THE PARENT MANIFESTO

STUDENT ASSESSMENT

A WHOLE-PERSON STUDENT EVALUATION MODEL

A LONGITUDINAL ASSESSMENT DESIGN

INTRODUCTION

A school's most basic responsibility is to identify and further a student's natural skills and abilities. To approach education in its intended purposes would mean good schools would abandon uniformity and standardization. Schools would seek individuality by increasing the variances in student development. The most effective assessments would evaluate a myriad of academic and cognitive skills through the actual demonstration of talents and abilities students possess through a variety of instructional contexts. This approach would actually widen the gap of the individual skills students in the same grade may possess.

Unfortunately, design of our educational system is based upon standardization and uniformity. Standardized assessments seek homogenization and a learning model represented by students progressing in unison through each grade level towards poorly defined and ever changing achievement goals. Simply seeking outcomes on standardized test as the primary assessment strategy severely minimizes the numerous factors affecting student achievement and the true intent of education. We must rethink the very foundations of education and the assessments used to measure student achievement if we are to align efficient and effective instructional practices to our understanding of student needs.

All organizations operate as they are assessed, and standardized tests drive instruction to only that which is so evaluated. Too often, outcomes aligned to standardized tests constitute the full extent of a school's effort to define student achievement. Standardized tests used to assess the management competence of educational institutions define the boundaries of its operation and often becomes its own reality. This paradox diffuses strategic alignment and masks the true intent of education. Misalignment of purpose severely reduces a school's ability to address root causes of poor student outcomes. This is further magnified by the dynamics of traditional school operations and the propensity of schools to rely upon antiquated discovery and remediation approaches devoid of any analysis or research capabilities.

The Standards approach to building descriptions of student knowledge often ignores relationships and the basic foundations of understanding. The unique character of any school environment and factors germane to the student population must be aligned to clearly articulated achievement goals. A school should be able to define with extreme clarity, what the graduating student should know / be able to do. The school should also implement strategies to influence the character of the student as a way to address "whole-person" student needs. This is achieved with the ability to recognize variations in a child's performance / understanding of a myriad of cognitive as well as academic skills. Strategies should be developed to determine how each child interprets information through assessment of individual *(cognitive)* strengths, implementing strategies to guide instruction to those strengths.

Effective strategies for teaching and learning must include specific standards of performance excellence evaluated through the daily routines of the classroom. Efficient local *(supplemental)* assessments must be established that would allow a determination of student achievement independent of State Standardized testing. The establishment and implementation of local assessments and the determination of relevant academic criteria would constitute a concise standard for student achievement as a comprehensive, whole-person development strategy. True education reform will not be realized by how we teach our children, but rather how we evaluate *(define)* them.

HISTORY OF MEASUREMENT

The word measurement comes from the Greek "metron" meaning limited proportion; it is the estimated quantification of a tangible characteristic / attribute of an entity; such that its e.g. length / weight is relative to a defined measurement unit. Quantified characteristics may include measures of speed, volume, density, direction, occurrences, quantity, quality, effectiveness, efficiency, frequency, intensity, timeliness, accuracy, magnitude of functional aspects of the targeted attribute.

Objective measurement is the repetition of a unit amount that maintains its size / dimensions within an allowable range of error; across various studies / measurement instruments and users. Objective measurement produces a reference standard / common criteria for the exchange of quantitative values where all research / practice relevant to a particular variable can be conducted in uniform terms. To substantiate the validity of any measurement, it must be calibrated by a comparable measurement model.

