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The Assessment Challenge of Native American Educational Researchers

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If we wanted to create one of the most complex challenges for educational researchers, we would focus on a distinctive group of children who are being raised in a cultural context that is significantly unlike the mainstream majority culture; has a history of childrearing and educational practices and objectives that are not congruent with the mainstream educational or cultural zeitgeist; has reduced socio-political and socioeconomic resources; either has to, or is expected to, learn and use a unique language in addition to English that may have a limited distribution within the broader population; and may attend a wide range of schools that may or may not support their cultural and/or linguistic qualities. We add to this a required focus on the development of some core but complex academic skill, such as reading, and the levels of research complexity are immense. Those courageous enough to work on trying to understand Native American childrens' educational needs begin within this context.

The reality of all educational research is that it requires the consideration of multivariate, interconnected domains of influence, including historical, cultural, institutional, economic, familial, instructional, linguistic, biological, and motivational/emotional. Some of these domains will represent significant predictors of group and individual variance differences in educational development, while others may account for only minimal variance. Those who take on the challenge of Native American educational research still work within this complex multivariate framework, and are focused on trying to identify those domains that are most critical in understanding these children's educational needs and development, but deal with a number of unique challenges, particularly related to measurement of these various domains over time.

Conceptual Considerations of Multilevel Measurement in Educational Research

All educational research must appreciate the concept of change over time and be apprehensive of the inherent conceptual, methodological, and statistical difficulties involved in its measurement. Education has as its core objective, regardless of content domain or agenda, change, which is frequently called

growth, in individual students' basic academic skills (reading, writing, and math) or more important higher-order conceptual, problem-solving and thinking skills, their knowledge and understanding about themselves or the world around them, their psychological/motivational frameworks, or in later years, occupational specific knowledge/skills. Because of this core goal, all educational measurements, regardless of the type of domain of focus, must provide tools that are, at their most basic foundation reliable and valid, but equally important, sensitive to change over time. If one is allowed to take some liberty in stereotyping a field, most educational research can be conceptualized as investigating questions related to those factors that impact changes in students' learning as those students develop.

As a brief example, if we continue to use a focus on questions related to reading development in Native American children, then we have to at least consider, and attempt to measure, the changes occurring within individual children in this and critically related domains. The important question though is what are considered to be the critical 'related domains'. Although it is not typically nor explicitly articulated as a key component of measurement methodology, the answer is found in one's theory or model of reading development and instruction. Without a clearly articulated theory and its resulting operationalized measurement model, researchers would not know what are the important child, teacher, instructional program, institutional, familial, or cultural attributes to measure. Theory helps to guide the research through the kinds of questions it generates, and provides clear direction to the types of measurement questions that have to be addressed. Because refuting a theory may be as important as supporting it, and because no single study provides "proof," evidence to support or refute it has to accumulate over time through multiple studies. Of course, one of the core problems in the scientific approach is that if one's theory is not supported, questions are raised as to whether it is because the theory was wrong, or because the key constructs were not well operationalized and measured. By focusing on measurement issues, one can decrease the likelihood of the latter, which would allow more attention to supporting or refuting the underlying conceptual models involved, thereby better advancing our understanding of the field.

Sparrow, Carter, Racusin, and Morris (1995) provide a generic measurement conceptual framework that can be easily utilized as a foundation on which to consider one's theoretical models within the Native American educational research endeavor. It represents a multilevel, interactive systems structure that "emphasizes the importance of understanding systemic processes" in relationship to measurement. Sparrow et al. (1995) state that: "This emphasis is consistent with the general acknowledgement that individuals must be viewed within the context of their families and the broader social institutions within which they live" (Bronfenbrenner, 1986, p. 82). Their measurement model has a child at the center of a series of concentric circles that represent different domains of measurement that have to be considered in any comprehensive understanding of a phenomena related to that child. The domains include the biological, genetic,

neurocognitive, psychological and other current attributes and resources of the individual child, which is incorporated within their living environment (a family typically, but conceptually this may be alternative child-rearing environments such as the clan), which is incorporated within what Sparrow et al. (1995) call institutional environments (such as schools, tribes, religious institutions) in which the child and family participates, which is further incorporated within a larger, community/environmental context (which may be at various levels, neighborhood, town, state, etc.), which is then incorporated within a cultural context. Clearly within studies of Native American education, this cultural context could be conceptualized as the relevant Native American world, which may or may not be somewhat intersecting with the additional majority culture context, or vice versa. An important advantage of this multilevel model is that it allows for different types and levels of measurement development at the different levels, so that if the field uses qualitative approaches at one level, they can be integrated with more quantitative measures on another level, or they can even be combined at any one level. The key consideration is that to fully understand a child's educational development, one must consider each level of influence and its role in predicting outcomes.

