to each First Nations' School Board's policy.

Three First Nation-operated, elementary schools (two from Community A, and one from Community B) participated in the development of CTBS normative data for use within First Nation-operated schools. A convenience sample of a total of 388 First Nation school-children (200 male, 188 female) from two rural, First Nation Boards of Education in Northern Ontario participated in the standardization of the Canadian Tests of Basic Skills for the Native normative data. All participants were of Native decent and either resided in, and were band members of the two First Nation communities participating in the study, or were band members of other reserves in the surrounding area.

Students participating in the study were in grades 3 to 8. There were three Grade 3 classes which included 54 subjects. There were 71 subjects in the three Grade 4 classes. Four Grade 5 classes contained 85 subjects. There were three Grade 6 classes which were composed of a total of 56 subjects. Three Grade 7 classes included 75 subjects, and three Grade 8 classes contained 47 subjects. The participants ranged in age from 8 years, 2 months to 15 years, 4 months.

Both Communities A and B are forerunners in the quest for "self-determination or self-government" for First Nations people in terms of education. That is, they each

possess an all-Native community-elected school board, through which they maintain control over fiscal matters, hiring and firing policies, academics and instruction, student matters, and all administrative decisions regarding education (Emerson, 1987).

Community A

Community A has a population of 2154, based on registered band members only. The population is increasing; in 1991 the population as reported by Statistics Canada was 1825, an increase of 18% in a five year span. These community members are of the Ojibway, Odawa and Potawatomi tribes. Although the children communicate primarily in English within the school setting, both Ojibway and English languages are spoken in the majority of residences (Director of Operations, personal communication, June 18, 1998).

Economically, most community members fall at the low end of the scale with the average employment rate of approximately 40%. The average annual income for persons employed within the public sector (i.e., employed by the Band) is approximately $26,000 in Community A (no figures were available for the private sector) (Director of Operations, personal communication, June 18, 1998). Two elementary schools are in operation within this community. The first school includes students from kindergarten to grade 4. The second school covers grade 5 to grade 8.

Community B

The population of Community B is approximately 1780, based on band membership both on and off reserve. Band members of Community B are Ojibway. As is the case in Community A, students speak primarily in English at school, but again both the Ojibway and English languages are spoken in the majority of homes (Economic Development Officer, personal communication, June 18, 1998).

In terms of economy, members of Community B also fall at the low end with the same rate of employment (40%) as Community A. This community provided some statistics from a 1992 economic development survey, where the annual income for those employed ranged from under $15,000 to $60,000 for earners within both the public and

private sectors. More specifically, 5% of those employed earned under $15,000, 10% earned between $15-30,000, 15% earned between $30-50,000, and another 10% of those employed earned between $50-60,000 annually (Economic Development Officer, personal communication, June 18, 1998). One elementary school is in operation in Community B, which includes students from kindergarten to grade 8.

The Canadian Tests of Basic Skills

The Canadian Tests of Basic Skills, a continuous test (1152 test items), measures achievement from Grade 3 to Grade 8. The test requires about five hours to administer, of which, four hours and sixteen minutes is actual working time. It is recommended that the test be administered over four days. There are six overlapping levels of each test which were assembled by combining "blocks of test items", increasing in skill difficulty (from low level grade 3 to superior level grade 9). The overlap accounts for the continuity of skills objectives at each grade. Since each of the tests is a single wide-range test, students begin and stop at different places depending on the level assigned (King-Shaw, 1990).

The skills measured with the CTBS battery are grouped in five areas: Vocabulary, Reading, Language, Work-Study, and Mathematics. Single comprehensive tests are provided for the first two areas, Vocabulary and Reading. Language is measured with separate tests for Spelling, Capitalization, Punctuation, and Usage and Expression. Work-study is subdivided into two tests: Visual Materials which involves interpreting maps, graphs, and tables and Reference Materials which involves the knowledge and use of references. Three separate tests are provided for the math section: Mathematics Concepts, Mathematics Problem Solving, and Mathematics Computation (King-Shaw, 1990).

Description of the Subtests

The vocabulary subtest is first to be administered. The words chosen for the Vocabulary subtest reflect an equal attention to nouns, verbs and adjectives, which corresponds to the growth of vocabulary in children (Herrick, 1981). This subtest involves reading, word meaning, and concept development. It is designed to measure the extent and breadth of vocabulary and the ability to make distinctions in word meanings by means of two skill classification systems: content-area skills classification, and linguistic/structural distinctions (i.e., the role nouns, verbs and adjectives play in language) (King-Shaw, 1990). The Vocabulary subtest contains 104 items of which the student answers only those assigned to his or her particular grade level. The student is asked to choose which of the four answers provided has the closest meaning to the bold-faced typed word in a phrase. An example of an item might be: *A **large** building*, the student chooses the best possible answer from a list of words [e.g., *1) small, 2) big, 3) scary 4) old*].

The reading comprehension subtest evaluates the ability to grasp details and purpose, analyzing and evaluating the organization of reading passages (Herrick, 1981). The skills objectives of this subtest are categorized into three classes: facts (e.g., answering who-what-when-where questions); inferences (e.g., drawing conclusions or answering the question why in each selection); and generalizations (e.g., getting the main idea or author's viewpoint from a selection) (King-Shaw, 1989). The Reading Comprehension subtest contains 141 items which vary in length from a few sentences to a full page. This exercise requires the student to read each passage quickly then choose the best of four answers provided for each item.

The language subtests of the CTBS are based on the mechanics of standard written English with the proofreading format (King-Shaw, 1989). These tests assess the basic skills in four major areas. The Spelling subtest is based upon the following error types: substitutions, reversals, omissions, and additions (King-Shaw, 1989). Some items contain

mistakes and others do not. The student is asked to look for errors in spelling of words. There are 104 items within the Spelling subtest.

The test of capitalization is similar to spelling in that it is based on finding the errors in capitalization. The skills objectives are grouped into six major categories: names and titles, dates and holidays, place names, organizations and groups, linguistic conventions, and avoiding overcapitalization in writing (King-Shaw, 1989). There are 80 items in this test, an example of which is: *1) "May i please, 2) go with you 3) to the store," Bob said. 4) (no mistakes)*. The student is required to choose the line in which the error in capitalization occurs. If there are no capitalization errors in the four answers provided, the child would choose the line 4 (no mistakes).

The punctuation subtest assesses the student's ability to use the appropriate type of punctuation marks. The skills measured with this test involve four major categories. Terminal punctuation is the first and involves the appropriate use of periods, question marks and exclamation marks. The second category includes the use of the comma in various situations. A third category emphasizes the appropriate use of the apostrophe, quotation marks, colon, and the semicolon. The fourth category involves instances of overpunctuation, where no punctuation is required (King-Shaw, 1989). This subtest is comprised of 80 items where the student is instructed to find mistakes in punctuation. To illustrate, an example of a typical punctuation test item is provided: *1) Sarah likes to 2) ride her bicycle She 3) just bought a new helmet. 4) (no mistakes)*.

Seven major categories are employed to classify the skills objectives in the Usage and Expression subtest. These include: the use of verbs, pronouns, modifiers, context, conciseness and clarity, appropriateness, and organization (King-Shaw, 1989). Again, the test is based on standard English. This subtest, which contains 103 items, has two parts. In Part One the student must identify errors in the use of words. An example is: *1) My sister and I went to the 2) movies. Us also went skating 3) at the arena. 4) (no mistakes)*. Part Two involves a test of the ability to express ideas correctly and effectively. For

example: *Mary said we will play since I get back.* The student is asked to choose the best way to express the underlined part of the sentence, with either, *1) while 2) then 3) when or 4) (no change)* when no change in the phrase is required.

The Visual Materials subtest measures the student's ability to read maps, and the ability to interpret information displayed in graphs and tables. This subtest contains 114 items which contain four answers for each exercise, one of which is the correct answer. Similarly, the subtest of reference materials examines the skills of alphabetizing words, use of a table of contents, index, encyclopedias, using guide and key words, and general reference materials, such as a dictionary (King-Shaw, 1989). This subtest is comprised of 94 items similar to the following: *1) balance, 2) water, 3) paper, 4) jar*, the student is required to choose the word that would appear first if these words were placed in alphabetical order.

The CTBS Mathematics portion is divided into three major sections: Mathematics Concepts, Mathematics Problem Solving, and Mathematics Computation. The skills objectives of the concepts test include: numeration and the number system; equations, inequalities, and number sentences; whole numbers and integers; fractions; decimals, currency, and percent; and geometry and measurement. This test is composed of 118 items, like the following: *What number is one greater than 8?*

The subtest of mathematics problem solving involves three major areas of skills objectives: single-step problems employing the operations of addition and subtraction, single-step problems employing the operations of multiplication and division, and multiple-step problems which combine the use of a number of operations. These areas might include items based on currency, whole numbers, or fractions, decimals and percents (King-Shaw, 1989). This subtest has 77 items similar to the following example: *A soccer team has six boys and five girls. How many are on the team altogether?*

The major skill areas covered in the Mathematics Computation subtest are an understanding of the basic operations: addition, subtraction, multiplication, and division,

as well as an understanding of whole numbers, fractions, and decimals (King-Shaw, 1989). The Mathematics Computation test contains 137 items. An example of such an item is: *18 - 8 = ? 1) 10, 2) 14, 3) 26, or 4) N* (meaning not given).

Reliability and Validity of the Subtests

The CTBS appears to be a psychometrically sound instrument. King-Shaw (1989) reported that internal consistency ranged from .83 to .96 for the five total scores (i.e., Vocabulary, Reading, Language, Work-Study, and Mathematics). Composite reliability is reported as being at least .97 for all grades (King-Shaw, 1989). In terms of validity, the authors claim that the "content specifications are based upon over fifty years of continuous research in curriculum, measurement procedures, interpretation and use of test results. The 248 skills objectives represented in the tests were determined through systematic consideration of courses of study, statements of authorities in method, and recommendations of national curriculum groups. The item selection process involved a combination of empirical and judgmental procedures, including evaluation by representative professionals from diverse cultural groups" (King-Shaw, 1989).

Reviews of the Canadian Tests of Basic Skills and the Iowa Tests of Basic Skills

The Canadian Tests of Basic Skills is a version of the well-known Iowa Tests of Basic Skills. The CTBS has not been extensively reviewed, however, the ITBS, its predecessor, has been reviewed at great length. These achievement tests evaluate general educational skills, not content achievement (Birch, 1983). The Iowa Tests of Basic Skills is a well respected achievement battery, and among those qualities that gave that test a good reputation include its level of technical sophistication, which is also evident in the Canadian Tests of Basic Skills (Birch, 1983). Both the CTBS and the ITBS boast sufficiently high reliabilities for individual diagnosis and prediction. The major strength of the ITBS, and thus the CTBS, is curricular validation. There was widespread

administration of the items for the establishment of discrimination and difficulty indexes, furthermore, extra care was taken in identifying and defining the skill processes prior to the development of the items (Herrick, 1981).

In his review of the ITBS, Herrick (1981) criticized that attention paid to the understanding of meanings of words, is much greater than that being paid to the word recognition tools and verification, and thus the vocabulary test is not actually measuring basic skills, but is more a measure of experiential background or intelligence. A particular strength of the test is the reading comprehension section where most of the items go beyond the facts to include understanding, and thus, test the ability to make inferences from the passages. The four language subtests are criticized as they rely on the "find the error" type of item which tends only to stress the editing skills rather than functional or creative aspects involved in writing. The work-study area of the test involves skills not typically covered in school curricula, thus, special difficulties may be presented for students in schools which do not cover these skills. Finally, the mathematics concepts subtest has been criticized as dealing more with content than the intellectual skills employed in arithmetic. The problem solving subtest is said to be a better measure in terms of the purpose of the test but fault is also found in this subtest focusing heavily on problems involving money. It should be noted that although the ITBS has been criticized for not including a computational subtest (Herrick, 1981), the CTBS, which is a newer version, does include a measure of mathematical computation which adds to its strengths.

In terms of criticisms of the CTBS, the use of grade-equivalents in lieu of age-norms for the CTBS has been criticized, since curriculum changes in the future may render these types of scores less meaningful (Birch, 1983). The fact that the CTBS was designed to measure general educational skills, not content achievement, has also been criticized because changes in curriculum may also make such evaluations less useful (Birch, 1983). For example, the capitalization and punctuation may be obsolete, as the emphasis of curriculum shifts. Birch (1983) found the study skills subtests to be most

valuable. Overall, the reviewers found the CTBS and ITBS to be useful and valuable instruments for assessing achievement, as long as teachers did not "teach to the test" (Herrick, 1981; Birch, 1983).

Procedure

The Canadian Tests of Basic Skills Elementary Multilevel Battery, Form 7, was administered during a three week period. All schools followed a similar schedule of testing in terms of time, where all testing sessions occurred in the morning. The following schedule was suggested by the Canadian Tests of Basic Skills test developers and was followed in the three participating schools.

| | | |
|---|---|---|
| Day 1 | 75 minutes | Pre-session: instructions, purposes, etc.<br>V: Vocabulary (15 min)<br>**SHORT REST PERIOD (5 min)**<br>R: Reading (42 min) |
| Day 2 | 80 minutes | L-1: Spelling (12 min)<br>**allow a minute or two to rest**<br>L-2: Capitalization (12 min)<br>**allow a minute or two to rest**<br>L-3: Punctuation (14 min)<br>**SHORT REST PERIOD (5 min)**<br>L-4: Usage and Expression (30 min) |
| Day 3 | 75 minutes | W-1: Visual Materials (40 min)<br>**SHORT REST PERIOD (5 min)**<br>W-2: Reference Materials (25 min) |
| Day 4 | 75 minutes | M-1: Math Concepts (25 min)<br>**SHORT REST PERIOD (5 min)**<br>M-2: Math Problems (25 min)<br>**SHORT REST PERIOD (1-2 min)**<br>M-3: Math Computation (16 min) |

Although for the majority of subjects the test was administered in four sessions, a fifth testing session was added to allow students who had been absent for any of the testing to "catch up". It should be noted that those students who were absent for any

more than two of the testing sessions were not required to participate in the fifth testing session as this would mean that a student would have to sit through a full, instead of a half day of testing, which might have contributed to fatigue in test-taking. However, their scores were included in data analyses, and missing scores were coded as missing values. The CTBS was administered by the classroom teachers with the exception of the fifth, "catch-up" day during which tests were administered by the primary researcher with assistance from an employee of the school, if it was required.

On the first day of testing, prior to the arrival of students, the test booklets for Form 7, answer sheets and Teacher's Guides were distributed to each teacher. All classes began testing at approximately the same time each day. After morning exercises (i.e., announcements by the school principal and completion of attendance records) the test booklets and answer sheets were distributed to each student. Subjects were introduced to the test and purposes of the tests were explained. During the pre-session instructions the subjects were asked to complete the information section of the answer sheet, (i.e., to print only their name and the name of their teacher) to save on administration time. Each student was supplied with a test booklet (a 112 page spiral-bound booklet containing 1152 items), an answer sheet, writing instruments (if necessary), and scratch paper for use during the mathematics tests. All instructions, from then on, were followed verbatim from the 1989 Canadian Tests of Basic Skills Teacher's Guide for the remainder of the testing sessions. During these testing sessions the primary researcher observed classrooms to ensure that the standardization procedures were followed.

Scoring Procedures

The Canadian Tests of Basic Skills were hand-scored according to the criteria in the CTBS Manual. The raw scores for each subtest were converted to grade-equivalent scores, and then to percentile ranks according to time of year by consulting the conversion tables which were available for all applicable levels in the CTBS Teacher's Guide.