METROLOGY

Metrology is the science of measurement and includes all theoretical / practical aspects thereof. The earliest examples of standardized measures were length, time and weight; standards established to facilitate commerce, record human activity and prevent fraud. With the advances in sciences, the relationship of experiment to theory required a more rational system of units applied to common standards of measurement. The concept of establishing units of measurement is based upon constants of nature:

"Measurements are derived from Nature
Quantities are derived from Measurement
Calculations are derived from Quantities
Comparisons are derived from Calculations
Analysis is derived from Comparisons"
Sun Tsu

Metrology embraces both;

- **experimental** *(set of observations performed in a specified context to solve a specific problem or research)*
- **theoretical** *(a mathematical / logical explanation / testable model of the manner of interaction capable of predicting future occurrences or observations of the same kind)*

Metrology is a broad field and may be divided into three subfields, <u>only concerned with subfield below</u>:

SCIENTIFIC / FUNDAMENTAL METROLOGY

Scientific / Fundamental Metrology involve the establishment of measurement units, unit systems, and development of new measurement methods. It is also the realization of measurement standards and the transfer of traceability to users in society.

A core concept in metrology is traceability, defined as the property of the measurement outcome / value of a standard related to stated references. The level of traceability characterizes the level of comparability of

the measurement standard. Traceability is defined through calibration; the relationship between a measuring instrument and the value of a measurement standard.

Overtime, all measurement instruments need to be calibrated to maintain its Traceability. Calibration may not necessarily be to adjust the instrument, but may adjust changing characteristics of the measured attribute. Changing measurement objectives reflect changing values assigned to defined characteristics of e.g. students; Criteria defining scientific processes *(below)* may determine the validity of outcome measures.

As the science of measurement, principles of Metrology should be used to enforce and validate clearly defined standards for accuracy, precision, reliability and traceability of exacting measurement standards:

- Accuracy is the degree of exactness between the final product and the measurement standard
- Preciseness refers to the degree a measuring instrument can determine accuracy
- Reliability refers to the consistency of accurate results over consecutive measurements
- Traceability refers to the ongoing validation of conformance to the original standard of measurement

SCIENTIFIC PROCESS

In the physical sciences, a measurement unit is a standardized quantity of a physical property used to express recurring quantities of that property. Measurement units are now generally defined on a scientific basis. The Scientific Process includes the following characteristics;

- employs systematic, empirical methods that draw upon observation or experiment
- requires data analysis that are adequate to test the stated hypotheses, justify conclusions drawn
- applied measurements can be validated across multiple studies by the same or different investigators
- Critical inquiry based upon logic and a systematic treatment of evidence

TYPES OF MEASUREMENT

According to the classification scheme in statistics, simple descriptions of the student are provided as defined characteristics to be measured. The measurement capability of a variable *(defined characteristic)* is further classified by the type / range of numeric values assigned to student variables as illustrated below.

NOMINAL MEASUREMENTS

In this classification, names are assigned to "groups" as labels; *(people, communities, organizations, etc)*.

- Assignment is performed by evaluating similarities of defined characteristics
- In social research, Nominal variables include gender, race, socio-economics, religious / political affiliation, political party affiliation, college major, birthplace, etc.

Nominal Variables only provide information relative to a defined group, common characteristics of group affiliates, e.g. research focuses on identification of common academic, cognitive, perceptional, social and performance skills within defined student groups to recognize / isolate common capabilities / challenges aligned to quantified achievement goals. Associations are made based upon common group characteristics, formulating strategies for specialized academic tracts, instruction & targeted remediation.

ORDINAL MEASUREMENTS

In this classification, numbers assigned to defined characteristics represent the rank order; (*1st, 2nd, 3rd, etc.*)

- Called rank variables, comparisons are of greater or lesser, equality or inequality, etc.
  - Cannot analyze / compare data using addition / subtraction, *(like horse race results shown in rank-order)*

Ordinal Variables illustrate student preferences supporting theories of e.g. instructional / developmental sequencing and studies of cognitive skill preferences to include gifted skills, perception & understanding

INTERVAL MEASUREMENTS

In this classification, numbers assigned to objects possess equal differences between measurements

- Differences between arbitrary pairs of measurements can be objectively / quantifiably compared
- Can analyze / compare data using addition / subtraction, but the zero point on the scale is arbitrary
- Negative values can be used
- Ratios cannot be calculated; *(Cannot analyze / compare data using multiplication and division)*
  - But ratios of quantified differences can be expressed as one difference can be twice another

Interval Variables support research that focuses on assessments reflecting e.g. the accumulation of skill-sets within a defined grade, career field, development objective, etc., illustrating student development over-time based upon the demonstration of skills needed for proficiency.