The challenge of any measurement model involved in educational research would be to decide which levels of this model are the key to focus upon, and that would depend on the research questions at hand. But even more important, is how to measure the interactive processes that occur between these different domains of measurement. As we know, each of these levels may influence one another, and all can impact the amount of change occurring in an individual child's reading development. Which are the most influential? Which account for the most variance in understanding the learning-related changes within a child's reading development? This all depends on one's initial theoretical framework regarding what factors are important in a Native American child's education if there is not compelling existing data to direct the focus. Clearly, the level(s) of analysis required by the underlying theoretical model, and its level of development and sophistication, will impact the type of measurement methodology that one chooses to utilize. The key concept here is the search for those systematic factors that can influence a child's learning and that will require carefully thought out measurement strategies.

Many Native American students in the U.S. appear to experience disproportional school failure in the mainstream, majority educational systems (Cummins, 1992). The roots of such educational difficulties have been hypothesized to lie at many different levels of the proposed measurements framework: individual, linguistic, neurobiological, familial, historical, social, economic and cultural. Clearly the most frequently identified are the discontinuities between home and school in terms of language, culture, ideology, and educational expectation which may be reinforced by incongruent instruction (pedagogy) and assessment methods or tools utilized in majority or mainstream schools. Unfortunately, despite an increasing awareness of the importance of

research on multicultural students and their families, the recent body of research has had a limited focus on developing reliable or valid measurement tools for better understanding these many cross-cultural and cross-language factors in Native American students.

General Measurement Considerations

As Demmert (2005) points out, the accuracy and adequacy of assessment tools measuring ethnic minority students' academic performance, which are both conceptually and functionally equivalent to the assessment of mainstream students, can only be established when students are assessed using appropriate measurement approaches within the context of their cultural and language environment, and when knowledge about extenuating factors that may impact the assessment approaches used for measuring achievement of minority students are taken into account. As a broad way of understanding such issues in relation to measurement at the different levels, the idea of cultural relativism is a useful concept to consider. Cultural relativism is a principle suggesting that an individual's beliefs and activities make the most sense in terms of his or her own culture. For example, each culture or subculture reinforces certain abilities and ways of behaving, and determines its own ways to regulate the proper behavior of its members. Hence, beliefs, aesthetics, morals and other cultural items can only be judged through their relevance to a given culture. In such a framework, test questions that are based and validated within the mainstream culture may carry such cultural influences within them and because of this their results will be so influenced.

There is a clear need to develop instruments which allow the student to perform at his/her best while understanding the influence of the potentially extraneous factors of age, education, language, literacy skills, culture, anxiety and unfamiliarity with the test situation on results (Roysircar, 2004). Either new instruments can be developed or existing instruments can be adapted and refined. Substantial research has addressed the issue of construct equivalence in cross-cultural measurement (Davidson, 1992; Demmert, 2005; Stone & Gridley, 1991; Ukrainetz, Harpell, Walsh & Coyle, 2000). Hui and Triandis (1985) have noted that there are different types of equivalence (e.g., conceptual, item, scalar) and different strategies for assessing equivalence (e.g., item response theory approaches, confirmatory factor analytic approaches) which need to be considered.

Although differences among Native American and majority culture groups on interview, questionnaire, or standardized test performances does not necessarily indicate the presence of 'test bias', questions as to whether the tests measure different things (i.e., constructs) in different groups and whether the tests have different meanings for different groups should be considered. In consideration of cultural differences and fairness in testing, content-based evidence and criterion-related (correlation between the test and the criterion) sources may need to be considered to obtain differential validity (Kaplan & Saccuzzo, 2001).