Math and reading grades each student earned on their November report card were obtained from the classroom teachers as a measure of concurrent validity. Appendix B shows the Provincial Guide for Grading and the Grade Conversion Table used in this study. Math and reading grades were converted by means of the Grade Conversion Table to numerical grades. Letter grades were assigned in grades one through six, and numerical grades assigned for grades seven and eight. In order to standardize each student's grade for further analysis, the grades were converted to a numerical grade (i.e., Mark used for Analysis in the Grade Conversion Table). For example, letter grades designated A+ were assigned a numeric grade of 95.

# Results

The most salient research question of this thesis was whether or not normative data for Native students were needed and if so to establish First Nations norms for the Canadian Tests of Basic Skills. A second objective was to examine the psychometric properties of selected individual subtests for Native students. Specifically, reliability and validity were assessed for the Native sample.

The first step involved determining whether or not local norms should be prepared for each community individually. As there were no differences on the raw, grade-equivalent, and national percentile scores of each subtest, local norms were then established and are presented in terms of percentile ranks for the two communities combined. The next step of analysis was to determine whether there was actually a difference between national and First Nation norms. The results of repeated measures analyses of variance which examine differences between the norms are presented.

To examine the psychometric properties of the individual subtests of the CTBS for the Native sample, a series of reliability analyses were performed on a sample of the grades and subtests to determine the internal consistency of a sample of the subtests. Concurrent validity was evaluated with correlations between subtests and criterion measures. Independent t-tests and correlations among the CTBS subtests were examined to evaluate construct validity.

## The Establishment of Local Norms for the First Nation Sample

A series of one-way analyses of variance for each separate subtest were performed to compare the two communities on the raw, grade-equivalent, and national percentile scores of each subtest. No significant differences were found between the means from Community A and Community B for any of the eleven subtests at any of the grade levels. The largest F ratio was for the national percentile rank score of Test L-2: Capitalization

($F(1,375) = 2.50$, $p > .05$). Therefore, all analyses were done using the two communities combined.

CTBS Local norms for the Native sample were then established by determining the cumulative percent (SPSS FREQUENCIES command). This provided the percentile ranks for each individual raw score. The norms are presented in terms of percentiles, as that was the preferred mode of presentation of the Canadian national norms in the CTBS manual. For the corresponding CTBS local norms established for the Native sample refer to Tables 1 to 11. In Table 1, for example, a Grade 5 student who achieves a vocabulary raw score of 14 would be at the 70th percentile employing the Local CTBS Percentile Norms.

Are First Nation Norms Required?

In order to determine whether there was actually a difference between the norms established for the First Nation sample and the national norms for the Canadian Tests of Basic Skills, a 2 x 11 x 6 repeated measures analysis of variance was conducted. There was one between-subjects factor, grade, with six levels (i.e., grade 3 to grade 8), and two within-subjects factors. One repeated factor was designated percentile, which had two levels (i.e., national and local). The second repeated factor was called subtest and had eleven levels (i.e., the 11 CTBS subtests).

It should be noted that of the original 388 cases, 1 was excluded from the following analyses as the subject was determined to be a univariate outlier on several of the CTBS subtests. When the scores were converted to z-scores there were other subjects whose scores were slightly over three standard deviations, however, this occurred on only one or two subtests for these subjects and thus, they were included in the analyses. The

Table 1

Local CTBS Percentile Norms for Test V: Vocabulary (Midyear)

| RAW SCORE | GRADE 3 | GRADE 4 | GRADE 5 | GRADE 6 | GRADE 7 | GRADE 8 |
|---|---|---|---|---|---|---|
| 0 | 4 | 1 | | | | |
| 1 | 8 | 3 | 1 | | | 2 |
| 2 | 10 | 6 | | | 1 | |
| 3 | | 7 | 2 | | 3 | |
| 4 | 14 | | 7 | | 4 | |
| 5 | 23 | 11 | 8 | 4 | | |
| 6 | 27 | 19 | 15 | 6 | 6 | 7 |
| 7 | 37 | 26 | 21 | | 13 | |
| 8 | 42 | 31 | 23 | 13 | 14 | 21 |
| 9 | 52 | 43 | 27 | 15 | 18 | 23 |
| 10 | 62 | 49 | 34 | 16 | 27 | |
| 11 | 73 | 54 | 48 | 24 | 37 | 35 |
| 12 | 83 | 64 | 55 | 36 | 47 | 44 |
| 13 | 85 | 71 | 66 | 47 | 48 | 51 |
| 14 | 90 | 74 | 70 | 58 | 62 | 58 |
| 15 | 94 | 77 | 71 | 69 | 69 | 63 |
| 16 | | 80 | 75 | 73 | 75 | 77 |
| 17 | 96 | 86 | 81 | 75 | 76 | |
| 18 | | 90 | 84 | 76 | 83 | 84 |
| 19 | 98 | 96 | 88 | 78 | 85 | 88 |
| 20 | | | 92 | 82 | 86 | 93 |
| 21 | | 97 | 93 | 86 | | |
| 22 | 100 | | | 89 | 89 | 95 |
| 23 | | 99 | 95 | 93 | 90 | |
| 24 | | | 99 | 95 | 92 | 98 |
| 25 | | 100 | 100 | 96 | 96 | |
| 26 | | | | 98 | 97 | |
| 27 | | | | 100 | | 100 |
| 28 | | | | | | |
| 29 | | | | | | |
| 30 | | | | | 99 | |
| 31 | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| 60 | | | | | 100 | |

Table 2

Local CTBS Percentile Norms for Test R: Reading Comprehension (Midyear)

| RAW SCORE | GRADE 3 | GRADE 4 | GRADE 5 | GRADE 6 | GRADE 7 | GRADE 8 |
|---|---|---|---|---|---|---|
| 0 | 4 | | | | | |
| 1 | 8 | | | | | |
| 2 | 12 | | | | | 2 |
| 3 | 16 | | 1 | | | |
| 4 | | 4 | | | | |
| 5 | 18 | | | | | |
| 6 | 22 | | 2 | | | |
| 7 | 26 | 11 | | | 1 | 5 |
| 8 | 33 | 14 | 4 | | | 7 |
| 9 | 35 | 17 | 6 | 2 | | 9 |
| 10 | 39 | 19 | 7 | 4 | 3 | 12 |
| 11 | 45 | 26 | 11 | | | |
| 12 | 49 | 29 | 17 | 9 | 4 | 16 |
| 13 | 61 | 44 | 25 | 16 | 10 | 19 |
| 14 | 69 | 50 | 34 | 18 | 14 | |
| 15 | 71 | 56 | 37 | 24 | | |
| 16 | 75 | 66 | 41 | 31 | 23 | 23 |
| 17 | 84 | 69 | 48 | 35 | 27 | 26 |
| 18 | 88 | 70 | 53 | 40 | 31 | 37 |
| 19 | 92 | 73 | 58 | | 38 | 51 |
| 20 | | 74 | 61 | 44 | 48 | 56 |
| 21 | | 77 | 64 | 46 | 52 | 63 |
| 22 | 94 | 81 | 65 | 47 | 55 | 70 |
| 23 | | 86 | 66 | 51 | 63 | |
| 24 | | 87 | 68 | 53 | 65 | 74 |
| 25 | | | 71 | 60 | 69 | |
| 26 | 96 | | 74 | 64 | 70 | |
| 27 | | 93 | 77 | 66 | 76 | 79 |
| 28 | | | 82 | 75 | 79 | 81 |
| 29 | 98 | | | 78 | 80 | 84 |
| 30 | | 94 | 83 | 80 | 82 | |
| 31 | 100 | | | 82 | 85 | |
| 32 | | | 86 | 84 | 86 | 86 |
| 33 | | 97 | 88 | 86 | 87 | 88 |
| 34 | | | | 87 | 89 | |
| 35 | | | 90 | 89 | | |
| 36 | | | 93 | | | 91 |
| 37 | | | 98 | 91 | 90 | |
| 38 | | | | | 94 | |
| 39 | | 99 | | 93 | | |
| 40 | | | | 96 | | |
| 41 | | | 99 | | | 93 |
| 42 | | 100 | | 98 | 97 | |
| 43 | | | | | | 95 |
| 44 | | | | 100 | 99 | 98 |
| 45 | | | 100 | | 100 | 100 |

Table 3

Local CTBS Percentile Norms for Test L-1: Spelling (Midyear)

| RAW SCORE | GRADE 3 | GRADE 4 | GRADE 5 | GRADE 6 | GRADE 7 | GRADE 8 |
|---|---|---|---|---|---|---|
| 0 | | 3 | | | | |
| 1 | 8 | 5 | | | | |
| 2 | 9 | | 2 | | | |
| 3 | 11 | 6 | 4 | | | |
| 4 | 17 | 12 | 5 | | | 2 |
| 5 | 25 | 16 | 7 | 2 | 1 | |
| 6 | 32 | 21 | 12 | | 3 | 7 |
| 7 | 36 | 28 | 17 | 11 | 4 | 18 |
| 8 | 45 | 34 | 25 | 17 | 6 | 20 |
| 9 | 47 | 39 | 34 | 19 | 13 | |
| 10 | 51 | 42 | 36 | 24 | 21 | 22 |
| 11 | 57 | 46 | 42 | 28 | 24 | |
| 12 | 60 | 54 | 46 | 30 | 28 | 29 |
| 13 | 64 | 57 | 51 | 35 | 35 | 36 |
| 14 | 68 | 60 | 55 | 46 | 38 | 38 |
| 15 | 70 | 63 | 61 | 48 | 41 | 40 |
| 16 | 74 | 64 | 66 | 57 | 45 | 44 |
| 17 | 77 | 69 | 72 | 61 | 49 | 53 |
| 18 | 85 | 70 | 77 | 63 | 56 | 60 |
| 19 | 91 | 73 | 78 | 65 | 59 | 64 |
| 20 | 94 | 79 | 81 | 70 | 63 | 67 |
| 21 | | 81 | 83 | | 68 | |
| 22 | | 82 | 86 | 72 | 72 | 69 |
| 23 | | 84 | 88 | | 75 | 80 |
| 24 | 96 | 85 | 90 | 76 | 78 | |
| 25 | 100 | 87 | 92 | 78 | 82 | 82 |
| 26 | | 91 | 95 | 82 | 85 | 84 |
| 27 | | 94 | 98 | | 87 | 87 |
| 28 | | 96 | | | 90 | 93 |
| 29 | | | 99 | 85 | 93 | 96 |
| 30 | | | | 89 | 94 | 98 |
| 31 | | 99 | | 93 | 96 | 100 |
| 32 | | 100 | | 96 | 97 | |
| 33 | | | | 98 | 99 | |
| 34 | | | | | | |
| 35 | | | | 100 | | |
| 36 | | | | | 100 | |
| 37 | | | | | | |
| 38 | | | 100 | | | |

Table 4

Local CTBS Percentile Norms for Test L-2: Capitalization (Midyear)

| RAW SCORE | GRADE 3 | GRADE 4 | GRADE 5 | GRADE 6 | GRADE 7 | GRADE 8 |
|---|---|---|---|---|---|---|
| 0 | 4 | | | | | |
| 1 | 6 | 3 | | | | 2 |
| 2 | | 9 | 1 | | | |
| 3 | 13 | 16 | 6 | 2 | | |
| 4 | 23 | 22 | 8 | | 1 | |
| 5 | 42 | 34 | 13 | 4 | 4 | 9 |
| 6 | 45 | 44 | 19 | 19 | 10 | 11 |
| 7 | 55 | 50 | 27 | 22 | 17 | 13 |
| 8 | 60 | 62 | 38 | 30 | 29 | 15 |
| 9 | 66 | 66 | 44 | 39 | 33 | 24 |
| 10 | | 74 | 57 | 50 | 42 | 33 |
| 11 | 74 | 78 | 69 | 56 | 49 | 46 |
| 12 | 76 | 82 | 74 | 61 | 57 | 57 |
| 13 | 79 | 85 | 81 | 67 | 60 | 74 |
| 14 | 81 | 94 | 83 | 70 | 69 | 80 |
| 15 | 85 | 97 | 87 | 82 | 76 | 89 |
| 16 | | 99 | 89 | 89 | 81 | 94 |
| 17 | 87 | | 95 | 91 | 85 | |
| 18 | 91 | | 99 | 94 | 88 | 96 |
| 19 | | | | 98 | 93 | 100 |
| 20 | 94 | 100 | | | | |
| 21 | | | | | 96 | |
| 22 | | | | | 97 | |
| 23 | 98 | | 100 | 100 | 99 | |
| 24 | 100 | | | | | |
| 25 | | | | | 100 | |

Table 5

Local CTBS Percentile Norms for Test L-3: Punctuation (Midyear)

| RAW SCORE | GRADE 3 | GRADE 4 | GRADE 5 | GRADE 6 | GRADE 7 | GRADE 8 |
|---|---|---|---|---|---|---|
| 0 | 2 | 2 | | | | |
| 1 | 8 | | | 2 | | |
| 2 | 12 | 4 | 1 | | | 4 |
| 3 | | 7 | 4 | | 1 | |
| 4 | | 21 | 7 | 7 | 4 | |
| 5 | 15 | | 15 | 17 | 7 | 11 |
| 6 | 21 | 35 | 25 | 26 | 13 | 13 |
| 7 | 35 | 44 | 41 | 35 | 17 | 17 |
| 8 | 44 | 56 | 55 | 41 | 24 | 20 |
| 9 | 56 | 65 | 60 | 46 | 29 | 30 |
| 10 | 65 | 74 | 72 | 57 | 38 | 44 |
| 11 | 73 | 77 | 77 | 61 | 42 | 50 |
| 12 | 75 | 82 | 82 | 72 | 50 | 52 |
| 13 | | 85 | 88 | | 56 | 54 |
| 14 | 79 | 88 | 92 | 74 | 60 | 65 |
| 15 | 85 | 93 | 94 | 80 | 64 | 72 |
| 16 | 89 | 96 | 96 | 85 | 71 | 74 |
| 17 | 92 | | 98 | 89 | 78 | 78 |
| 18 | 94 | 99 | | | 81 | 83 |
| 19 | | 100 | 99 | 94 | 82 | 85 |
| 20 | | | | | 85 | 89 |
| 21 | 98 | | | 96 | 90 | |
| 22 | | | | | 93 | 94 |
| 23 | 100 | | | | 94 | 96 |
| 24 | | | | 98 | 96 | 98 |
| 25 | | | 100 | 100 | | 100 |
| 26 | | | | | 97 | |
| 27 | | | | | 98 | |
| 28 | | | | | | |
| 29 | | | | | 100 | |