RATIO MEASUREMENTS

In this classification, numbers assigned to objects possess defined ratios and numeric values

- Equal differences between measurements allow multiplication / division operations to be performed
- ZERO value is assigned / ratios *(proportional relationship of an amount relative to another)* can be conducted
  - Most physical quantities such as mass, length, energy, etc. are measured on ratio scales

PHYSICS

Physical science is the category of knowledge relating to the order of nature / regular succession of events

"Give me matter and motion, and I will construct the universe." **--Rene Descartes (*1596-1650*)**

Physics is an ***experimental*** science; the science of matter and its motion as well as space and time. Scientist observes nature to find patterns / principles relating phenomena; broadly used patterns / physical theories are called physical laws / principles. Studies of student achievement / cognition applied to concepts of force, energy, mass, charge will associate student development to our understanding of the natural world.

CORE THEORIES

The core theories of physics contained in a Longitudinal Assessment / Analysis approach include classical mechanics, thermodynamics and statistical mechanics to support empirical scientific research.

CLASSICAL MECHANICS

Classical Mechanics is a model of the physics of forces acting upon bodies, subdivided into;

- **Statics**, *(the analysis of loads (force, torque/moment) on physical systems)* modeling objects at rest
- **Kinematics,** *(the motion of objects)* modeling objects in motion
- **Dynamics**, *(the effects of forces on the motion of objects)* modeling objects subjected to forces

Of special interest are the "indirect" effects that take place at different times or different locations than when / where the force is applied. This is the study of the direct / indirect relationship of cause and effect, the basis of most psychological research.

- Indirect-in-Space is e.g. how a student may transfer the effect of external forces from the place where the force is applied, *(e.g. home)* to other places *(e.g. school)*
- Indirect-in-Time is e.g. how a student's reaction may be delayed from when force is applied, *(e.g. trauma)*

THERMODYNAMICS AND STATISTICAL MECHANICS

Thermodynamics studies the effects of changes in temperature, pressure and volume on physical systems along with transfer of energy as heat. Changes to each of the above are not measures unto themselves, but rather the manifestation of its effect on a system / the environment realized as quantified changes of defined characteristics. Research designs of this nature seek quantified associations of environmental conditions / characteristics to student performance.

Statistical mechanics analyzes measurable / observable outcomes by applying quantified characteristics of defined properties that define the student. The application of probability theory includes mathematical tools for calculating large populations to relate group property characteristics to individual characteristics that are observed in everyday life.

RESEARCH

Theoretical physics is closely related to mathematics, providing the language of physical theories. Theorists rely upon numerical analysis / computer simulations, etc. in the formulation of physical models. Large areas of mathematics, e.g. calculus, have been invented specifically to solve problems in physics.

NORMAN CAMPBELL'S THEORY OF FUNDAMENTAL MEASUREMENT

The application of Theory of Physical Measurement to the Measurement of Psychological Magnitudes

According to Campbell, measurement is the assignment of numeric values to systems according to scientific laws. The developed scale must demonstrate by some operation that the relationship between defined characteristics of the system is Transitive: *(a given relation between terms such that if it exists between "a" and "b" and between "b" and "c," then it also exists between "a" and "c").*

To not demonstrate a transitive relationship, numerals assigned are meaningless; the relationship between values is not quantified and will not represent an accurate relationship between measured systems.

SCIENTIFIC METHOD

Scientific method is a structured technique for investigating data / phenomena, acquiring new knowledge or correcting / integrating previous knowledge. It is based upon gathering observable and measurable evidence subject to specific principles of reasoning. The scientific method consists of the collection of data through observation / experimentation and the formulation and testing of hypotheses.