Bias represents a statistical characteristic of the test scores or of the predictions based on those scores, especially when a test makes systematic errors in measurement or prediction (Murphy & Davidshofer, 1998). Defining bias in more qualitative interview and open-ended questionnaire methods is more complex but still is based on the idea that such measurement approaches may have systematic error in their ability to accurately describe or predict, which makes understanding what educational changes are happening in a child less reliable and valid. Two types of test bias (bias in measurement and bias in prediction) exist, as measurement in general entails these two general purposes: to measure a particular characteristic and to predict scores on some criterion or outcome measure (Murphy & Davidshofer, 1998).

In order to reduce a possible cultural bias (i.e., the content of the test is relevant or familiar to a certain culture and novel or irrelevant to others) in a measurement approach, regardless of whether it is a qualitative or quantitative method, Murphy and Davidshofer (1998) suggest possible solutions: (1) to change the content to reduce the influence of potentially irrelevant cultural factors, (2) to develop with the specific objective of reducing group differences, (3) to separate the effects of real differences in the attributes measured from the effects of irrelevant biases, (4) to employ multiple methods of assessment, and (5) to change the method (e.g., change from written tests to individually administered oral tests).

It is difficult to conduct research on such bias in different measurement approaches. Murphy and Davidshofer (1998) identified several reasons for the complexity of dealing with test bias. First, there is no clear consensus about the precise meaning of such terms as 'unbiased' or 'fair'. Second, there is frequently a lack of culturally specific demographic information due to students' limited responding about their ethnic identity. This failure to identify one's ethnic origins is more common in some groups than in others, resulting in a substantial sampling bias due to differential inclusion or exclusion of some groups in the analysis and interpretation of results. Finally, the differential sensitivity of various questions within different race or ethnic groups contributes to the difficulty in conducting research on measurement bias. Specific concerns in establishing equivalence include whether approaches or instruments elicit the same conceptual frame of reference in different cultures and whether respondents calibrate the intervals anchoring the measurement continuum in the same way (Demmert, 2005). This is just as true for qualitative as for quantitative approaches.

The determination of the cross-cultural equivalence of measures is also a challenge but can be approached in several ways. Frequently, researchers use an approach (Katigbak, Church, & Akamine, 1996) which relies upon the extrinsic concepts and categories that have meaning for a group of specific researchers. In other words, a measurement structure derived in one culture is assumed to be universal and is applied to other cultures. For example, U.S.-normed psychometric measures may be used to assess the abilities of non-U.S. students. There are complex means of assessing such instrumentation equivalence that can highlight

when and how a measure is psychometrically deficient when imposed on other cultures, but few researchers make the effort to understand these factors. Critics of such approaches advocate an alternative approach which focuses on the measurement of those intrinsic cultural distinctions that are meaningful to the members of a given culture. This approach requires the development of culture-specific measures of the constructs of interest. The use of such approaches though is typically considered impractical because of the difficulties in defining 'cultures' and their diversity in most samples, but also the difficulties of comparing such unique measures across cultures.

Knight and Hill (1998) have provided psychometric guidelines for investigating measurement equivalence across disparate groups in order for instruments to show equivalent meanings and properties. According to them, instruments need to demonstrate item, functional and scalar equivalences (Knight & Hill, 1998). Item equivalence is achieved when items (i.e., questions, ratings, performance items) measuring the construct of interest carry the same meaning across different groups. Measurement equivalence occurs when the results generated by a measure of a construct are related to theoretically relevant constructs in each group in a consistent way. Finally, scalar equivalence, the most stringent form of measurement equivalence, refers to whether any given result on a measurement instrument indicates the same magnitude, degree, scale, and intensity of the construct across different cultural groups (Knight & Hill, 1998). One of the approaches to evaluate the scalar equivalence of more quantitative measures is to test the mediating effects of cultural group on the regression slope and intercept of that measure predicting a criterion variable (Knight & Hill, 1998).