Table 6

Local CTBS Percentile Norms for Test L-4: Usage and Expression (Midyear)

| RAW SCORE | GRADE 3 | GRADE 4 | GRADE 5 | GRADE 6 | GRADE 7 | GRADE 8 |
|---|---|---|---|---|---|---|
| 0 | | | | | | |
| 1 | 2 | 3 | | | | |
| 2 | | | | | | |
| 3 | | | | | | 2 |
| 4 | 10 | 4 | 1 | | | |
| 5 | 14 | 9 | 4 | | 3 | |
| 6 | 19 | 12 | 5 | | | |
| 7 | 33 | 21 | 11 | 4 | | 7 |
| 8 | 37 | 34 | 14 | 9 | | 9 |
| 9 | 46 | 43 | 24 | | 7 | 11 |
| 10 | 56 | 49 | 30 | 22 | 11 | 15 |
| 11 | 60 | 57 | 37 | 32 | 14 | 22 |
| 12 | 65 | 63 | 45 | 39 | 15 | 28 |
| 13 | 73 | 69 | 52 | 43 | 19 | 39 |
| 14 | 85 | 72 | 58 | 50 | 26 | 41 |
| 15 | | 77 | 62 | 52 | 35 | 48 |
| 16 | 87 | 82 | 68 | 56 | 36 | 54 |
| 17 | 92 | | 70 | 57 | 40 | 61 |
| 18 | | 84 | 75 | | 49 | 65 |
| 19 | 96 | 87 | 80 | 61 | 51 | 72 |
| 20 | 98 | 88 | | 69 | 54 | 78 |
| 21 | 100 | | 83 | 74 | 63 | 80 |
| 22 | | 90 | 87 | 82 | 68 | 83 |
| 23 | | 91 | 88 | 85 | 71 | 87 |
| 24 | | 93 | 92 | 89 | 72 | 89 |
| 25 | | 94 | 93 | | 76 | 91 |
| 26 | | 99 | 95 | 91 | 81 | 96 |
| 27 | | | | 93 | 86 | |
| 28 | | | 96 | 96 | 90 | 98 |
| 29 | | | 99 | 98 | 93 | |
| 30 | | | 100 | | 94 | 100 |
| 31 | | 100 | | | 96 | |
| 32 | | | | 100 | 99 | |
| 33 | | | | | 100 | |

Table 7

Local Percentile Norms for Test W-1: Visual Materials (Midyear)

| RAW SCORE | GRADE 3 | GRADE 4 | GRADE 5 | GRADE 6 | GRADE 7 | GRADE 8 |
|---|---|---|---|---|---|---|
| 0 | 4 | | | | | |
| 1 | | | | | | 2 |
| 2 | 8 | | | | | |
| 3 | 14 | | | | 1 | |
| 4 | 16 | 2 | 1 | | | |
| 5 | 22 | 3 | 2 | 2 | | 5 |
| 6 | | 6 | | | | |
| 7 | 24 | 9 | 5 | | | |
| 8 | 33 | 15 | 6 | | 3 | |
| 9 | 35 | 23 | 13 | 6 | | |
| 10 | 41 | 29 | 17 | 11 | | |
| 11 | 49 | 31 | 23 | 15 | 4 | 10 |
| 12 | 55 | 35 | 28 | 19 | 13 | 14 |
| 13 | 57 | 43 | 37 | 28 | 14 | 19 |
| 14 | 59 | 51 | 43 | 33 | 17 | 21 |
| 15 | 69 | 59 | 48 | 43 | 21 | 26 |
| 16 | 75 | 63 | 52 | 50 | 24 | 33 |
| 17 | 82 | 71 | 53 | 56 | 34 | 41 |
| 18 | 86 | | 55 | 61 | 39 | 48 |
| 19 | | 74 | 60 | 63 | | 57 |
| 20 | | 77 | 65 | 67 | 41 | |
| 21 | 88 | 79 | 70 | 72 | 49 | 62 |
| 22 | 90 | 80 | 74 | 74 | 56 | 71 |
| 23 | 96 | 88 | 76 | 76 | 61 | 74 |
| 24 | | 89 | 80 | 83 | 66 | 81 |
| 25 | | 94 | 81 | 85 | 70 | 88 |
| 26 | 98 | | 82 | | 76 | 91 |
| 27 | | | 83 | 87 | 80 | |
| 28 | | 95 | 89 | 89 | 83 | 93 |
| 29 | 100 | | 92 | 91 | 86 | |
| 30 | | 99 | 95 | 98 | 89 | |
| 31 | | 100 | 96 | 100 | 92 | |
| 32 | | | | | 94 | 98 |
| 33 | | | 100 | | 96 | |
| 34 | | | | | | |
| 35 | | | | | 97 | |
| 36 | | | | | | |
| 37 | | | | | | 100 |
| 38 | | | | | | |
| 39 | | | | | | |
| 40 | | | | | 100 | |

Table 8

Local CTBS Percentile Norms for Test W-2: Reference Materials (Midyear)

| RAW SCORE | GRADE 3 | GRADE 4 | GRADE 5 | GRADE 6 | GRADE 7 | GRADE 8 |
|---|---|---|---|---|---|---|
| 0 | 4 | | | | | |
| 1 | 9 | | | | | |
| 2 | | | | | | |
| 3 | 13 | | | 2 | | 2 |
| 4 | 18 | | | | 1 | |
| 5 | 20 | | 4 | | 3 | |
| 6 | 27 | 3 | 6 | | | 7 |
| 7 | 31 | 6 | 10 | 6 | 4 | 10 |
| 8 | 40 | 11 | 17 | 9 | 7 | 12 |
| 9 | 42 | 14 | 22 | 17 | 10 | 21 |
| 10 | 51 | 25 | 28 | 22 | 13 | 24 |
| 11 | 53 | 31 | 39 | 33 | 17 | 26 |
| 12 | 64 | 35 | 46 | 35 | 21 | 31 |
| 13 | | 43 | 53 | 43 | 22 | 33 |
| 14 | 67 | 46 | 58 | 44 | 25 | 36 |
| 15 | 73 | 55 | 61 | 52 | 28 | 38 |
| 16 | 76 | 59 | | 56 | 35 | 43 |
| 17 | 82 | 60 | 64 | 57 | 43 | 50 |
| 18 | 84 | 62 | 68 | | 50 | 60 |
| 19 | 87 | 63 | | 59 | 54 | 71 |
| 20 | | 69 | 70 | 63 | 58 | 76 |
| 21 | 89 | 71 | 71 | 67 | 68 | 79 |
| 22 | 91 | 75 | 76 | 72 | 75 | 83 |
| 23 | | 80 | 82 | 76 | 76 | 86 |
| 24 | 93 | | 86 | 78 | 78 | 91 |
| 25 | 100 | 89 | 87 | 83 | 79 | 93 |
| 26 | | 91 | 89 | | 82 | |
| 27 | | 92 | 90 | 89 | 85 | 95 |
| 28 | | 95 | | | 88 | |
| 29 | | 97 | 93 | 91 | 92 | 100 |
| 30 | | | 94 | | 94 | |
| 31 | | 99 | 96 | 98 | 96 | |
| 32 | | | 98 | | 99 | |
| 33 | | 100 | | | 100 | |
| 34 | | | | | | |
| 35 | | | | | | |
| 36 | | | 99 | 100 | | |
| 37 | | | 100 | | | |

Table 9

Local CTBS Percentile Norms for Test M-1: Mathematics Concepts (Midyear)

| RAW SCORE | GRADE 3 | GRADE 4 | GRADE 5 | GRADE 6 | GRADE 7 | GRADE 8 |
|---|---|---|---|---|---|---|
| 0 | 2 | | | | | |
| 1 | 4 | 2 | | 2 | | |
| 2 | 6 | | 1 | | | 2 |
| 3 | 10 | 3 | | | | |
| 4 | 13 | 6 | | | 3 | |
| 5 | 19 | 8 | | | | |
| 6 | | 11 | 3 | 5 | | |
| 7 | 21 | 13 | 5 | 7 | | |
| 8 | 29 | 22 | 11 | 9 | 7 | 5 |
| 9 | | 27 | 15 | 14 | 9 | 7 |
| 10 | 35 | 36 | 27 | 18 | 11 | 16 |
| 11 | 48 | 44 | 43 | 23 | 20 | 32 |
| 12 | 58 | 45 | 51 | 29 | 30 | 36 |
| 13 | 75 | 52 | 62 | 39 | 33 | 48 |
| 14 | 79 | 58 | 67 | 46 | 40 | 59 |
| 15 | 85 | 63 | 72 | 54 | 46 | 64 |
| 16 | 90 | 69 | 80 | 66 | 50 | 66 |
| 17 | 92 | 73 | 82 | 68 | 59 | 73 |
| 18 | | 78 | 88 | 71 | 67 | 80 |
| 19 | 96 | | | 73 | 69 | 82 |
| 20 | 98 | 80 | 90 | 77 | 74 | 91 |
| 21 | | 84 | 94 | 82 | 81 | 93 |
| 22 | | 94 | | 96 | 86 | 96 |
| 23 | | 97 | 98 | 88 | 91 | |
| 24 | | | 100 | 89 | 93 | 98 |
| 25 | | | | 93 | 97 | |
| 26 | 100 | 98 | | 96 | | |
| 27 | | | | 98 | | |
| 28 | | | | | 100 | |
| 29 | | 100 | | 100 | | |
| 30 | | | | | | |
| 31 | | | | | | |
| 32 | | | | | | 100 |

Table 10

Local CTBS Percentile Norms for Test M-2: Mathematics Problem Solving (Midyear)

| RAW SCORE | GRADE 3 | GRADE 4 | GRADE 5 | GRADE 6 | GRADE 7 | GRADE 8 |
|---|---|---|---|---|---|---|
| 0 | | | | | | |
| 1 | 4 | | | | | 2 |
| 2 | 6 | 2 | 3 | | 1 | 5 |
| 3 | 15 | 5 | 4 | 2 | | |
| 4 | 31 | 13 | 13 | 6 | 4 | 12 |
| 5 | 42 | 22 | 19 | 15 | 11 | 19 |
| 6 | 52 | 30 | 25 | 26 | 23 | 26 |
| 7 | 60 | 42 | 35 | 35 | 39 | 35 |
| 8 | 71 | 56 | 49 | 42 | 46 | |
| 9 | 77 | 66 | 61 | 49 | 50 | 42 |
| 10 | 85 | 67 | 69 | 58 | 66 | 49 |
| 11 | 90 | 72 | 78 | 69 | 73 | 67 |
| 12 | 92 | 81 | 81 | 75 | 80 | 77 |
| 13 | | 84 | 85 | 82 | 87 | 88 |
| 14 | 94 | 86 | 90 | 86 | 90 | 91 |
| 15 | | 91 | 95 | 87 | 93 | 93 |
| 16 | 100 | 94 | 96 | 89 | 96 | 95 |
| 17 | | | 98 | | 97 | |
| 18 | | 95 | 99 | 91 | 99 | 98 |
| 19 | | 98 | 100 | 96 | | |
| 20 | | | | 98 | 100 | |
| 21 | | | | | | 100 |
| 22 | | | | 100 | | |
| 23 | | | | | | |
| 24 | | 100 | | | | |

Table 11

Local CTBS Percentile Norms for Test M-3: Mathematics Computation (Midyear)

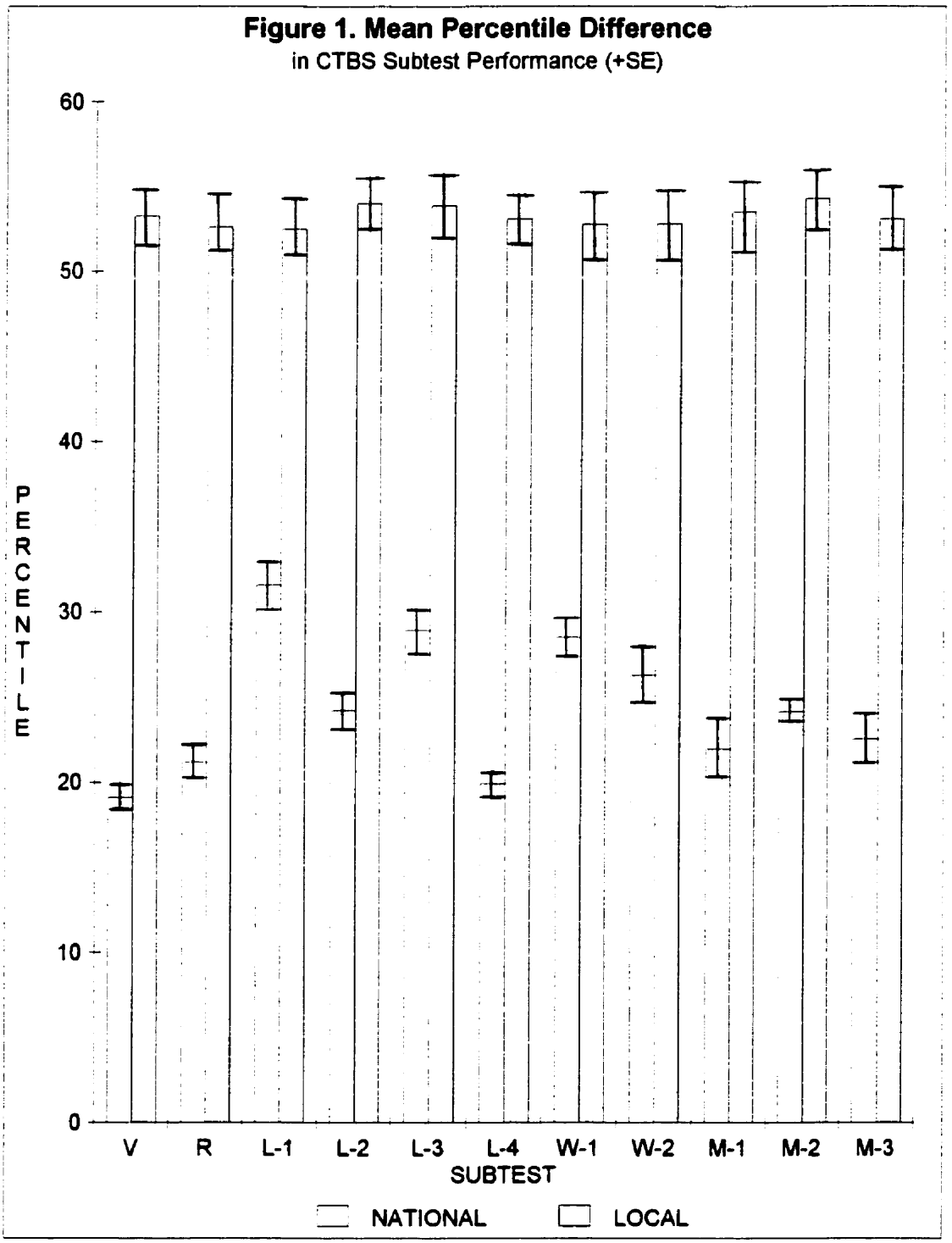
| RAW SCORE | GRADE 3 | GRADE 4 | GRADE 5 | GRADE 6 | GRADE 7 | GRADE 8 |
|---|---|---|---|---|---|---|
| 0 | | | | | | |
| 1 | | 2 | | | | |
| 2 | | 3 | | | | |
| 3 | 2 | | 1 | 2 | | |
| 4 | 6 | 5 | 3 | | | 2 |
| 5 | 9 | 8 | 6 | | 1 | 5 |
| 6 | 17 | 11 | 11 | 6 | 3 | 10 |
| 7 | 19 | 17 | | 7 | 7 | 14 |
| 8 | 23 | 23 | 20 | 11 | 14 | 21 |
| 9 | 30 | 30 | 25 | 20 | 16 | 29 |
| 10 | | 33 | 31 | 29 | 20 | 36 |
| 11 | 38 | 42 | 36 | 31 | 23 | 48 |
| 12 | 45 | 48 | 40 | 40 | 34 | 52 |
| 13 | 47 | 53 | 49 | 47 | 44 | 57 |
| 14 | 57 | 56 | 59 | 53 | 49 | 64 |
| 15 | 60 | 61 | 61 | 60 | 56 | 83 |
| 16 | 66 | 67 | 66 | 64 | 60 | 88 |
| 17 | 72 | | 73 | 66 | 66 | |
| 18 | | 75 | 76 | 67 | 74 | |
| 19 | 75 | 80 | 80 | | 79 | |
| 20 | 77 | 81 | 84 | 75 | 87 | 91 |
| 21 | 81 | 84 | 90 | | 93 | 93 |
| 22 | 87 | 88 | 93 | 76 | 96 | 98 |
| 23 | 92 | 91 | | 80 | | |
| 24 | 96 | | 98 | 84 | | |
| 25 | | 95 | | 87 | 97 | |
| 26 | | 97 | | | 99 | |
| 27 | 98 | 98 | 99 | | | |
| 28 | | 100 | | 89 | | |
| 29 | | | 100 | | | |
| 30 | | | | 95 | | 100 |
| 31 | 100 | | | 96 | | |
| 32 | | | | 100 | | |
| 33 | | | | | | |
| 34 | | | | | 100 | |

assumptions related to all statistical tests performed were satisfied. An alpha level of .05 was employed for all statistical analyses.