Theories that encompass a broader scope of inquiry may bind many hypotheses together in a coherent structure. This in turn may form new hypotheses or place established groups of hypotheses into context. The steps in the analysis process must be repeatable to be objective, reduce biased in interpretation of the results. A defined analysis process documents, archives and shares all data, available for careful scrutiny by other scientists *(traceability).* The Scientific method is reliant upon increasingly more sophisticated characterizations of the student overtime. Scientific measurements are mapped to determine correlations *(also called correlation coefficient, indicates the strength / direction of linear relationships between random variables)*. Hypotheses are usually designed as mathematical models. Scientists should use all available resources; creativity, ideas from other fields, etc. to imagine possible explanations for phenomenon under study.

SYSTEMICS

Systemics is the emerging branch of science that studies holistic systems. It attempts to develop logical, mathematical, engineering or philosophical paradigms and frameworks in which physical, technological, biological, social, cognitive and metaphysical systems can be studied and developed. Systemics supports "whole-person" student development designs, seeking to show relationships of various aspects of the student / environment to achievement of outcome objectives.

LAW OF COMPARATIVE JUDGMENT

Conceived by L. L. Thurstone, the Law of Comparative Judgment *(LCJ)* is a general numeric representation of a comparative process between pairs of a defined characteristic with respect to the magnitude of the attributes, traits, attitudes, etc. LCJ is more aptly described as a measurement model and constitutes a mathematically-supported hypothesis comprising theoretical criteria for measurement.

SYSTEMS

All systems possess a defined boundary *(characteristics of its independence)* to delineate it from the environment. All systems interact with their environment: once a system is identified *(the boundary defined),* scientific analysis describes:

- the properties / characteristics of the system,
- the properties / characteristics of the environment *(excluding the system)* which affect the system, and
- the interactions / relationships between the system and the environment

NOTE: Student & System is interchangeable as is Environment & Universe

SYSTEMS PERSPECTIVE

Taking into account all of the behaviors of a system as a whole in the context of its environment is the Systems Perspective. Once the system is identified as a separate part of the universe, further reduction into isolated parts will produce a segmented description of the system's behavior. A systems perspective describes the entire system in relationship to its environment; considers the system in the context of the environment as interactions / relationships and how environmental changes affect the system.

SYSTEM PERSISTENCE

Systems typically have persistent properties; systems that possess form, structure and internal properties. Persistence is a conceptual generalization of survival in biology; within this context, persistence as survival suggests an identity *(self)* as all systems undergoes constant change. This becomes a study of those structural characteristics of the system or environment that perpetuates the survival of specified behaviors.

ENVIRONMENT

To describe a system in the context of its environment refers to its "response" and the "behavior" of the system. The response of a system is how it changes when the environment changes. Behavior is a general system description in the context of diverse environmental conditions. Observing a system typically involves the response of a system to its environment; e.g. descriptions of a system's shape or color are actually descriptions of how the system responds to light.

Describing characteristics of the environment is a much more difficult task than describing characteristics of the system. Primary aspects of the environment are described as forces most directly relevant to the behavior system. Part of the process of describing *(or modeling)* a system's behavior involves identifying those aspects of the environment that are relevant to the defined behavior.

Properties of the environment are referenced as quantified measures of e.g. force in relation to the system itself. When features of the environment are treated as random influences, its properties will have no defined system relationships, ignoring functional interdependencies of the system with the environment.

PATTERNS

A Pattern is a set of defined relationships observed as a repeating structure in space. In a description of a system, repetition corresponds to the redundancy of the system / system characteristics.

DYNAMIC RESPONSE

One of the powerful ways of probing the behavior of a complex system is observing how it responds to a force applied to it; especially the "indirect" effects that take place at different places or at other times than when the force is applied. This is a way of probing the direct and indirect relationships of cause and effect.