Ukrainetz, Harpell, Walsh, and Coyle (2000) recommended the method of dynamic assessment as a less-biased evaluation procedure when measuring culturally different children's performances. As a process-oriented approach rather than product-oriented, dynamic assessment focuses on how the child approaches tasks, the patterns of errors made, and the ability to self-correct, and, as a result, provides insight into a child's modifiability, or the extent to which the child changes in response to education and the intensity of effort required by the examiner to achieve this change (Ukrainetz et al., 2000). As an alternative approach to the conventional psychometric measures, dynamic assessment differs from standardized measures in terms of goals of testing, orientation, context of testing, interpretation of results, and nature of tasks. This dynamic assessment procedure may be particularly suitable for Native American students because they are reported to not easily respond to Euro-American-style questioning that includes direct and often abrupt question-and-answer sequences and time constraints that are inconsistent with their culture and community experiences. Unfortunately, identifying useful components of such a process-oriented measurement approach that can be used as a focus for research is a frequent challenge which has limited this orientation's use.

Finally, there are actual measurement administration factors which may impact one's measurement results. Differences in subcultures, such as primary or

secondary language use, speed of daily life, and settings (urban or rural area), can make evaluating the student's optimal performance or knowledge difficult. For example, Devers and Bradley-Johnson (1994) noted that Native Americans may typically wait 11 or more seconds to speak, compared with one or two seconds for white students, in part because they believe that question-answer sequences are inappropriate. Some Native Americans communicate respect for individuals in authority by not making eye contact or posing direct questions (Joe & Malach, 2004). The cultural differences in a testing or measurement situation may include an individual's lack of exposure to specific assessment approaches, test materials or test formats; partial understanding of a question; making a wild guess or giving up if a problem is not immediately solvable (Bond, 1990); or rushing through a disinteresting or culturally irrelevant process in order to shorten the period of personal discomfort (Anastasi, 1988). The need for social desirability and approval and the need to avoid criticism can also affect reactions to measures (Stone & Gridley, 1991). In most cultures, a behavior is linked to a context, situation, and communication pattern that make the response to a measurement question dependent on who asks the question and what type of content is involved (Lonner, 1985). Informed knowledge of the culture can evoke a level of performance that more accurately reflects the examinee's underlying competencies (Reschly, 1980).

Demmert (2005) suggests that there are key considerations when assessing Native American students: (1) the language of the home and the language of instruction, including the vocabulary of the student and whether he or she understands the meaning of the words used in the assessment, (2) the context and perspective from which questions are asked such that they incorporate the values and priorities of the community(ies) from which the students come, (3) compatibility between the background knowledge of the student and the questions asked of the student, and (4) the ability of the assessor to create an atmosphere in which the students feel safe and comfortable (p. 21).

Measurement at Different Levels of Analysis

Measuring Culture & Community

Native Americans represent approximately two percent (over four million people, of which 1.4 million are children) of the American population, not counting those mixed-race (Native American along with another race) persons who would have close ties. Over 75 percent of this four million claim membership in specific tribes, with eight tribes represented by more than 50,000 members (U.S. Census). With estimates of over 500 federally recognized American Indian Tribes and their related range of languages, Native Americans represent a very large array of cultural and linguistic diversity. A review of the Native American educational research literature suggests that a major need and focus has been to sustain and nourish their traditional cultures and languages, while also struggling with the complex issues involved in trying to become educated for successful interactions within the mainstream society. It is not surprising that many researchers have adapted a culturally-based educational (CBE) theory to inform their research.

Given the differences between the diversity of Native American cultures and the majority culture(s), which dominate most public and many private educational institutions, Native American researchers have hypothesized that when teachers use culturally congruent interaction styles with students, students are engaged more productively in learning (Demmert & Towner, 2003). The CBE model appears to be a series of interrelated theories that include (1) cultural compatibility theory, (2) cognitive theory, and (3) cultural-historical-activity theory. Cultural compatibility theory suggests that the more similar the students' school environment and experiences are to those of their home and community, the more they will respond to the educational goals of their school. Cognitive theory suggests a child's learning will be more successful when their relevant prior knowledge is used as a foundation for developing and learning new information. Cultural-historical-activity theory suggests that joint learning within a culturally-relevant context, with a knowledgeable partner, advances a child's language, cognition, and understanding of their community and culture.