The results showed a significant difference among the two measures of percentile ($F(1,335) = 11.36$, $p < .05$). There was also a significant main effect for subtest ($F(10,3350) = 13.02$, $p < .05$). There was no main effect for grade. Also, there was a significant two-way interaction between percentile type and subtest ($F(10,3350) = 554.05$, $p < .05$). A three-way interaction was found between percentile type, subtest and grade ($F(50,3350) = 1.65$, $p < .05$).

The results suggest that there are clear differences between the norms established for the Native sample and the existing national norms for the Canadian Tests of Basic Skills. Post-hoc paired t-tests were employed to test the percentile main effect. Within these post-hoc analyses, the mean national percentile rank performance on each subtest was compared to the mean local percentile rank performance. For all of the CTBS tests, collapsed across grades, the direction of effects suggested that the mean performance on the national percentile ranks was lower than the mean performance on the local percentile ranks.

Figure 1 depicts the percentile main effect. The greatest difference existed between the means for national ($M = 19.11$) and local percentile ($M = 53.27$) ranks for the Vocabulary test ($t(372) = -43.99$, $p < .05$). The range of t-scores for the national vs. local percentile comparisons was from ($t(356) = -41.28$, $p < .05$) for the Mathematics Computation subtest to ($t(372) = -47.36$, $p < .05$) for the Spelling subtest. The means and standard deviations for the national and local percentile ranks for each CTBS subtest are available in Table 12.




Note. V = Vocabulary; R = Reading Comprehension; L-1 = Spelling; L-2= Capitalization L-3 = Punctuation; L-4 = Usage & Expression; W-1 = Visual Materials; W-2 = Reference Materials; M-1 = Mathematics Concepts; M-2 = Mathematics Problem Solving; M-3 = Mathematics Computation

Table 12. Means and Standard Deviations of National and Local Percentile Ranks for CTBS Subtests

| | | National Percentiles | | Local Percentiles | | |
|---|---|---|---|---|---|---|
| TEST | GRADE | MEAN | SD | MEAN | SD | t Value |
| Vocabulary | 3 | 22.88 | 17.97 | 53.88 | 29.07 | -15.46* |
| | 4 | 18.3 | 17.55 | 52.46 | 28.47 | -20.20* |
| | 5 | 19.12 | 16.45 | 53.41 | 28.65 | -21.39* |
| | 6 | 19.04 | 16.11 | 53.69 | 28.36 | -16.56* |
| | 7 | 18.99 | 19.16 | 52.42 | 28.68 | -18.36* |
| | 8 | 16.09 | 15.12 | 54.37 | 28.46 | -15.29* |
| Reading Comprehension | 3 | 18.84 | 17.68 | 53 | 29.28 | -16.07* |
| | 4 | 18.62 | 19.34 | 52.68 | 28.12 | -19.83* |
| | 5 | 20.98 | 21.58 | 52.3 | 28.64 | -21.33* |
| | 6 | 21.64 | 20.87 | 52.44 | 28.77 | -17.58* |
| | 7 | 26.9 | 22.21 | 52.56 | 28.44 | -19.02* |
| | 8 | 18.4 | 22.27 | 53.07 | 28.82 | -13.14* |
| Spelling | 3 | 34.58 | 27.63 | 52.85 | 28.67 | -21.46* |
| | 4 | 30.84 | 29.66 | 52.21 | 28.79 | -17.66* |
| | 5 | 28.19 | 23.81 | 52.16 | 28.64 | -23.11* |
| | 6 | 33.72 | 29.21 | 52.76 | 28.44 | -15.70* |
| | 7 | 33.73 | 25.56 | 52.21 | 28.55 | -25.28* |
| | 8 | 29.51 | 25.24 | 53.13 | 28.8 | -22.20* |
| Capitalization | 3 | 31.7 | 28.66 | 54.3 | 27.73 | -15.98 |
| | 4 | 18.44 | 19.45 | 53.84 | 28.64 | -20.54* |
| | 5 | 21.49 | 20.08 | 53.75 | 28.9 | -21.45* |
| | 6 | 23.74 | 20.34 | 54.3 | 28.12 | -20.06* |
| | 7 | 28.54 | 25.31 | 53.47 | 28.44 | -21.83* |
| | 8 | 22.83 | 17.09 | 54.98 | 29.4 | -14.62* |
| Punctuation | 3 | 36.02 | 29.76 | 54.06 | 28.8 | -13.63* |
| | 4 | 26.22 | 26.07 | 54.5 | 27.85 | -17.24* |
| | 5 | 25.6 | 22.01 | 54.54 | 28.13 | -22.19* |
| | 6 | 27.91 | 25.82 | 53.57 | 28.51 | -18.12* |
| | 7 | 33.26 | 26.67 | 52.82 | 28.71 | -22.16* |
| | 8 | 25.35 | 23.76 | 53.48 | 28.63 | -17.17* |
| Usage & Expression | 3 | 19.92 | 17.71 | 54.08 | 28.69 | -18.00* |
| | 4 | 18.13 | 21.54 | 53.35 | 28.1 | -19.05* |
| | 5 | 18.98 | 19.03 | 52.73 | 28.38 | -21.92* |
| | 6 | 18.11 | 18.48 | 53.37 | 28.17 | -18.45* |
| | 7 | 26.08 | 21.09 | 52.54 | 28.86 | -21.84* |
| | 8 | 16.74 | 16.81 | 52.78 | 28.84 | -15.50* |
| Visual Materials | 3 | 25.02 | 24.5 | 53.06 | 28.1 | -18.70* |
| | 4 | 25.46 | 25.93 | 52.86 | 29.09 | -18.87* |
| | 5 | 26.57 | 25.5 | 52.37 | 28.7 | -23.54* |
| | 6 | 30.17 | 25.53 | 52.94 | 28.8 | -18.92* |
| | 7 | 36.82 | 24.47 | 52.62 | 28.5 | -23.56* |
| | 8 | 25.05 | 20.68 | 53.07 | 29.4 | -14.50* |

Note. * indicates significance at the alpha level of .01

Table 12. Means and Standard Deviations of National and Local Percentile Ranks for CTBS Subtests (continued)

| | | National Percentiles | | Local Percentiles | | |
|---|---|---|---|---|---|---|
| TEST | GRADE | MEAN | SD | MEAN | SD | t Value |
| Reference Materials | 3 | 26 | 23.19 | 52.93 | 29.14 | -17.64* |
| | 4 | 25.52 | 22.65 | 52.89 | 28.67 | -20.89* |
| | 5 | 25.58 | 22.64 | 52.81 | 28.31 | -22.16* |
| | 6 | 26.2 | 22.23 | 52.89 | 28.79 | -18.06* |
| | 7 | 32.24 | 23.98 | 52.51 | 29.08 | -19.19* |
| | 8 | 19.12 | 17.03 | 52.98 | 29.32 | -14.66* |
| Math Concepts | 3 | 24.79 | 21.97 | 54.1 | 29.53 | -14.72* |
| | 4 | 24.51 | 25.58 | 52.38 | 28.61 | -20.01* |
| | 5 | 20.48 | 20.05 | 54.33 | 28.33 | -20.96* |
| | 6 | 22.84 | 21.71 | 52.96 | 28.93 | -17.71* |
| | 7 | 23.97 | 18.85 | 53.14 | 28.77 | -20.65* |
| | 8 | 13.5 | 14.88 | 54.43 | 28.32 | -14.59* |
| Math Problems | 3 | 21.02 | 21.6 | 54.67 | 28.19 | -18.64* |
| | 4 | 25.1 | 21.16 | 53.49 | 27.87 | -20.01* |
| | 5 | 24.18 | 18.57 | 54.26 | 28.38 | -21.99* |
| | 6 | 25.6 | 20.77 | 53.93 | 28.24 | -18.41* |
| | 7 | 27.9 | 19.25 | 54.81 | 28.21 | -20.67* |
| | 8 | 18.3 | 15.43 | 54.7 | 29.37 | -14.57* |
| Math Computation | 3 | 27.47 | 24.9 | 52.94 | 28.97 | -15.68* |
| | 4 | 22.46 | 22.09 | 52.4 | 29.11 | -19.44* |
| | 5 | 19.73 | 17.32 | 52.98 | 28.92 | -20.66* |
| | 6 | 25.47 | 26.42 | 53 | 28.63 | -16.74* |
| | 7 | 24.53 | 20.79 | 53.3 | 28.97 | -20.15* |
| | 8 | 15.29 | 17.72 | 54.36 | 29.92 | -13.29* |

Note. * indicates significance at the alpha level of .01

The two-way (percentile x subtest) interaction was also examined via post-hoc paired t-tests which revealed that there were significant differences between the national percentile rank comparisons between each CTBS subtest, however, no significant differences were found when comparing the local percentile rank of the subtests. Paired t-test comparisons between the subtests for the local percentile rank performance yielded a range of t-scores from ($t(352) = 0$, $p > .05$) for the Spelling ($M = 53.47$, $SD = 28.40$)-Reference Materials ($M = 53.47$, $SD = 28.51$) comparison to ($t(372) = -1.55$, $p > .05$) for the Spelling ($M = 52.48$, $SD = 28.45$)-Capitalization ($M = 54.43$, $SD = 28.19$) comparison.

Based on previous research which states that Native students are weaker on language measures (Connelly, 1985) and that Native students perform poorly on the verbal portion of intelligence tests (St. John, Krichev, & Bawman, 1976; Seyfort, Spreen, & Lahmer, 1980; McCullough, Walker, & Diessner, 1985; Diessner & Walker, 1989), it was expected that performance on the language measures (i.e., Vocabulary and Reading Comprehension) would be lower than the performance on the other CTBS subtests. For the national percentile rank performance comparisons between subtests it was found that performance on the Vocabulary test was in fact lower than the other subtests, except the test of Usage and Expression (i.e., a language test) where no significant difference existed. The greatest significant differences existed between Spelling ($M = 31.60$, $SD = 26.75$) and Usage and Expression ($M = 20.12$, $SD = 19.55$), $t(371) = 11.52$, $p < .05$, and between Spelling ($M = 31.72$, $SD = 26.74$) and Vocabulary ($M = 19.37$, $SD = 17.23$), $t(363) = -11.40$, $p < .05$.

Similarly, Reading Comprehension performance was found to be lower than the performance on the remaining subtests with the exception of the Vocabulary test on which performance was found to be lower, and the Usage and Expression, and Mathematics Computation subtests where no significant differences existed. Here, again, the greatest significant difference existed between Reading Comprehension ($M = 21.45$, $SD = 20.97$)

and Spelling ($M$ = 31.80, $SD$ = 26.74), $t(362) = -9.56$, $p < .05$. Interestingly, comparisons with the performance on the Usage and Expression subtest, which is closely related to the language measures of Vocabulary and especially Reading Comprehension, the greatest difference was also found to be with the Spelling subtest ($t(371) = 11.52$, $p < .05$).

The paired t-test comparisons between the national percentile ranks of each subtest revealed a range of t-scores from ($t(354) = -0.17$, $p > .05$) for the Mathematics Concepts ($M$ = 22.28, $SD$ = 21.08)-Mathematics Computation ($M$ = 22.46, $SD$ = 21.63) comparison to ($t(371) = 11.52$, $p < .05$) for the Spelling ($M$ = 31.60, $SD$ = 26.75)-Usage and Expression ($M$ = 20.12, $SD$ = 19.55) comparison. These results indicate that the subjects performed best on the CTBS Spelling test and most poorly on the Vocabulary, Usage and Expression, Mathematics Computation, and Reading Comprehension tests.

Using post-hoc t-tests to further test the three-way (percentile x subtest x grade) interaction, the means of the local and national percentile ranks for each of the eleven subtests were compared between each grade level. Figure 2 through 12 show that the interaction lies in the difference among the grades for some subtests but not others. For the Reading Comprehension subtest, Grades 3 and 7 ($t(120) = -2.15$, $p < .05$), and Grades 4 and 7 ($t(138) = -2.35$, $p < .05$) differ significantly on the national percentile scores, where performance in Grade 7 ($M$ = 26.90) is higher. For the Capitalization subtest, Grades 3 and 4 ($t(119) = 3.03$, $p < .05$), Grades 3 and 5 ($t(135) = 2.45$, $p < .05$), and Grades 4 and 7 ($t(138) = -2.64$, $p < .05$) differ significantly on national percentile scores, where performance in Grade 3 ($M$ = 31.70) is higher than Grades 4 and 5, and performance in Grade 7 ($M$ = 28.54) is higher than in Grade 4. In Figure 6, Grades 3 and 5 ($t(133) = 2.33$, $p < .05$), differ significantly on the national percentile scores for the Punctuation subtest, where performance is higher in Grade 3 ($M$ = 36.02). In Figure 7, Grades 4 and 7 ($t(138) = -2.21$, $p < .05$), Grades 5 and 7 ($t(154) = -2.21$, $p < .05$), Grades 6 and 7 ($t(124) = -2.21$, $p < .05$), and Grades 7 and 8 ($t(116) = 2.53$, $p < .05$) differ significantly on the Usage and Expression subtest, where performance in Grade 7 ($M$ =

26.08) is higher. Similarly, in Figure 8, Grades 3 and 7 ($t(120) = -2.63$, $p < .05$), Grades 4 and 7 ($t(134) = -2.63$, $p < .05$), Grades 5 and 7 ($t(152) = -2.53$, $p < .05$), and Grades 7 and 8 ($t(111) = 2.61$, $p < .05$) differ significantly on the national percentile scores for the Visual Materials subtest, where performance in Grade 7 ($M = 36.82$) is higher. In Figure 10 there are significant differences between the national percentile scores for Grades 3 and 8 ($t(90) = 2.86$, $p < .05$), Grades 4 and 8 ($t(105) = 2.57$, $p < .05$), Grades 5 and 8 ($t(123) = 2.03$, $p < .05$), Grades 6 and 8 ($t(98) = 2.44$, $p < .05$), and Grades 7 and 8 ($t(112) = 3.12$, $p < .05$), where the Mathematics Concepts subtest performance in Grade 8 ($M = 13.50$) was lower than in the other grades. In Figure 11, performance in Grade 7 ($M = 27.90$) is significantly higher than in Grade 8 ($t(111) = 2.77$, $p < .05$) on national percentile scores for the Mathematics Problem Solving subtest. Finally, Figure 12 depicts the three-way interaction for the Mathematics Computation subtest, where performance in Grade 3 ($M = 27.47$) is higher than in both Grades 5 ($t(125) = 2.06$, $p < .05$) and 8 ($t(87) = 2.63$, $p < .05$). Grade 8 ($M = 15.29$) national percentile scores for the Mathematics Computation subtest were lower than both Grades 6 ($t(95) = 2.15$, $p < .05$) and 7 ($t(110) = 2.40$, $p < .05$).