COMPLEX SYSTEMS THEORY: BASIC DEFINITION

A Complex System is any system which involves a structured number of elements, arranged in defined structures. Complex systems go through processes of change that include characteristics / attributes whose emergence *(growth)* cannot be predicted from current understanding. Complex Systems Theory includes the study of the interactions of many parts of the system. Student are regarded as Complex Systems.

PROBABILITY THEORY

Probability theory is the branch of mathematics concerned with analysis of random variables / processes, and events: e.g. although a coin toss or the roll of a die is a random event, if repeated many times the sequence of random events will exhibit discernable statistical patterns, which can be studied. Two representative mathematical models describing such patterns are;

- Law of Large Numbers (*a theorem in probability that describes the long-term stability of a random variable*)
- Central Limit Theorem *(any sum of many independent and identically-distributed random variables will tend to be distributed according to a particular "attractor distribution").*

LAW OF LARGE NUMBERS

Common understanding suggests if a coin is tossed many times, approximately half of the time will be heads, and the other half it will be tails. The more often the coin is tossed, the more likely the ratio of heads to tails will approach a uniform, statically probable expectation. Modern probability studies define the Law of Large Numbers *(LLN)* as a sample average *(of independent / identically distributed random variables with finite expectation*) converging towards the theoretical expectation μ.

CENTRAL LIMIT THEOREM

The Central Limit Theorem states that the average of many independent / identically distributed random variables trends towards a normal distribution. Probability is the numerical assessment of likelihood on a scale from impossibility to absolute certainty; expressed as the ratio between the number of ways an event can happen versus the total number of variations that can occur *(e.g., there are 13 ways of picking a diamond from a deck of 52 cards, so the probability of picking a diamond is 13/52, or 1/4).*

EMERGENCE

In philosophy, systems theory and the sciences, emergence refers to the way complex systems / patterns arise out of a multitude of relatively simple interactions. The unpredictability inherent in the natural

evolution of complex systems may yield results that are totally unpredictable based upon knowledge of the original conditions. Such unpredictable results are called emergent properties.

Emergence is…

1) what parts of a system do together that they would not do by themselves: collective behavior
2) what a system does by virtue of its environmental relationship that it would not do by itself: its function
3) the act / process of becoming an emergent system

Accordingly, emergence refers to how behavior at a larger scale of the system arises from the detailed structure, behavior and relationships on a finer scale. It also refers to all the characteristics assigned to e.g. a student that are really characteristics of the relationship between a student and their environment.

COGNITIVE THEORY

In psychology, the term cognition refers to an information processing view of an individual's psychological functions. Other interpretations include the development of personal concepts that define an individual's understanding and their ability to make sense of the world. The term cognition refers to the human-like processing of information and is closely related to such abstract concepts as the mind, reasoning, perception, intelligence, learning and other characteristics that describe mental capabilities.

In psychology, it is used to refer to the mental functions and mental states of students with a particular focus toward the study of mental processes, e.g. comprehension, inference, decision-making, planning and learning. Recently, advanced cognitive research has focused on the capacities of abstraction, generalization, concretization *(to make something solid, real, or specific),* specialization and meta-reasoning *(hierarchy of relationships in reasoning)* which references higher-order mental concepts as beliefs, knowledge, desires, preferences and student intentions. The term "cognition" is also used in a wider sense as the act of knowing or knowledge and interpreted in a social / cultural context to describe emergent development.

COGNITIVE SCIENCE

Cognitive science is an interdisciplinary study with contributors from various fields, including psychology, neuroscience, linguistics, philosophy, computer science, anthropology, biology, and physics. The field is compatible with the physical sciences and uses the scientific method as well as simulation or modeling.

From the external point of view, the largest interdisciplinary context of cognitive science is systemics (*study of holistic systems*). It includes the socio-cognitive extension of cognition models / theories over various social environmental systems, with emphasis on relevant cognitive states / conditions. The essential questions of cognitive science are: *what is intelligence / how is it possible to model it*

RESEARCH METHODS

Various approaches are used to study cognitive science; a highly interdisciplinary research field cutting across multiple areas of study to draw on psychology, neuroscience, computer science, systems theory, etc.