It is not surprising then that a large majority of education research with Native American children has had a strong focus on their cultural background and identity. Unfortunately, there are few systematic examples of the development of actual measures of such children's cultural background and identity, or their level of assimilation into their Native culture or the majority culture, with most studies relying on geographic and Tribal identities as proxies. There are many qualitative and descriptive studies which begin to form the foundation for the development of more sophisticated measures in this domain, but they have not been widely adapted nor evaluated for use across a wide range of tribal groups or situations. Unfortunately, such limited assessment options of children's cultural heritage and their adaptation within it, particularly those features that might influence their understanding and motivations regarding school and academic learning, constrain our study and understanding of its influence on achievement outcomes.

A challenge in this regard will be to develop measurement approaches that can be utilized across the diversity of heritages represented within the Native American community. One would expect that any measurement of 'Native culture' would be very complex, but also critical in any research focused upon CBE-related theories or predictions. In addition, if one is interested in developing a more comprehensive model of the interrelationships between different levels of measurement (culture, institution, family, etc.) and their influence on academic outcomes, systematic measures of aspects of this cultural factor will be important. Without it, one will not be able to easily document whether its influence on academic outcomes is as crucial as is typically hypothesized, or is interactive with other predictors in unique ways.

Measuring Institutional Environments

A primary institution focused on academic achievement is the schools. Pavel, Thomas, and Summer (1997) have reported that schools with large American Indian populations are mostly in rural areas, tend to have small enrollments, and

are highly concentrated in the Northern Plains and Southwest regions of the U.S. (cited in Cunningham & Redmond, 2001). Understanding how the school environment impacts Native American students' achievement calls for a systematic measurement model of school characteristics and environment.

There is a large body of majority culture research focused on those characteristics of effective schools (Marzano, 2003) that has developed a wide range of measurement models focused on specific attributes of schools, teachers and instructional models that have been shown to be predictive of student achievement. It is an interesting question as to whether these measurement models, which typically are a hybrid of qualitative and quantitative approaches, would be cross-culturally equivalent in Native American schools, or predictive in the same way for Native American students' achievement.

The diversity of schools, even in the same community, being attended by American Indian students was highlighted by Ward (2005), who conducted a study of key characteristics of three separate high schools in Montana. Both qualitative (participant observations) and quantitative (descriptive data collected from school records) methods were used to collect data from over 698 students. Across the three schools, the percentage of American Indian students was 99%, 95%, and 34%, while the number of American Indian teachers was small in all of the schools.

In one of the schools, American Indian students were often identified early on as learning disabled. The staff did not have an understanding of Northern Cheyenne history, culture, or social life, and parents of these students felt that there was a lack of inclusion of their culture in the curriculum, lack of support for American Indian students to participate in school activities, and indifference by the staff to work with American Indian parents. In the second school, an effort was made to integrate American Indian culture into its programs. There were many positive programs and resources utilized by the students, but at the same time a school-wide discipline program was perceived among parents to be somewhat abusive to American Indian students. The third school was known for accepting any student who could not make it at the other schools and therefore functioned as an alternative school. Often the students came because of a myriad of problems including drug and alcohol abuse, conflicts with authority, poor self esteem, poor health, and little family support for schooling. The teacher and administrator turnover rates were high and school cohesion was low.

The quantitative data examined graduation rates, transfer rates, course grades, standardized test scores, and grade point average (GPA) (Ward, 2005). School completion data for American Indians at each of the schools indicated 52% graduating from one school and 45% from the other two. The overall mean GPAs for American Indian students at the schools were 2.30, 2.21, and 2.04.

Even though these three schools were located within a defined geographic area of Montana, their significant differences and strengths and weaknesses from the American Indian student point of view are striking. Because of the small school sample size in this study, it is not possible to correlate statistically the

influence of these school characteristics on student outcomes, nor the influence of student characteristics on those outcomes independent of the 'school' effect. Although there is a focus on each school's inclusion of American Indian culture within their learning environment, the interaction of those school differences on this factor with these school attributes cannot be easily discerned. Such answers, though, could provide increasing direction toward answering those important questions about the impact of a student's home culture and environment and their school's learning culture and environment, and how each independently, or interactively, influences student achievement outcomes. Without systematic measurement of each domain, such questions cannot be addressed.