Although the three-way interaction is not very strong, the depiction of this three-way interaction in Figures 2 to 12 shows that for some of the subtests there were significant differences among the grades. The two-way interaction between percentile and subtest illustrates that for all subtests of the CTBS, the mean performance for each grade according to the national norms was significantly lower than the mean performance for each grade according to the local norms established for the Native sample. These results, the main effect for percentile, as well as the two-way interaction between percentile type and subtest were strong, and evidently, show that local norms are required for all subtests, in particular, for the language measures, Vocabulary, Reading Comprehension, and Usage and Expression.

**Figure 2. Mean Percentile Rank (+SE)**

Test V: Vocabulary

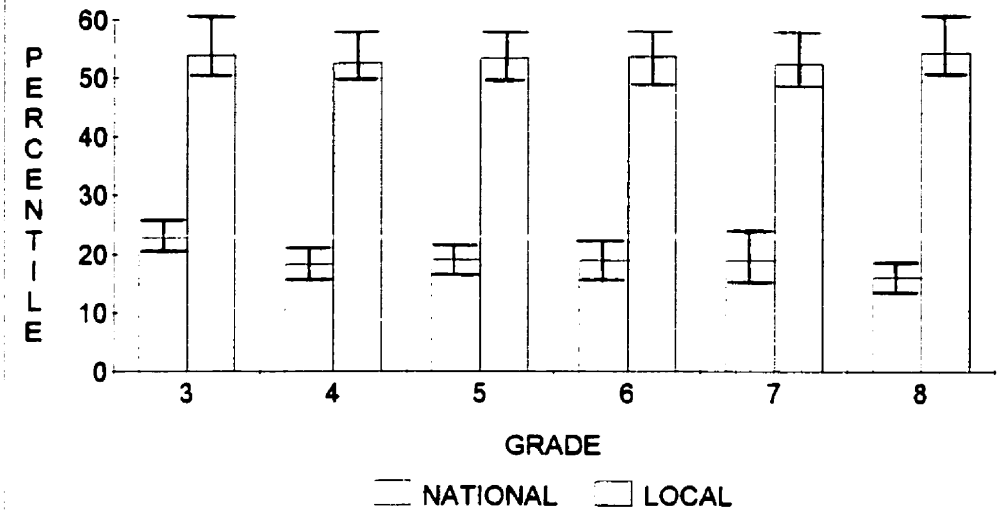



**Figure 3. Mean Percentile Rank (+SE)**

Test R: Reading Comprehension

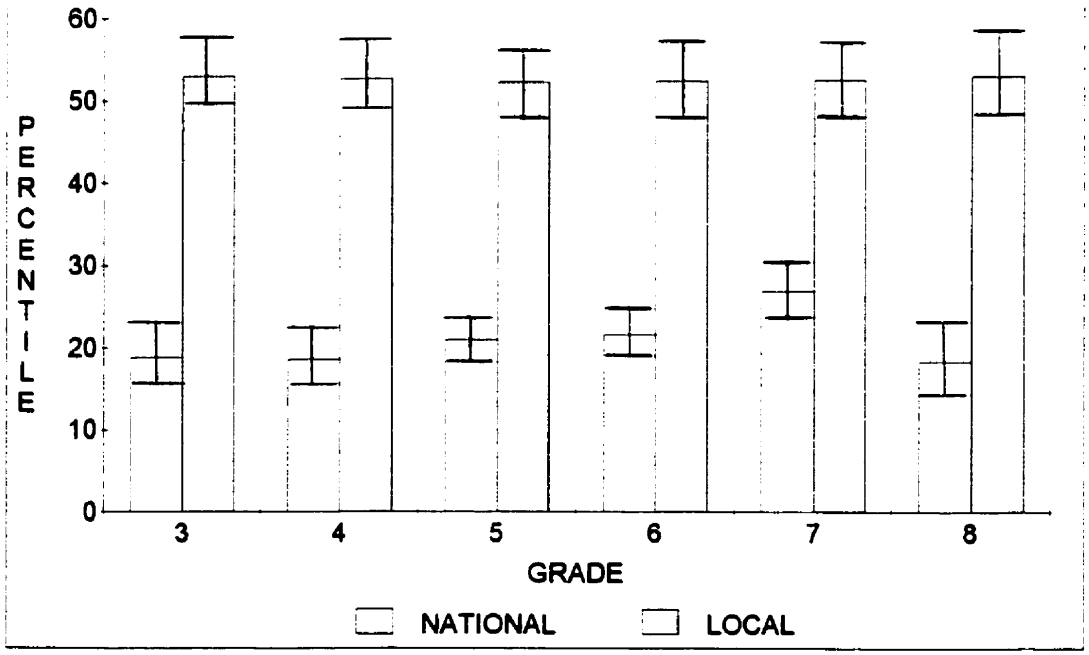


**Figure 4. Mean Percentile Rank (+SE)**

Test L-1: Spelling

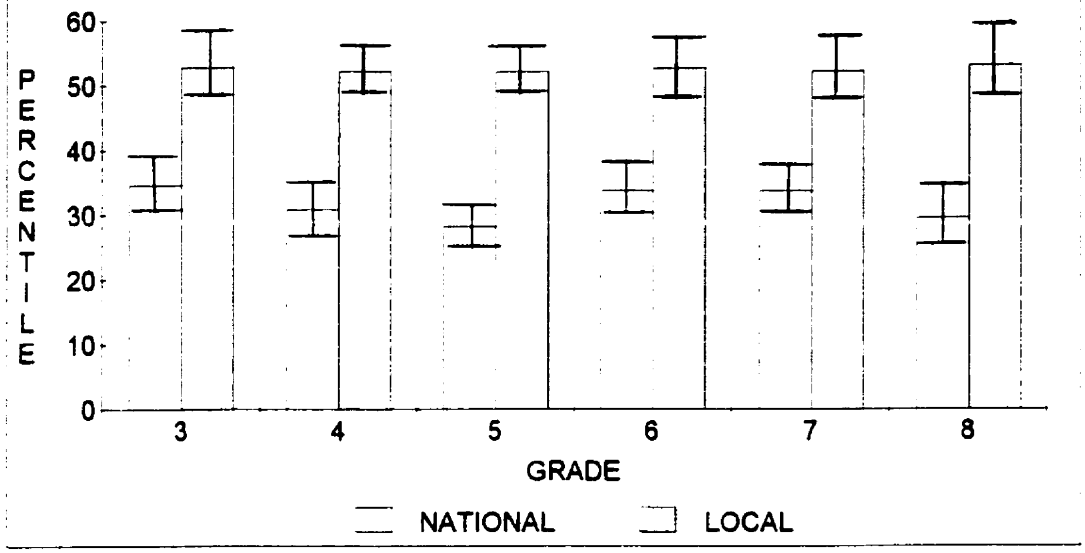



**Figure 5. Mean Percentile Rank (+SE)**

Test L-2: Capitalization

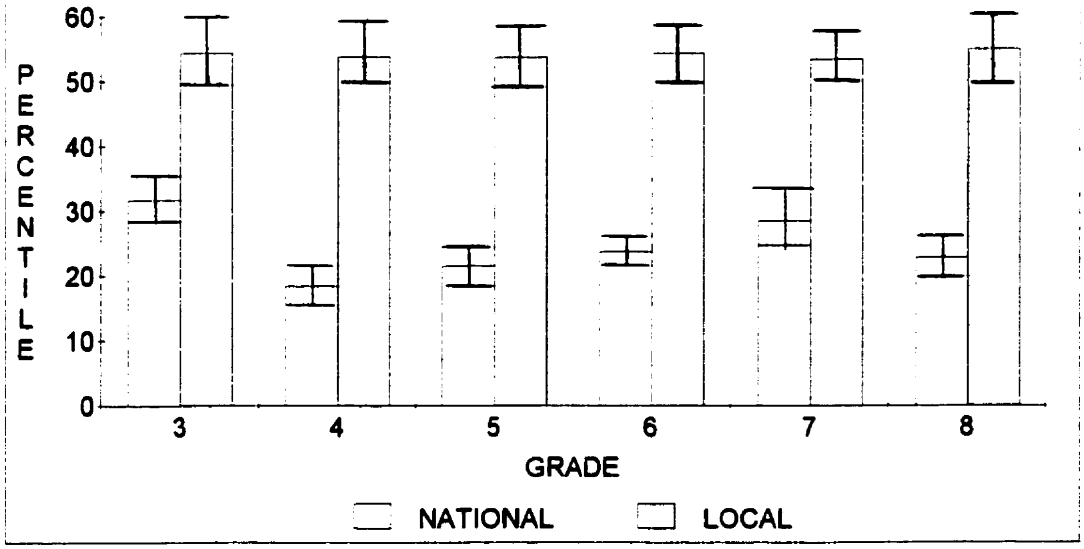


**Figure 6. Mean Percentile Rank (+SE)**

Test L-3: Punctuation

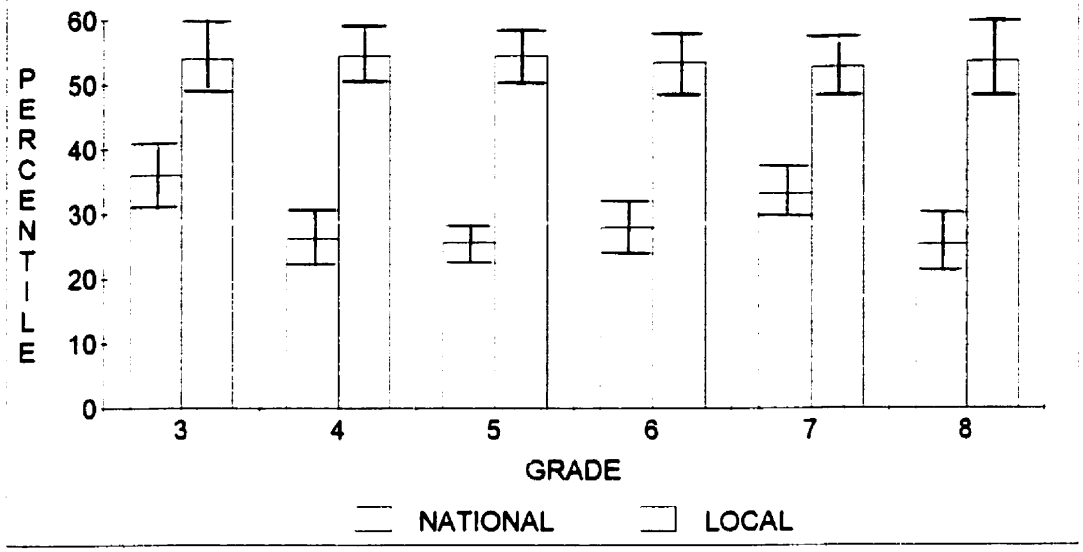



**Figure 7. Mean Percentile Rank (+SE)**

Test L-4: Usage and Expression

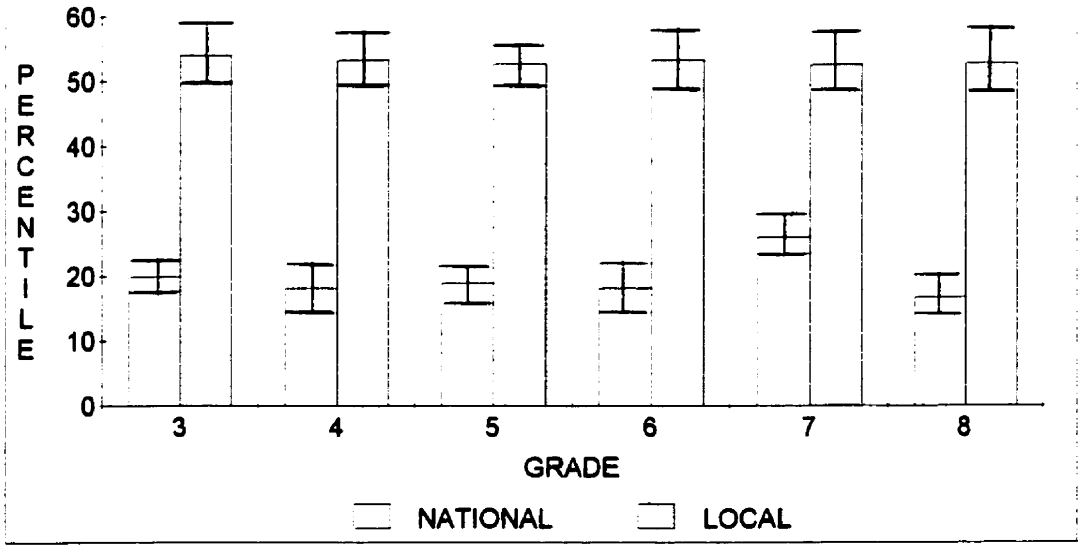


**Figure 8. Mean Percentile Rank (+SE)**

Test W-1: Visual Materials

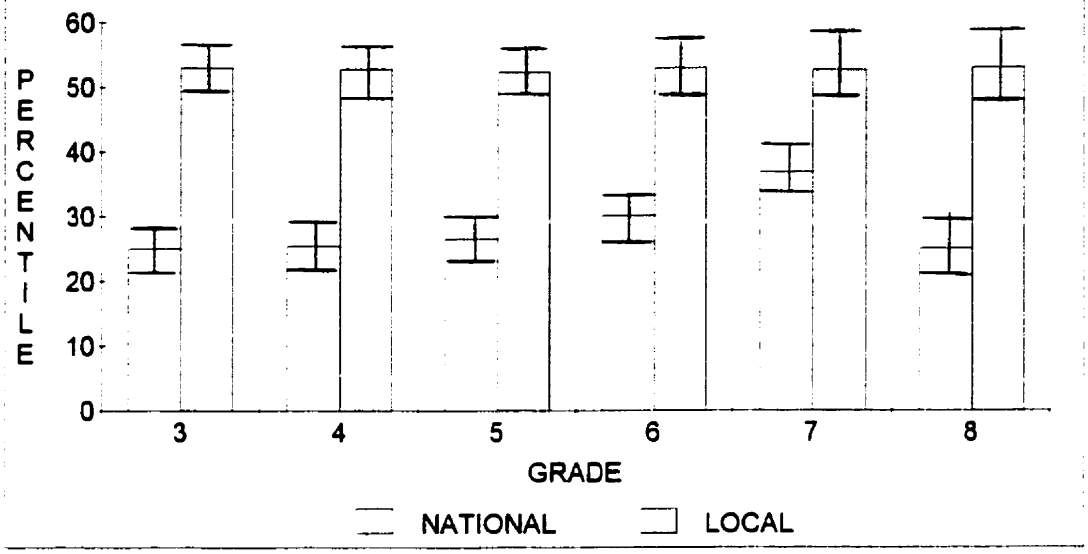



**Figure 9. Mean Percentile Rank (+SE)**

Test W-2: Reference Materials

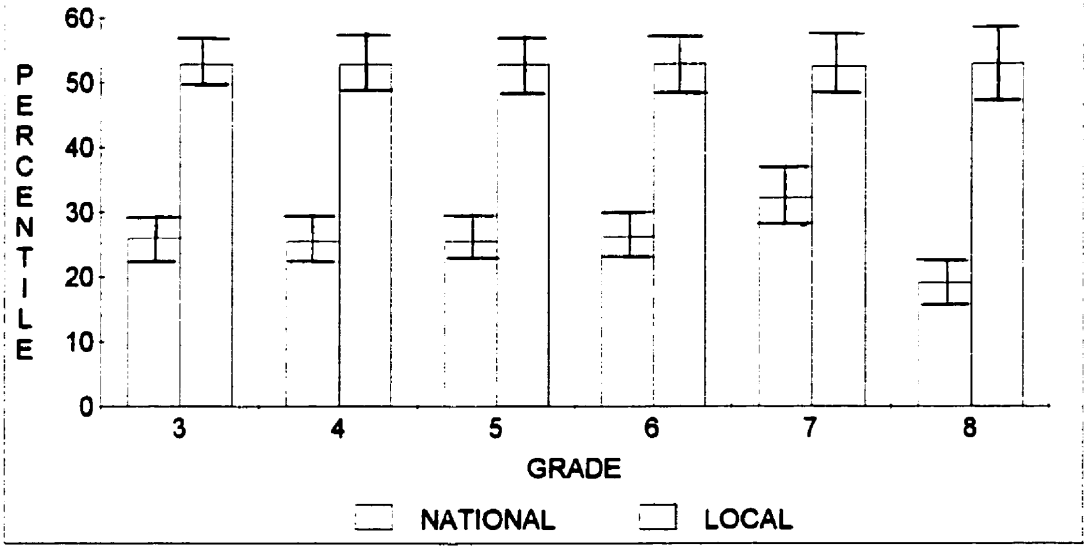


**Figure 10. Mean Percentile Rank (+SE)**

Test M-1: Mathematics Concepts

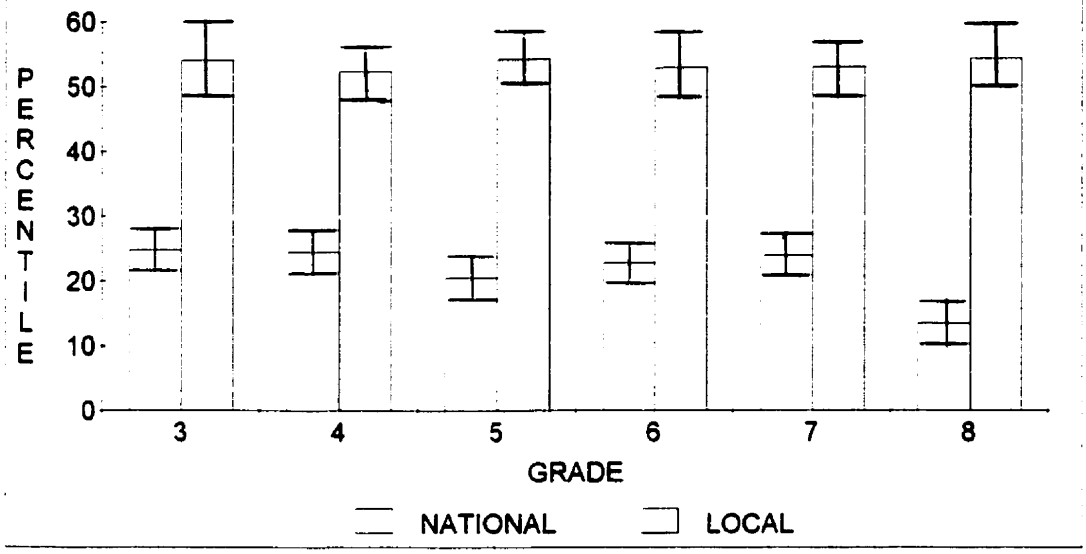



**Figure 11. Mean Percentile Rank (+SE)**

Test M-2: Mathematics Problem Solving

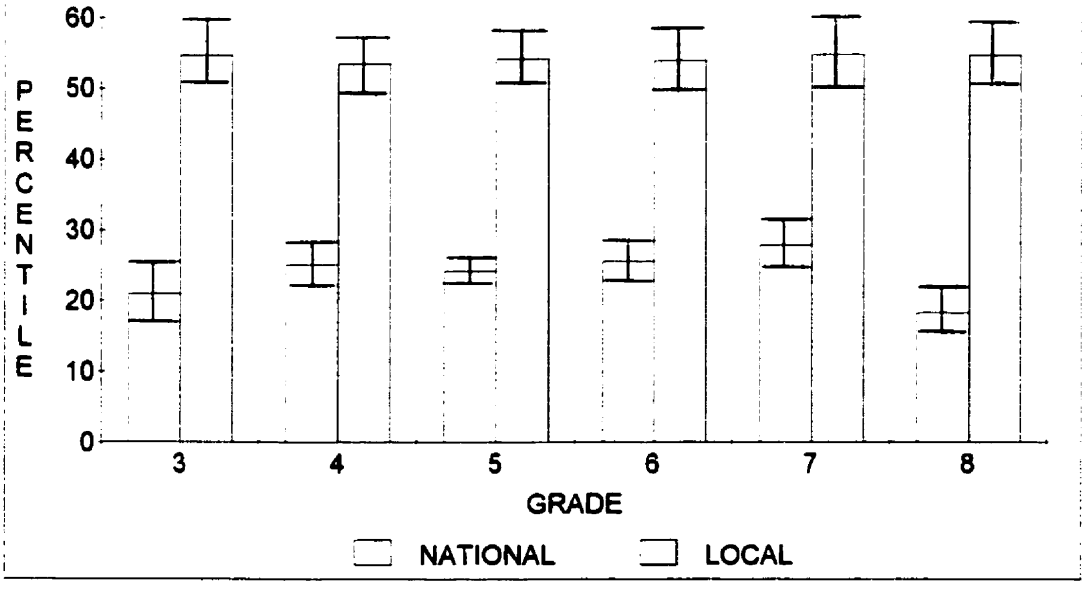
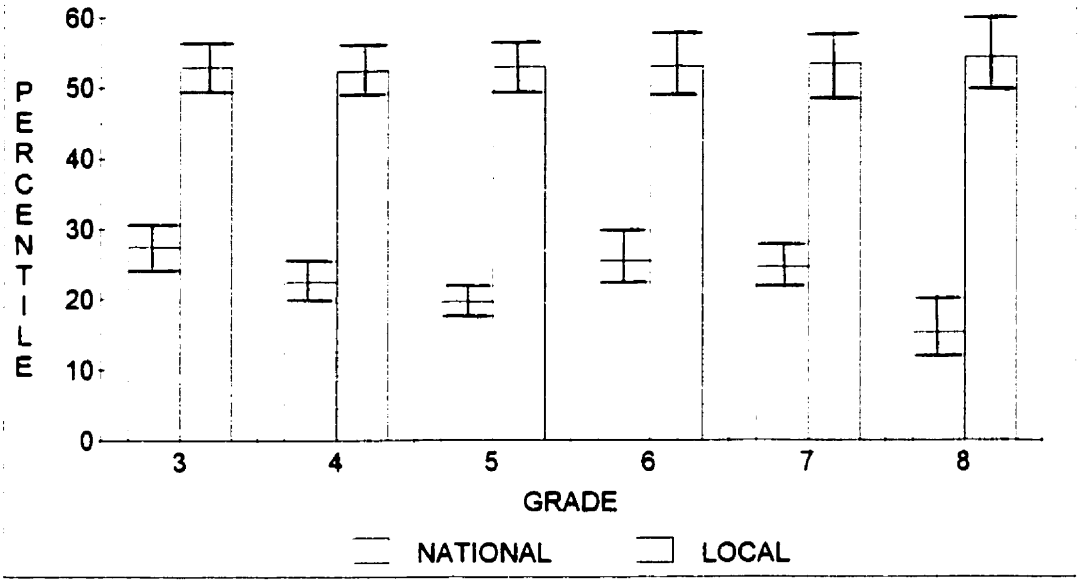


**Figure 12. Mean Percentile Rank (+SE)**

Test M-3: Mathematics Computation



Psychometric Properties of the CTBS for the Native Sample

To further examine the psychometric properties of the individual subtests for the Native sample, five subtests and four grades were chosen for reliability and validity analyses. The subtests Vocabulary, Reading Comprehension, Mathematics Concepts, Mathematics Problem Solving, and Mathematics Computation were chosen based on their universality among elementary school curriculum. A sample of the elementary grades, a junior category (i.e., Grades 3 & 4) and a senior category (i.e., Grades 7 & 8) were chosen mainly for convenience, as there were no grade main effects in any of the analyses.

Reliability of the Selected Subtests of the CTBS

Reliability was assessed through an analysis of the internal consistency of each selected subtest for each selected grade level. The resulting Cronbach alpha coefficients for each reliability analysis are outlined in Table 13. For the following reliability analyses, correlations between .3 and .59 were considered to be indicative of low internal consistency. Correlations between .6 and .79 were considered to indicate moderate internal consistency. Finally, correlations between .8 and .99 were considered to indicate high internal consistency of the CTBS tests.

The results of the reliability analysis for Test V: Vocabulary indicated moderate internal consistency of the scale. The Cronbach alpha's were indicative of high internal consistency for Test R: Reading Comprehension. The results of the analyses of Test M-1: Mathematics Concepts yield Cronbach alpha coefficients which indicated moderate to high internal consistency. The Cronbach alpha's were not as high for Test M-2: Mathematics Problem Solving, which suggested low to moderate internal consistency of the scale. Finally, Cronbach alpha's for Test M-3: Mathematics Computation indicated moderate to high internal consistency.

Internal consistency was also assessed by comparing the item-total correlations on each selected subtest for each selected grade. These correlations were found to be

Table 13

Internal Consistency of the Selected Subtests

| SUBTEST | GRADE | N of Cases | N of Items | Cronbach's Alpha |
|---|---|---|---|---|
| Vocabulary | 3 | 52 | 30 | 0.77 |
| | 4 | 69 | 36 | 0.76 |
| | 7 | 71 | 41 | 0.76 |
| | 8 | 43 | 41 | 0.71 |
| Reading | 3 | 51 | 44 | 0.86 |
| | 4 | 70 | 49 | 0.85 |