BEHAVIORAL EXPERIMENTS

Essential to effective school management is the design of assessment processes that allow the recognition and analysis of performance / behavioral changes, isolating specific patterns of resistance and making an immediate association to student gains. Required competencies may be academic, performance, cognitive, behavioral, sensory / motor skills, etc. depending upon the skill-sets needed to demonstrate proficiency of a standard or any performance goal. Behavioral research is closely related to studies in cognitive psychology / psychophysics; by measuring behavioral responses to various stimuli, a study of their effect can be conducted as an empirical analysis.

From a detailed examination of conditions that impact student performance, a school may explore how their impact can be recognized though behavioral and performance analysis. The approach incorporates strategies to apply quantified values to environmental influences, student behaviors, etc., making relative and comparative associations of their influence on short / long term student achievement. This will provide an ability to standardize the recognition of student needs, preferences, areas of resistance, etc., to ensure selection of effective instructional and intervention strategies systematically tied to student outcomes.

COGNITIVE STYLE

Cognitive style is a term used in cognitive psychology to describe the way individuals think, perceive and remember information; their preferred approach to using such information to solve problems. Cognitive style differs from cognitive ability, the latter being measured by aptitude or so-called intelligence tests.

PSYCHOMETRICS

Although student outcomes are random and often deviate from any predetermined law, appropriate pre-analysis is essential and can substantiate “a knowable outcome.” A knowable outcome is that which can be predicted based upon a thorough knowledge of all factors of influence and / or the ability to analyze outcomes of a previous event through statistical probability.

Psychometrics is the field of study concerned with the theory / technique of educational and psychological measurement, which includes the measurement of knowledge, abilities, attitudes and personality traits. Research in unobservable phenomena in the physical sciences cannot be observed directly but must be inferred from their manifestations, e.g. as seen in heat / force and the study of student understanding.

The basic premise is once you understand what is intended to happen, only then can you analyze the factors that support or prevent it. Psychometrics relates to measures of complexity and cybernetics and the determination of cognitive attributes applied as quantified student characteristics, developing a set of classification rules specifying how cognition and other factors of influence impact student performance. After many trials, generalizations from the results can be attempted with a degree of statistical probability.

The stable patterns obtained *(if any)* are calculated as probability formulas. All of the above must be supported by an ability to determine outcome objectives met following every instructional effort.

DEFINITION OF MEASUREMENT IN THE SOCIAL SCIENCES

The definition of measurement in the social sciences is the numerical estimation of the magnitude of one quantity relative to another; quantified instructional outcome measures to establish objective correlations.

KEY CONCEPTS IN CLASSICAL TEST THEORY

The key traditional concepts in Classical Test Theory are reliability and validity;

- a reliable measure is measuring something consistently
- a valid measure is measuring what is supposed to measured
    - Testing as an educational measurement is neither
- A measure has structural validity if it is related to other variables as required by theory
- Content validity is demonstrating the items of a test are drawn from the domain being measured
- Both reliability and validity may be assessed mathematically
    - Intra-class correlations (*ratio of variance of measurements of a given target to the variance of all targets*)

UNDERSTANDING TESTS

Tests are intended to perform the following support functions in education

- Measure a student's achievement / mastery of skills
- Provide information to define instructional practices / evaluate effectiveness of instructional programs
- Monitor the performance of schools / school districts for public accountability

Established test criteria do not provide an objective analysis of student needs / capabilities. The basic test types include the following:

- **Achievement tests** cover what the student should know / be able to do. Test content should be directly matched to specific content taught in class. Achievement tests are the type most used in school.
- **Criterion-Referenced tests** are designed to compare a student's performance to clearly defined instructional objectives, skills, standards or specific areas of knowledge. Criterion-Referenced tests do not compare student scores as an evaluation factor.
- **Standardized tests** indicate the test is given in the same manner using the same content across a broad scope of student populations. Specific time limits are established and student outcomes are compared to other students taking the same test or based upon predetermined standards criteria.
    - Standardized tests are used to compare the performance of one school to another