Measuring Family Context

There is evidence that many Native American families place more emphasis on their child's learning about their heritage than on their children's more mainstream academic performance, and view the loss of their Native language, which clearly is critically linked to their culture, as one of the most vital problems (Reyhner, 1992). Children master the basic structure of their Native language (L1) in their home and community settings before they come to school, but it rarely is as simple as this. As a general example, in some families there may be simultaneous bilingualism practiced (learning L1 and L2 – typically English), or various forms of sequential bilingualism (L1 learned 1st, then L2, or vice versa). How much does a family use each language, how proficient are they in each, and in what settings is each language typically used? Such family related factors are critical in understanding what a child brings to school linguistically, and have a major influence in their readiness to learn more formal academic skills such as reading. Unfortunately, although there are numerous linguistic descriptions of the different Native American languages being practiced in families throughout the larger community, there has been little attention given to the impact of their different linguistic characteristics in the development of early reading skills in that Native American language, nor in learning to read in English.

In addition, due to the large number of Native American languages that have only a few native speakers, language loss threatens Native American culture as well. The movement toward revitalization of Native American languages attempts to address this threat (some examples that describe such programs in various Native American languages are Johnson & Wilson, 2006; LaPier, 2006; Williams & Rearden, 2006; Wilson, Kamanä & Rawlins, 2006). These programs raise interesting issues for research on language learning and how to optimize bilingualism under relatively unique conditions where both child and parents are learning a 'new' native language at the same time. Such information, while seemingly esoteric, has important implications not only for Native American communities seeking to preserve their Native languages, but also for immigrants wishing for their children to maintain or acquire the 'home' or cultural heritage language (Peyton, Ranard & McGinnis, 2001), and for monolingual families who simply wish to raise their children as bilingual.

The literature on bilingual reading development, along with the development of reading in English language learners is extensive, and there are many different measurement approaches, although not in Native American students or languages. If families are important factors in a child's ultimate achievement, then evaluation of this one area of family functioning would add notable information to most outcome studies.

Besides the language context of families, it is within families that the socialization and core values on which the educational process is based for most children. This process involves imparting values, beliefs, and norms from one generation to the next, in other words, the sharing of one culture. Therefore, families can also greatly influence children's perceptions about, and involvement in, the educational process. For example, in a study of Navajo students, parents and extended family members were found to be the strongest influences of a student's positive or negative progress in school (Demmert, 2001). There are several family characteristics that have been found to impact a child's educational experience. Among these are lack of parental involvement, family size and structure, perceptions concerning the lack of connections between job opportunities and educational credentials, and cultural biases against majority educational institutions (Ward, 2005). Just as family values may impact academic development, so might other family demographic factors such as family size and structure, which might include number of family members, living with extended family members, household income, and location of where the family lives. All these factors have been shown to have important consequences on students' school outcomes (Ward, 2005).

The assessment of families can take many different approaches depending on the characteristics of the family thought to be critical in predicting academic outcomes. These characteristics may include family language use, or achievement motivation, or even measures of family dysfunction. Again, there is a broad literature on family assessment and the measurement of many of these characteristics, but few have been used, much less adapted and validated in the Native American education research field.

Measuring Child Attributes: Language and Reading Achievement

The assessment domain of the child is a very important one as it represents the primary focus of the educational process and embodies its ultimate impact. How, and to what extent a child changes through the educational and learning process, is the ultimate outcome of interest in education research. In this example, the final focus is on reading development, which is built upon a child's language functioning. Therefore, a focus on the assessment of the child at this level of the measurement must describe not only the child's language functioning and factors that impact it, but also his or her actual reading abilities.

Since language acquisition is an intrinsically social and collaborative process, the linguistic, cognitive, and social-affective skills acquired through the learning of a native language may serve as the basis for learning a second

language. Research has shown many examples of cross-language interdependence and cross-linguistic transfer, that is, language functions and forms developed in the primary language transfer readily to the second language (Chiappe & Siegel, 1999; Durgunoglu, Nagy, & Hancin-Bhatt, 1993). This cross-language transfer may facilitate the acquisition of new academic contents, and provide social and affective advantage.