| | 7 | 71 | 57 | 0.84 |
| | 8 | 43 | 58 | 0.89 |
| Math Concepts | 3 | 48 | 28 | 0.81 |
| | 4 | 64 | 32 | 0.85 |
| | 7 | 70 | 41 | 0.73 |
| | 8 | 44 | 42 | 0.68 |
| Math Problem Solving | 3 | 48 | 24 | 0.72 |
| | 4 | 64 | 26 | 0.76 |
| | 7 | 70 | 30 | 0.57 |
| | 8 | 43 | 32 | 0.67 |
| Math Computation | 3 | 47 | 34 | 0.89 |
| | 4 | 65 | 37 | 0.85 |
| | 7 | 70 | 42 | 0.75 |
| | 8 | 42 | 43 | 0.72 |

consistent and evident of both the reliability and validity of the CTBS for the Native sample. The item-total correlations ranged from .69 to .77 for selected grades on the Vocabulary subtest and from .83 to .89 for the Reading Comprehension subtest. Item-total correlations for selected grades on the Mathematics Concepts subtest ranged from .66 to .85, on the Mathematics Problem Solving subtest the range was from .52 to .77, and for the Mathematics Computation subtest from .70 to .89. The relative consistency of the item-total correlations indicate that no items are biased.

## Validity of the Canadian Tests of Basic Skills for the Native Sample

### Concurrent Validity

Validity was determined through criterion-related validation. The effectiveness of the CTBS was established for the Native sample by checking both the national and local percentile rank performance of the Vocabulary, Reading Comprehension and the three Math subtests against the criterion of reading and math grades obtained from the students' November Report Cards. Table 14 provides a frequency distribution of the grades for both reading and mathematics, from the November report cards. As can be seen, for reading, the most frequent grades for Grade 3 were at the B level, Grade 4 at the C level, Grade 5 at the B level, Grade 6 at the C level, Grade 7 at the A level, and Grade 8 students achieved most frequently at grades below 50. For mathematics achievement, grades for Grade 3, 4, and 5 students were most frequent at the B level, Grade 6 and Grade 7 at the A level, and Grade 8 students achieved grades at the B level most frequently.

Using Pearson product-moment correlations, concurrent validity was evaluated. The correlations between the national and local percentile ranks for the Vocabulary test and criterion, reading grades, were low and significant ($r = .46$ and .45), respectively. The correlations between the national and local percentile ranks for the Reading Comprehension test and the criterion, reading grades, were equally low ($r = .43$) and

Table 14

Frequency Table of Reading and Mathematics Grades for Grades 3 to 8

| | | READING | | MATHEMATICS | |
|---|---|---|---|---|---|
| GRADE | MARK | FREQUENCY | PERCENT | FREQUENCY | PERCENT |
| 3 | A | 9 | 16.7 | 10 | 18.5 |
| | B | 19 | 35.2 | 24 | 44.4 |
| | C | 11 | 20.4 | 17 | 31.5 |
| | D | 13 | 24.1 | 3 | 5.6 |
| | R | 2 | 3.7 | 0 | 0 |
| 4 | A | 17 | 26.6 | 13 | 20 |
| | B | 12 | 18.8 | 18 | 27.7 |
| | C | 20 | 31.3 | 14 | 21.5 |
| | D | 13 | 20.3 | 16 | 24.6 |
| | R | 2 | 3.1 | 4 | 6.2 |
| 5 | A | 15 | 20 | 14 | 17.3 |
| | B | 27 | 36 | 30 | 37 |
| | C | 23 | 30.7 | 25 | 30.9 |
| | D | 8 | 10.7 | 11 | 13.6 |
| | R | 2 | 2.7 | 1 | 1.2 |
| 6 | A | 7 | 12.5 | 16 | 28.6 |
| | B | 13 | 23.2 | 13 | 23.2 |
| | C | 17 | 30.4 | 9 | 16.1 |
| | D | 11 | 19.6 | 8 | 14.3 |
| | R | 8 | 14.3 | 10 | 17.9 |
| 7 | A | 27 | 38 | 23 | 32.4 |
| | B | 15 | 21.1 | 22 | 31 |
| | C | 13 | 18.3 | 13 | 18.3 |
| | D | 14 | 19.7 | 5 | 7 |
| | R | 2 | 2.8 | 8 | 11.3 |
| 8 | A | 4 | 9.3 | 6 | 13.6 |
| | B | 11 | 25.6 | 16 | 36.4 |
| | C | 7 | 16.3 | 11 | 25 |
| | D | 8 | 18.6 | 5 | 11.4 |
| | R | 13 | 30.2 | 6 | 13.6 |

Note.

| | |
|---|---|
| A | 80 - 100 |
| B | 70 - 79 |
| C | 60 - 69 |
| D | 50 - 59 |
| R | below 50 |

significant.

National and local percentile rank performance on the CTBS mathematics tests were also checked against the criterion of math grades as a measure of concurrent validity. The correlations between the national and local percentiles for the Mathematics Concepts test and the criterion of math grades were found to be equally low and significant ($r$ = .54). Similarly, the correlations between the national and local percentiles for the Mathematics Problem Solving test and math grades were also low and significant ($r$ = .43 and .42), respectively. Finally, the correlations between the national and local percentile ranks for the Mathematics Computation test and the criterion were also low and significant ($r$ = .47 and .50), respectively.