NOTE: The outcomes on a Standardized test must create a "Bell-Curve." This requires as many as 40% percentage of test-takers answer each question incorrectly. A claim could be made that test designers use a

Nominal analysis model targeting common characteristics / attributes of specific groups of students. The counter-claim would be certain student groups lack the abilities of other groups *(intra-class correlations).*

- **Norm-Referenced Achievement tests** measures basic concepts and common skills taught in schools across the country. The test is designed to measure the general knowledge taught in a specific grade.
    - Test results may be presented as a comparison of other students, e.g. 65th percentile, meaning the student scored above 65% of students who took the test.

If tests define students & teachers teach to the test, then it is test makers who define achievement

The individuality of every student is determined by factors that support their ability to reach their own *(perceived)* state of equilibrium *(in the face of external influences)* to progress along a calculated developmental tract *(individualized educational planning)* to quantified achievement goals *(graduation /career proficiency).* The study of the complexity of human performance requires a Holistic approach where an evaluation is made of the "whole" student rather than simply academic outcomes. What's sought are instructional designs / student assessments with the capacity to reveal the distinctive talents of individual students and the ability to quantify effects of school practices on their development.

As a student-focused approach, Constructivism is a theory that describes the student as central to teaching and learning. The environment, emotions, social preferences and needs for visual, auditory and tactile stimuli are factors operating simultaneously and is the basis for an objective determination of individual student needs overtime. As a result, constructivism powerfully influences educational practice, focusing on the management competence of the school to address student needs.

Students should be evaluated based upon the demonstrated competence of the specific skill-sets needed to demonstrate proficiency of a standard. This allows a quantifiable assessment of individual performance in any environmental / instructional context. The serious consideration of supporting academic and performance skill-sets introduces for the first time, quantifiable measures of "Constructionism," and the use of whole-person strategies to provide an objective developmental roadmap.

DIAGNOSTIC ASSESSMENTS

The design of Diagnostics; a web-based Longitudinal Student Assessment platform is based upon quantified units of measure to support an accumulative analysis model.

To assign a quantifiable value, you must have an intended outcome - To quantify student development is to show how that which is evaluated, changes over-time

- Achieved by finding an analytical function that includes all system variables expressed as a mathematical expression that is a function of time and / or volume
- Incorporate selected values against time / volume to derive quantifiable measurements / assessment at any stage of development through trend analysis
- Provides a relative *(Nominal / Ordinal)* assessment of, e.g. culture, the community, learning environment, support structures, etc. to determine influences to instructional outcomes as a comparative model.

Student development, *(change or the rate of change)* is measured by the accumulation of knowledge in relation to specific curricular objectives towards defined standards / any designated achievement goal

- Time is finite / specific enough to translate into a quantifiable value *(a grade)*
- Academic / Cognitive achievement may be presented as a quantified value to determine volume *(e.g. what a student is to learn in that grade / skill-sets required of a defined career field)*

Summative evaluation ratings illustrate an accumulated value showing actual student progress within a growth model format. Formative evaluation ratings indicate the level of proficiency the student exhibits in supporting skills necessary for total student comprehension. Formative evaluations are used as measures of Character, EQ and other individual performance skills required for "whole-person" student development.

NOTE: As a parent, whenever the school makes an academic or psychological determination of your child, always ask these two questions; what are you measuring and how are you measuring it???

ANALYSIS & RESEARCH

There appears to be little theory in the design of instruction and student development strategies. Management and instructional processes are re-introduced year-after-year with little diagnostic value to improve overtime. A longitudinal evaluation approach provides a credible research platform by defining and quantifying all relevant analysis parameters. The Diagnostic evaluation format will produce as many as thirty metric outcome evaluations for a single lesson. The ratings provide a more comprehensive vision of student progress and the associated factors that impact their development.