The actual direct measurement of language capacities and proficiency, in either a Native language, or in English, within Native American students is difficult due to the dearth of standard language measures in most major Native American languages, or the appropriate standardization and norming for Native American students of widely used majority-student measures of English. In some instances, there is no direct equivalent vocabulary word(s) in the Native American language. Joe and Malach (2004) have described an interventionist using the words "without ears" to convey to a family that their infant son presented with profound bilateral hearing loss. Because reading development is predicted by constructs like phonological awareness, rapid naming, and vocabulary, there is a critical need to develop, or modify, measures of these constructs for use with Native American students from differing linguistic backgrounds. Difference in narrative forms and their development also may impact radically both story construction and comprehension (Gutierrez-Clellen and Quinn, 1993; Robinson-Zanartu, 1996). To date there are numerous examples of such bilingual language measures within these domains for students from different cultural and linguistic backgrounds, but most have been focused on Spanish for Latino students. The measurement issues involved in their development and validation though are not thought to be different from that needed for the evaluation of Native American students, and thus could serve to inform such efforts.

The same can be said for measures of reading. Clearly Native American students who are learning to read will need both reliable and valid assessment tools of their reading development in their native language, but also appropriately developed and normed measures in English. Measures of decoding, fluency, reading vocabulary, comprehension and motivation to read will need to be available to provide a systematic assessment of a Native American students' reading abilities, which would represent the ultimate outcome goal.

Summary

It is important to be able to understand the myriad factors that impact Native American student's achievement outcomes. The proposed multilevel, interactive measurement framework takes into account the potential importance of information from each level of analysis, but more importantly how these levels interact and influence each other. The important central theme of this discussion is that without consideration of these different levels, one cannot begin to understand the true complexity underlying the factors impacting a child's academic functioning. Clearly one cannot always assess all levels of the model, and different theoretical questions may require primary focus at only one or a few

levels of analysis, but it is important to keep in mind that those unattended to levels may have unknown roles in the ultimate results of such a study.

From an assessment point of view, it is obvious that there has been much more systematic attention given to the assessment of the individual child's abilities and characteristics compared to those levels of the model that are at higher levels (families, institutions, cultures), even though for the Native American researcher, the importance of culture and family cannot be over stated. In addition, although there are measurement approaches to each of these levels in other areas of research (i.e., cross-cultural, family assessment, school improvement), sometimes using qualitative methods or measures, very few of these approaches or measures have been evaluated within the Native American research field. Clearly a major reason for this is the very limited level of research funding that has been focused in these areas, the more typical one-tribe research focus which has limited the need for measures which are capable of assessing concepts and domains across tribes, and tackling the real difficulties in developing culturally appropriate measures sensitive to change.

Thus, as stated at the beginning of this article, if we wanted to create one of the most complex measurement challenges for educational researchers, we would study reading development in Native American children. It is because of this complexity, though, that this type of research is so important. If researchers are ultimately able to develop reliable and valid measurement models and evaluation tools within this maximally-complex situation, it would provide a critical and core measurement foundation for education research across all other majority and minority populations in the country. As our country becomes increasingly diverse culturally, linguistically, and socioeconomically, Native American education research will teach us how to better understand and measure the complex interplay of cultural, institutional, familial, and child characteristics that will assist us in understanding how all children can learn optimally, thus enabling us to provide the most effective education for all children.

Robin Morris is Regent's Professor of Psychology and jointly appointed in the Department of Educational Psychology and Special Education. He is currently the Vice President for Research at Georgia State University. His research has focused on the developmental interactions between biological, linguistic, environmental, and instructional factors impacting academic learning, particularly reading development, multivariate and measurement methodologies, and reading and related developmental disabilities.

Hye Kyeong Pae is a research associate in the Department of Psychology at Georgia State University and an adjunct faculty at Georgia Perimeter College. Her research interests lie in classification of learning disabilities, including subtypes of reading disabilities, intervention effects, bilingualism, and cross-language transfer between written languages, particularly those with different scripts, and measurement issues across cultures.

Cynthia Arrington is a research coordinator in the Department of Psychology at Georgia State University. She has a Master's Degree in Educational Research and in Professional Counseling. Currently she is working on a Master's Degree in Managerial Sciences while coordinating activities on a number of large grants focused on reading interventions in various groups of poor readers.

Rose Sevcik is Professor of Psychology at Georgia State University and Chair of the Developmental Psychology Program. Her research interests focus on communication and reading development in both typical and atypical children, with special focus on children with reading disabilities and more moderate and severe communication disorders.

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