Construct Validity

Construct-related validation was assessed with the use of the criterion of age differentiation. Since abilities are expected to increase with age, it was argued that the scores on selected subtests should also show an increase with age. Each CTBS subtest was constructed as a single wide-range test, where certain items of the tests were shared by two or more levels. Mean performance on the shared items of two consecutive levels (grades) was examined to determine if children did better on these items with age. Validity was determined by conducting t-tests to compare the mean performance on the shared items for two consecutive grades.

The results suggested that for some of the selected subtests (i.e., Vocabulary; Reading Comprehension; Mathematics Concepts; Mathematics Problem Solving; and Mathematics Computation) the mean performance of older children was found to be significantly higher than the mean performance of younger children. The fact that seven out of the ten t-tests comparing older and younger children were significant, lends partial support to the suggestion that the test may be valid. Interestingly, those comparisons that were not significant were those between grades seven and eight for Reading Comprehension, Mathematics Concepts, and Mathematics Problem Solving. Thus, other

means of assessment must be considered to support educational placement decisions made based on achievement. Table 15 outlines the results of the t-tests and corresponding means and standard deviations.

Correlations Among the CTBS Subtests

In order to further examine construct validity, the interrelationships in test performance or correlations between the national percentile scores for each of the subtests of the Canadian Tests of Basic skills were computed (Table 16). The correlation coefficients which ranged from .33 to .76, indicated significant, low to moderate relationships between the CTBS tests. These correlations provide evidence that the subtests measure a similar construct, "achievement". However, the correlations are not too high, and thus, suggest that each test is measuring a different aspect of this construct.

Table 15

Means and Standard Deviations of Mean Performance by Grade on the Shared Items of Selected Subtests

| SUBTEST | GRADE | N | MEAN | S.D. | t Value |
|---|---|---|---|---|---|
| Vocabulary | 3 | 52 | 4.69 | 3.05 | -4.70* |
| | 4 | 69 | 7.49 | 3.38 | |
| | 7 | 70 | 9.77 | 4.35 | -2.54* |
| | 8 | 43 | 11.93 | 4.45 | |
| Reading Comprehension | 3 | 51 | 4.47 | 4.2 | -6.97* |
| | 4 | 70 | 10.28 | 4.75 | |
| | 7 | 71 | 14.79 | 6.65 | -1.90 |
| | 8 | 43 | 17.33 | 7.35 | |
| Math Concepts | 3 | 48 | 5.2 | 3.35 | -4.80* |
| | 4 | 64 | 8.29 | 3.39 | |
| | 7 | 70 | 9.81 | 3.69 | -1.31 |
| | 8 | 44 | 10.76 | 3.91 | |
| Math Problem Solving | 3 | 48 | 3.28 | 2.74 | -5.17* |
| | 4 | 64 | 6.35 | 3.36 | |
| | 7 | 70 | 7.35 | 2.82 | -0.50 |
| | 8 | 43 | 7.66 | 3.73 | |
| Math Computation | 3 | 47 | 4.41 | 4.07 | -6.15* |
| | 4 | 65 | 9.17 | 4.03 | |
| | 7 | 70 | 4.7 | 3 | -4.49* |
| | 8 | 42 | 7.22 | 2.63 | |

Note. * indicates significance of comparisons between grades at the alpha level of .05

Table 16

Correlations Among the CTBS Subtest National Percentile Scores

| | V | R | L-1 | L-2 | L-3 | L-4 | W-1 | W-2 | M-1 | M-2 | M-3 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| V | 1 | .68** | .63** | .55** | .52** | .62** | .59** | .63** | .56** | .53** | .33** |
| R | | 1 | .65** | .61** | .55** | .65** | .67** | .67** | .61** | .60** | .46** |
| L-1 | | | 1 | .64** | .61** | .70** | .61** | .67** | .57** | .52** | .49** |
| L-2 | | | | 1 | .68** | .58** | .57** | .59** | .56** | .45** | .42** |
| L-3 | | | | | 1 | .63** | .57** | .59** | .54** | .47** | .45** |
| L-4 | | | | | | 1 | .62** | .69** | .61** | .59** | .42** |
| W-1 | | | | | | | 1 | .76** | .66** | .62** | .53** |
| W-2 | | | | | | | | 1 | .70** | .68** | .59** |
| M-1 | | | | | | | | | 1 | .68** | .57** |
| M-2 | | | | | | | | | | 1 | .52** |
| M-3 | | | | | | | | | | | 1 |

Note. ** indicates significance at the alpha level of .01
V = Vocabulary; R = Reading Comprehension; L-1 = Spelling; L-2 = Capitalization;
L-3 = Punctuation; L-4 = Usage & Expression; W-1 = Visual Materials;
W-2 = Reference Materials; M-1 = Mathematics Concepts;
M-2 = Mathematics Problem Solving; M-3 = Mathematics Computation

# Discussion

## Both National and First Nation Norms are Required

The primary objective of the present investigation was to determine whether or not First Nation normative data were required and if so, to establish local First Nation norms for the Canadian Tests of Basic Skills. The results of repeated measures analyses of variance have demonstrated that normative data for the First Nation sample were required. Post hoc analyses of the percentile main effect, in addition to the two- and three-way interactions have clearly demonstrated that there were significant differences between the national and local percentile ranks, where the direction of effects suggested that the performance was higher when employing the local rather than the national percentile norms. When employing grade equivalent scores to evaluate performance, the results also demonstrate that the performance of this Native student sample is at least two grade levels below the national mean which further supports previous findings which stated that the overall achievement of First Nation children lags well below that of children of the majority culture (Rhodes, 1990; McShane & Plas, 1988).

Secondly, the results of the percentile by subtest interaction demonstrates the fact that the local norms differ considerably from the national norms, specifically for the language measures, Vocabulary, Reading Comprehension, and Usage and Expression. When employing the national percentile ranks to compare performance between each of the subtests, there were significant differences found. However, when employing the local percentile ranks to compare performance between each subtest, no significant differences were found. The results have demonstrated the need for national norms in order to make comparisons between the scores earned by Native students, in comparison to other non-Native students. These results, thus, lend support for the rationale of the present study, that is to develop local norms for use in conjunction with the national norms. While First Nation children continue to be expected to compete with their non-Native

counterparts in terms of education and employment, comparison with national norms is relevant.

However, when attempting to compare performance of Native students with their peers within the same community, local norms are required. The local norms lessen the population differences and allow for a fairer assessment of a Native child's achievement. A number of studies have supported the development of local norms in order to avoid the problems encountered in employing tests and assessment instruments with minority cultures who were not represented in the sample used to standardize those particular tests (Boyle, 1995; Verhulst et al., 1993; Ferrer & Yong Pak, 1991; Leon-Carrion, 1989; Norris, Juarez, & Perkins, 1989; Epperson & Hammond, 1991; Howard & Nieto De Salazar, 1984; Mendez, 1984; Lyketsos et al., 1979). In a study by Epperson and Hammond (1981) on interest inventories with Native Americans, Zuni Indian students' performance was examined using the Kuder's General Interest Survey, Form E (Kuder-E). The results indicated that the appropriateness of the Kuder-E for this particular sample was questionable due to substantial differences between the normative sample and the Zuni sample on the scales which were attributed to cultural differences and differences in socialization. It was found that without local norms, career exploration for this sample would be restricted by leading these students into traditional or stereotypic areas.

An example cited in the Epperson & Hammond (1981) study illustrates the impact that the development of local norms has on assessment in general. A ninth grade subject in their study obtained a raw score of 38 on both the Artistic and Scientific subscales of the Kuder-E. Using the national norms, this score placed him at the 80th percentile on the Artistic scale and at the 50th percentile on the Scientific scale. These scores would warrant advising the student to pursue an artistic career but not a scientific one. However, if his score was interpreted using the local norms he would be at the 70th percentile on the Artistic scale and at the 90th percentile on the Scientific scale. These percentile ranks

paint an entirely different picture from those of the national norms and open new career options for that student.

The logic for the development of local norms in this example can also be applied to the development of CTBS First Nation local norms in the present study. For example, in examining the CTBS Test V: Vocabulary, using the national norms, a Grade 5 student who earned a raw score of 25 would be at the 60th percentile. That same student with an identical score would be at the 100th percentile using the local First Nation normative data. Clearly, this score has different implications and meanings depending on which normative data is being applied. With such a score, a child being evaluated solely on the basis of the national norms may be considered average, and may miss opportunities afforded to him or her, like advanced reading groups or gifted programs, which would be possible if evaluated with the local norms (i.e., comparison with his or her own Native peers). Such results lend support for the claim that local norms are required for interpretation of an individual's score when that individual belongs to an ethnic group that has not been adequately represented in the standardization of a test (Janzen, Skakum, & Lightning, 1994; Darou, 1992). These local norms also allow for direct, community specific comparisons.

Properties of the CTBS for the First Nation Sample

The second research objective of the present investigation was one of examining the psychometric properties of the Canadian Tests of Basic Skills in terms of the Native sample studied. The research question drawn from this secondary objective was whether or not the CTBS is a reliable and valid measure for First Nation students. A number of studies on achievement and intelligence have concluded that the psychometric properties of such tests do not hold up in minority samples (Darou, 1992; McShane & Plas, 1988). The psychometric properties of reliability and validity with respect to the First Nation sample will be discussed in turn.

Reliability was assessed for the Native students' performance on the Canadian Tests of Basic Skills to ensure that this psychometric property of the CTBS holds for the First Nation sample. Since reliability was not assessed for all of the tests, statements regarding the reliability of the CTBS reflect only the five selected tests: Vocabulary, Reading Comprehension, Mathematics Concepts, Mathematics Problem Solving, and Mathematics Computation. The results for reliability of the CTBS with respect to the First Nation sample are positive and moderately high. The consistency of the item-total correlations for each of the selected grades on each of the five subtests, suggests that there were no isolated items which deviated from the median item-total correlation. This finding further suggests that none of the items of the Canadian Tests of Basic Skills were found to be "biased" against subjects in the Native sample.

Reliabilities vary with tests and grades but the resulting Cronbach alpha coefficients, for those investigated, ranged from 0.57 to 0.89 indicating low to high internal consistency of the CTBS subtests for the Native sample. The results of the reliability analyses conducted for the First Nation sample, although lower, are comparable to the internal consistency reliability coefficients obtained for the five main area scores on the CTBS (Vocabulary, Reading, Language, Work-Study, and Mathematics) which range from 0.83 to 0.96, indicate high internal consistency in these areas (King-Shaw, 1989). Composite reliability was assessed to be "at least 0.97 for all grades" (King-Shaw, 1989). Thus, it is safe to say that the Canadian Tests of Basic Skills continues to be a reliable measure of achievement.

Correlations among the Canadian Tests of Basic Skills were also computed. The resulting correlation coefficients range from 0.32 to 0.72 which indicate significant, moderate relationships between the tests. These significant, moderate correlations provide evidence that the Canadian Tests of Basic Skills measure the construct, in this case, achievement. In addition, the correlations among the tests were not too highly correlated which further suggests that each subtest of the CTBS is measuring a different aspect of the

achievement construct. King-Shaw (1990) states that some of the common relationships between tests may be due to factors such as "extent of vocabulary or ability to read, a considerable portion of the common relationship is probably due to our education system's placing emphasis on the "well-rounded" education" (75). Furthermore, the fact that most of the correlations between various tests of the CTBS for the Native sample "hang together" is suggestive that student achievement in other related areas will be similar. For instance, if a student performs poorly on the Vocabulary and Reading Comprehension tests (i.e., language measures), he or she is likely to perform poorly on most academic pursuits, as these measures are the basis for successful learning in educational institutions.

A second psychometric property of the CTBS assessed for the First Nation sample was the validity of the tests. For concurrent validity, math and reading grades obtained from each student's November report card were employed as the criterion. Correlations between the criterion measures and the national and local percentile ranks of related tests ranged from .42 to .54 which are low but lend partial support for the concurrent validity of the CTBS. These correlations suggest that the CTBS and the curriculum goals of the classrooms tested are not directly related. These findings may be suggestive of the fact that the skills objectives in the classroom may not be exactly the same as those skill objectives the CTBS was designed to assess. These low correlations may also be related to the teachers' effectiveness or biases.

Validity for the Canadian Tests of Basic Skills was determined through content-specifications, which have undergone "constant evolution over a period of more than fifty years and have involved the experience, research, and expertise of a large number of professionals representing a wide variety of specialties in the educational community" (King-Shaw, 1990: 52). Achievement tests are designed to conform to the curriculum goals of a wide population of schools. However, no achievement test can be assumed to be perfectly suited to every individual school curriculum (King-Shaw, 1990). Therefore, validity of the CTBS for each school depends on whether or not the skills and

abilities required for this test "match" those that are taught within the school.

Construct validity was also assessed by employing age differentiation as the criterion. "Since abilities are expected to increase with age during childhood, it is argued that the test scores should likewise show an increase, if the test is valid" (Anastasi, 1988). Mean performance on those items shared by two consecutive levels (i.e., grades 3 and 4; grades 7 and 8) were compared using t-tests to examine whether children in grades 4 and 8 perform better that children in grades 3 and 7 on the five tests. The results suggest that on seven of the ten comparisons the older children scored significantly higher than the younger children. These findings, again, lend partial support for the validity of the Canadian Tests of Basic Skills for the First Nation sample.

For the Reading Comprehension, Mathematics Concepts, and Mathematics Problem Solving there were no significant differences found between Grades 7 and 8. In terms of where significant differences between levels did not exist, a number of explanations may be inferred. The fact that there were no significant differences between these grades may signify a cohort or curriculum change. The lack of difference may also be an artifact of the reliability of the CTBS at each grade, or may be related to the uneven numbers of subjects in each grade.

The findings of other researchers concerning the criticism of standardized tests that psychometric properties do not hold up for Natives was unfounded in this study. Upon examination of the data it appears that the CTBS is, for all intents and purposes, a reliable, and to a certain degree, valid measure of achievement for the First Nation students. However, in light of some of the tests of validity, scores on the Canadian Tests of Basic Skills should not be used in isolation. In addition to the use of local, First Nation normative data with the Canadian Tests of Basic Skills the resulting scores should be accompanied by other sources of information to deliver fair assessment of First Nations students. If test bias was not a factor in determining the apparent lag in achievement scores evidenced on this administration of the CTBS, other factors such as socioeconomic

status, lack of motivation, or the language barrier, which seemed most evident in the classrooms observed, may have been playing a role. These factors will be discussed in the following section.

Some Considerations for the Lag in Academic Achievement Exhibited on the CTBS

The academic achievement of Native children in Canada has been described as low, though not widely documented. Specifically, it has been accepted that the achievement levels of the American Indian student lags at least one and a half to three and a half years below grade level (McShane & Plas, 1988). Similarly, it has been documented that the Native Canadian children experience a similar lag of two and a half years below grade level (Bowd, 1972). The present study examined the academic achievement of children by employing the CTBS and found that the achievement of the First Nation sample is two years below grade level. The grades from the November report cards also give an indication of the academic achievement of these students (Table 14).

The low academic achievement of First Nation students may relate to the claim made by Mayfield and Davies (1984) that the low academic achievement of one generation of Natives contributes to the learning problems faced in the next generation, setting a cycle in motion. This generational cycle stems from historical injustices done to the First Nation people of Canada. In the past, Native history, tradition, and customs were passed down by the oral tradition. The following statements were written and interpreted for the purpose of this thesis, as they were told to this author by community elders: The oral tradition of Native people was abruptly terminated with the enactment of the residential school system which assured Native parents of a vehicle to their children's acculturation into the dominant European society. Native oral history, traditions and customs were seen as unacceptable and detrimental to the desired goal of fully acculturating Natives to what was perceived as a better way of life. After the Native people who attended residential

schools were shown the European way of life, they were sent home and remained displaced from both cultures. The disillusionment of many Native people contributed to their negative views of the educational system, that is, education did not seem to benefit or enhance their way of life on the reserve. They, in turn, projected their views of education onto the next generation.