Research involves designing assessment criteria for academic, cognitive & emotional development. This includes quantifiable measures of curriculum, objective academic outcomes along with standardized cognitive evaluation criteria. Criteria requires development of objective analysis formulas based upon continuous examination of instructional outcome data aligned to a myriad of metric indicators determined through research. The quantified analysis of *(all)* system variables is essential to form objective, data-driven conclusions. Research will seek to substantiate numerous existing cognitive theories:

THEORIES OF MOTIVATION

Studies in Goal-oriented achievement strategies will evaluate intrinsically versus extrinsically motivated performance; strategies that "Draw" vs. "Drive" performance *(seeking success vs. avoiding failure).* It is also a study of stability in achievement behavior through identification of common performance indicators. Defined as "Cognitive Self-Regulation," it is an internally synchronized state of performance equilibrium, measuring opposing forces of stability & in-stability in all aspects of student development to achieve motivated learning. This also includes enhanced learning competence through techniques for improved memory, studying / test-taking skills along with theory supporting a Mastery-based instructional approach.

Diagnostics introduces innovative motivation and behavioral modification strategies to the total student development design. The primary motivational approach of Diagnostics is the illustration of student growth as continuous progress toward defined academic / career goals. Each skill the student demonstrates proficiency is reflected as a quantified measure toward defined objectives. Schools replace the word

"Failure" with "we haven't been able to teach that to you yet." Before this can be accomplished, the school must develop an assessment capability to individualize the needs of each student matched to instruction.

THEORY OF TRANSFER

The design and sequence of learning activities affects the way information is processed & retained. Most schools rarely consider learning theory in development of their scope and sequence, but rather presume content & sequential accommodations have been made to maximize information processing. Research will focus on the Theory of Transfer as an evaluation of how specific cognitive skills influence reasoning, memory and perceptional competence. Cognitive skills may greatly affect sequential relationships *(prerequisite vs. follow-on skills)* needed to acquire a higher-level understanding of academic skill-sets. Theories of cognitive skills transfer supports research of instructional & developmental sequencing; studied as an Individualized Educational Planning approach achieved through targeted cognitive skills development.

PROFILE ANALYSIS

Profiles are formulated based upon a Nominal / Ordinal analysis model. Research focuses on identification of common cognitive, perceptional, social, performance traits within defined student groups. Currently, students are defined based upon their race / ethnicity and socio-economic status, *(required by the No Child Left Behind Act of 2001)*. This study broadens the profile analysis to include cultural, environmental, gifted, perceptual, gender as defined "Attractors." Associations are made based upon the common characteristics, facilitating profile strategies for development / remediation supported by calculated instructional designs.

INDIVIDUALIZED EDUCATIONAL PLANNING

Areas of primary concern in differentiated instruction are the effective use of classroom resources, theories of transfer, motivation, how curriculum is sequenced and aligned to student needs, how the pace of a student is determined, how student understanding is monitored to identify skill-gaps in development, etc. The study seeks to re-engineer common educational management and instructional approaches to maximize the capabilities of a longitudinal assessment design. The association of longitudinal assessments to studies of cognitive skills greatly broadens the variables analyzed, e.g. the impact of environmental factors on student achievement. This includes the identification of gifted skills, career choices, student perception and quantified measures of student determination and resiliency to achieve objectives.

STUDENT CAREER GOALS

Research focuses on identification of common academic, cognitive, sensory-motor skills and traits within defined career fields, identifying appropriate developmental tracts based upon the skills needed for career proficiency. These skills are tracked separately, providing a sovereign rating criterion for career oriented competencies based upon outcome ratings independent of the school's primary student achievement requirements. As a measure of intrinsic motivation, these areas illustrate a higher level of student interest and may recognize special talents / interests. Accompanying efforts should be made in creating new public visions to include research into shaping students' perceptions of the future and their place in it.