The view held by many Native people that education is not of value or beneficial to life in their communities has persisted to the present day and manifests itself in a variety of ways. These manifestations include parental alienation from school and the apparent lack of parental involvement in the education of their children (St. Dennis, 1991). Evidence of the negative views held in regards to educational testing became apparent during the observation of the administration of the CTBS for the present study. The behaviour in some of the classrooms (e.g., unwillingness to try) and certain comments made (e.g., "I don't care"), point to the negative attitudes held toward education and the apparent lack of interest in academics for the majority of students.

These motivational problems may stem from what was termed the language barrier. It was expected that the Native students in this sample would demonstrate greater deficits on the language measures (i.e., Vocabulary and Reading Comprehension tests). The results of the post hoc analysis of the subtest main effect supports this claim. It was, in fact, the case that the students performed most poorly on the Vocabulary, Reading Comprehension, and Usage and Expression CTBS tests, although the pattern of scoring on the tests suggested a consistent deficit across all measures. A certain degree of bilingualism may have had an impact on underachievement of students, especially on the language measures, in this sample. Many of the students who participated in the present study are bilingual in the sense that although these students may not speak their Native language fluently, the majority of these children are frequently spoken to in and are able to understand their language. Although all of the participants spoke English, the form of English spoken by some is a dialect, not the standard English of educational institutions.

This discrepancy in linguistics poses additional problems in learning proper English and thus, poses problems in performance on language measures such as those employed in standardized tests of achievement and intelligence.

Another consideration for the overall lag in achievement may be the effect socioeconomic status has on achievement, specifically, achievement in language-based curriculum. The positive relationship between socioeconomic status and academic achievement has been addressed in previous literature (Douglas & Ross, 1965; Fogelman, 1978; Bolz & Varrati, 1981; Hull, 1988). It seems that this positive relationship, though not directly studied, can be assumed to apply in the First Nation sample. The majority of Native people are far behind the wider culture both economically and academically. The low academic achievement experienced by the Native children in this sample can also be related to each community's low employment rate (i.e., approximately 40%), and thus, their low socioeconomic status. The low socioeconomic status of the majority of Native people implies a lack of resources, especially educational, such as books, computers, in addition to missing the opportunities (i.e., visiting a museum, zoo, science centres, or other culturally enriching activities) afforded to those having middle or high socioeconomic status. This lack of resources may have contributed to the difficulty experienced in the vocabulary and reading portions of the CTBS which ultimately adversely effects other tests relating to or depending on these skills.

Directions for Future Research

Further research in the area of Native achievement, in general, needs to continue due to the re-introduction of standardization testing into the school systems. It has been shown in past research, as well as in the present thesis that the academic achievement of First Nation children still "lags behind" that of the majority culture. With the introduction of Ontario provincial testing at the Grade three level, educators are concerned with the academic performance of all children (D. Moore, personal communication, October 15,

1997). Educators working within the First Nation-operated school systems must address the issue of increasing academic performance to a provincial standard, and face the added problem of ensuring that the standardized test employed to measure achievement is unbiased and fair for their students. These problems or issues become compounded when taking into consideration the numerous aforementioned social, economic, cultural, cognitive and emotional factors, affecting the achievement of First Nation students.

There are certain strengths and limitations which can be found in the present study. One particular strength of the present study is that the sample size was large, and totally representative of the geographic location studied, since the procedures were such that they allowed every student registered in those particular schools to participate. When compared to other studies cited in the introduction, such as norming of the CTBS which included only 175 students of the entire 30,000 were categorized as private, Native or Christian students, the sample size of 388 for the present study was large. However, the issue of generalizing the results is often implied in educational research. It should be emphasized that the sample identified in the present study was very specific, and as such the ability to generalize these results to other Native groups is limited. These are issues that can be resolved and with these changes implemented, new areas for future research may develop. Although these issues exist, the present study is practical and still adds to the areas of First Nation assessment and achievement.

As for limitations, it should be noted that the norms established are for the midyear administration of the CTBS only, while the CTBS itself, provides norms for the fall, and spring administrations of the test. Furthermore, the present study might have included a control group of non-Native students from a similar geographic region to allow for direct comparisons of CTBS scores in order to make qualified statements about the performance of Native and non-Native students. It may be that any or all of factors affecting First Nation achievement addressed in the introduction (i.e., socioeconomic status, motivational factors and/or language background) might have been playing a role in the pattern of

scoring on this test. Some of these factors might have been measured, and more controlled for to aid in explaining the findings. For instance, an experimental design controlling for socioeconomic status by matching Native and non-Native students on the SES variable, may provide some insight into whether or not the low academic achievement is a Native or socioeconomic issue. The results of such studies point to the next logical step in research on Native achievement, that is, providing an answer to the question of why Native students are lagging in achievement.

The concept of achievement testing and the function of those tests within the educational system should always consider those issues involving the whole purpose of education and standardized tests. Educators and researchers, alike should start with the fundamentals: "Should the schools, particularly the elementary schools, be concerned with teaching all children a common set of knowledges and skills identified as important, or should the schools be concerned with helping each child achieve unique goals that "make sense" to the child?" (Coffman, 1980: 314) The decision of whether or not to continue with the notion of standardized testing depends upon the answer to this question. If the educational system decides to continue with this line of inquiry, then another question posed by Coffman follows concerning the purpose of standardized tests. "Should standardized tests measure those common goals of instruction as revealed by analyses of the content of textbooks and curriculum guides, or should the tests attempt to measure as directly as possible the ultimate goals of education in terms of what students can do with what they have learned?" (Coffman, 1980: 316).

Even with local norms, standardized tests can never be the only way of assessing a student's academic potential. In accordance with assessment guidelines, no standardized test should be employed in isolation when making decisions concerning educational placement. Standardized tests should always be accompanied by other forms of data concerning a child's academic achievement. Another type of test which appears to be sensitive to the issues surrounding cross-cultural psychoeducational assessment is the

learning potential test. In addition, Coffman's (1980) notion of a test which measures education in terms of what students can accomplish with what they have learned appears to relate to the learning potential test. The learning potential test was designed not only to measure previously acquired knowledge and skills, but also "the ability to learn" (Hamers, Hessels, & Pennings, 1996). Such an instrument may be able to measure the ability to adapt to new situations while drawing from past experience. Psychoeducational assessments including standardized tests with appropriate normative data, and such tests as the learning potential test may prove to decrease the "educational gap" between Native and non-Native students, especially in terms of achievement and intelligence.

## Conclusions

In accordance with assessment guidelines, it should be emphasized that educators administering tests should never look at a single measure when making judgments about achievement or intelligence. As discussed earlier, it should also be stressed that Native peoples and cultures are not a homogeneous group (Common & Frost, 1988), and that the norms provided only reflect the performance of the students in the two communities studied. In addition, local norms are useful as long as they are updated in order to ensure that they continue to be representative of the population for which they are intended. The norms established here should therefore be used with these factors in mind.

In a time when educators and researchers are focusing their attention on improving the quality of education and student achievement this type of study proves timely. The results suggest that the Canadian Tests of Basic Skills achievement battery still serves as a useful tool in the comparison of Native students with respect to their non-Native counterparts. However, the development of First Nation normative data for use with the CTBS was found to be justified. These local norms prove to be essential in making assumptions about a student's achievement in relation to his or her peers. The First Nation

norms developed for the Canadian Tests of Basic Skills should be employed to allow for fair comparison in Native assessment.

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# Appendix A

## Letter to Boards of Education Requesting Participation in the Study

Education Director and _____ Board of Education:

My name is Cindy Lewis and I am a band member of Wikwemikong. I am currently enrolled in the Master of Arts Program in Human Development at Laurentian University. I am writing to request permission to conduct a study on the _____ First Nation. The study is a practical one, hopefully one that will be of interest to educators and administrators alike, especially those working in First Nation communities. Each thesis proposal must pass an ethics review to ensure that the research is in accordance with the Children's Bill of Research Rights. My faculty supervisor is Dr. Elizabeth Levin, any concerns that you may have about my study may be addressed to her at the following number (705) 675-1151 ext. 4242. Following, you will find a brief description of my research. I have also enclosed a copy of my thesis proposal for your perusal.

In consultation with my thesis supervisor, committee members, and the psycho-educational consultant at Kenjgewin Teg Educational Institute, I have been focusing my research on the development of First Nation normative data to be employed with the standardized achievement battery, the Canadian Tests of Basic Skills. I am primarily interested in studying how these tests have been employed to examine the academic standing of Native students in comparison to other Canadian children.

It has been cited in much of the educational research that Native children are weaker on language measures, especially reading. Also, of great concern to educators and researchers is the fact that Native children have lower achievement scores on the national scale. Despite the value of achievement batteries such as the Canadian Tests of Basic Skills, educators are often worried that the verbal nature of these tests may be biased against First Nation children. Unless these types of achievement batteries are normed for Native children, they are essentially useless tools for measuring a child's ability or achievement. The value of such testing instruments would greatly be enhanced if norms

were developed specifically for First Nation children to be employed in their school systems. The First Nation norms should instill educators with confidence in using achievement batteries to test Native children.

In order to conduct such a study I will need to administer the Canadian Tests of Basic Skills in _____ School. I will be testing students from grade 3 to grade 8 within the band-operated schools. It is my understanding that this achievement battery is usually administered in May of each year. With the permission of the school principal, I would like to administer the midyear test in February of this year and apply the midyear percentile norms for my analyses. The test requires a total time of 4 hours and 16 minutes. I plan to arrange testing times into appropriate sessions so as to lessen the disruption of class time. A testing schedule will be forwarded to the school principal.

It is my belief that the results of this study will be both worthwhile and practical for First Nation schools currently employing this achievement battery. The development of First Nation norms would eliminate the population differences inherent to Canadian norms when testing Native children. When educators use the First Nation norms they will be making better predictions about students who may require various educational programs. The development of these norms would help in placement and prediction of scholastic achievement, specifically for Native children.

I will be available to discuss my study with yourself and the Board of Education, if desired. A copy of my completed will be provided to each participating First Nation when it is available. Upon completion, I am willing to discuss the findings of my thesis with any interested individuals.

I look forward to your reply and I thank you for your time and cooperation in this matter.

Sincerely,

Cindy M. Lewis

Appendix A (continued)

Letter to Principals and Teachers Outlining Testing Procedures

Dear Principals and Teachers:

I have received permission from the _____ Board of Education to conduct a study in your school. My name is Cindy Lewis and I am a band member of Wikwemikong. I am currently enrolled in the Master of Arts Program in Human Development at Laurentian University. At the present time, I am working to complete my Master's thesis entitled "CTBS Normative Data Developed for Use Within First Nation-Operated Schools: A Case for Local Norms". My thesis is a practical one, hopefully one that will be of interest to educators and administrators alike, especially those working in First Nation communities. My faculty supervisor is Dr. Elizabeth Levin, any concerns that you may have about my study may be addressed to myself at (705) 522-0982 or to her at (705) 675-1151 ext. 4242. Following, you will find a brief description of my research. I have also included a copy of my thesis proposal for your perusal.

It has been cited in much of the educational research that Native children are weaker on language measures, especially reading. Also, of great concern to educators and researchers is the fact that Native children have lower achievement scores on the national scale. Despite the value of achievement batteries such as the Canadian Tests of Basic Skills, educators are often worried that the verbal nature of these tests may be biased against First Nation children. Unless these types of achievement batteries are normed for Native children, they are essentially useless tools for measuring a child's ability or achievement. The value of such testing instruments would greatly be enhanced if norms were developed specifically for First Nation children to be employed in their school systems. The First Nation norms should instill educators with confidence in using achievement batteries to test Native children.

A study of this sort requires two things. First, the Canadian Tests of Basic Skills must be administered by the classroom teachers to students in grades 3 to 8. Second, the student's math and reading grades from the November report cards are required for validity purposes. It is my understanding that the CTBS is usually administered in May of each year. I am requesting that the testing be scheduled in February for this year.

The test requires about 5 hours to administer, 4 hours and 16 minutes of which is actual working time. In order to lessen the disruption of class time, I have adopted the following schedule suggested by the CTBS test developers:

| | | |
|---|---|---|
| Day 1 | 75 minutes | Pre-session: instructions, purposes, etc.<br>V: Vocabulary (15 min)<br>**SHORT REST PERIOD (5 min)**<br>R: Reading (42 min) |
| Day 2 | 80 minutes | L-1: Spelling (12 min)<br>**allow a minute or two to rest**<br>L-2: Capitalization (12 min)<br>**allow a minute or two to rest**<br>L-3: Punctuation (14 min)<br>**SHORT REST PERIOD (5 min)**<br>L-4: Usage and Expression (30 min) |
| Day 3 | 75 minutes | W-1: Visual Materials (40 min)<br>**SHORT REST PERIOD (5 min)**<br>W-2: Reference Materials (25 min) |
| Day 4 | 75 minutes | M-1: Math Concepts (25 min)<br>**SHORT REST PERIOD (5 min)**<br>M-2: Math Problems (25 min)<br>**SHORT REST PERIOD (1-2 min)**<br>M-3: Math Computation (16 min) |

It is imperative that the testing times be followed exactly as prescribed. Under no circumstances should any class or pupil have extra working time. Doing so will ruin the standardization procedures of the test. Any deviation from the actual testing times will skew the results and will not allow for direct comparison. If they do occur, please note

any disruptions so that in my analysis of the results I may be able to explain any problems with the data.

It is my belief that the results of this study will be both worthwhile and practical for First Nation schools currently employing this achievement battery. The development of First Nation norms would eliminate the population differences inherent to Canadian norms when testing Native children. When educators use the First Nations norms they will be making better predictions about students who may require various educational programs. The development of these norms would help in placement and prediction of scholastic achievement, specifically for Native children.

I look forward to meeting you during the testing sessions and sharing the results when my thesis is completed. I thank you for your time and cooperation in this matter.

Sincerely,

Cindy M. Lewis

Appendix B

Provincial Guide for Grading and Grade Conversion Table

| Level | Definition | Provincial Standards Letter Grade (Gr. 1 - 6) | Provincial Standards % Mark (Gr. 7 - 8) | Mark Used for Analysis |
|---|---|---|---|---|
| 4 | The student has demonstrated the required knowledge and skills. Achievement exceeds the provincial standard. | A+ | 90 - 100 | **95** |
| | | A | 85 - 89 | **87** |
| | | A- | 80 - 84 | **82** |
| 3 | The student has demonstrated most of the required knowledge and skills. Achievement meets the provincial standard. | B+ | 77 - 79 | **78** |
| | | B | 73 - 76 | **74** |
| | | B- | 70 - 72 | **71** |
| 2 | The student has demonstrated some of the required knowledge and skills. Achievement approaches the provincial standard. | C+ | 67 - 69 | **68** |
| | | C | 63 - 66 | **64** |
| | | C- | 60 - 62 | **61** |
| 1 | The student has demonstrated some of the required knowledge and skills in limited ways. Achievement falls much below the provincial standard. | D+ | 57 - 59 | **58** |
| | | D | 53 - 56 | **54** |
| | | D- | 50 - 52 | **51** |
| R or below 50 | The student has not demonstrated the required knowledge and skills. Extensive remediation is required. | R | below 50 | **49** |