Conducting Fluency Research:
Topics, Tools, Designs

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An Abbreviated History of the Thermometer
and Measuring Human Body Temperature

(An example of the process of standardizing measurement units & instrumentation)

"The first thermometer was made . . . .in 1593 by Galileo . . . Galileo's instrument was called a 'thermoscope,' and it wasn't very accurate."

The first accurate thermometer was developed in 1641, it used alcohol.

German physicist Gabriel Fahrenheit developed the mercury thermometer in 1714.

Fahrenheit also developed the Fahrenheit temperature scale establishing three fixed temperatures:
- 0° - freezing point of salty water
- 32° - freezing point of pure water
- 96° - temperature of human body

German physician Carl Wunderlich published a study in 1868 establishing the range of normal body temperature from 97.2° to 100.4° with 98.6° as the average (based on placing a mercury thermometer under the armpits of 25,000 healthy people).

Phillip Mackowiak, an infectious disease specialist, in 1992 established the range of normal body temperature from 96° to 99.9° with 98.2° as the average (based on placing electronic thermometers under the tongues of 148 healthy people).

Mackowiak tested a thermometer used by Wunderlich and found it was calibrated too high, likely explaining the number differences.

(Swedish astronomer Anders Celsius in 1742 introduced the Celsius scale which established 0° degrees as the freezing point of pure water and 100° as the boiling point of pure water.)

POSSIBLE RESEARCH AREAS & QUESTIONS
RELATING TO SCREENING/ASSESSMENT

[Possible sub-categories: instructional placement, screening, assessment (diagnostic), on-going monitoring/ decision rules, program effectiveness.]

Vital Signs

What are the vital signs of functional/behavioral health? What are the behaviors that define a person as a competent member of their community?

What are the proficiency (fluency) standards for those vital signs? (i.e. related to REAPS)

What are the "speed limits" (physiological ceilings) for the vital signs? What happens to behavior as we reach these limits? (e.g. Does accuracy breakdown?)

Path Analysis

Which paths through the chunks, skills and abilities are most efficient in achieving vital sign proficiency (fluency)?

Is there a best path for most learners for achieving vital sign proficiency (fluency)?

Calibration

What level of calibration provides the best cost-benefit results (i.e. balance of precision & practicality) ?

How do celeration values vary based on calibration level? (e.g. digits vs. problems, words vs. pages, completing tasks vs. jobs)

Instructional Placement

What procedure(s) for instructional placement is most effective in maximizing learning? (e.g. performance based - frequency snap shots; learning based - try three; combination)

Screening

What are the 3 - 5 channel combinations that are most fundamental to academic success (e.g. see-say, think-write)? to social success (e.g. hear-say)?

How strong is the inverse correlation between correct and error frequencies?

Assessment (Diagnostic)

What are the channel combinations to assess and in what sequence, after the 3-5 monitored for screening purposes?

On-Going Monitoring/Decision Rules

What are the celeration norms (e.g. by months of age) for various skills and abilities?

Should developmental norms be used in intervention change and resource allocation decisions ?

Objective/Subjective Relationship

What is the relationship between observer/manager (e.g. parent, teacher, supervisor) impressions regarding improvement and actual improvement (i.e. as measured by frequency/celeration) ?

How does the relationship change as the manager uses more frequency/celeration data ?

Program Effectiveness

What is the difference in average learning (determined through learning picture collections) of programs which emphasize fluency vs. those which do not?

Folder: ABA
File: Poss Q Screen/Assess.

Education's House of Essential Abilities

The

Goals of Education

involve learning to be successful in the

Activities of Daily Living
(at home, at work and in the community)

Higher Order Abilities

Creating Abilities
Critical Thinking Abilities
Knowledge Usage Abilities
Information Management Abilities
Social Interaction Abilities

Basic Abilities

Communication Abilities
(listening, speaking, reading, writing,
mathematics, artistic expression, daily actions)

Foundation Skills

The Foundation Skills are the building blocks
necessary to perform the basic abilities.
(For example, penmanship and spelling
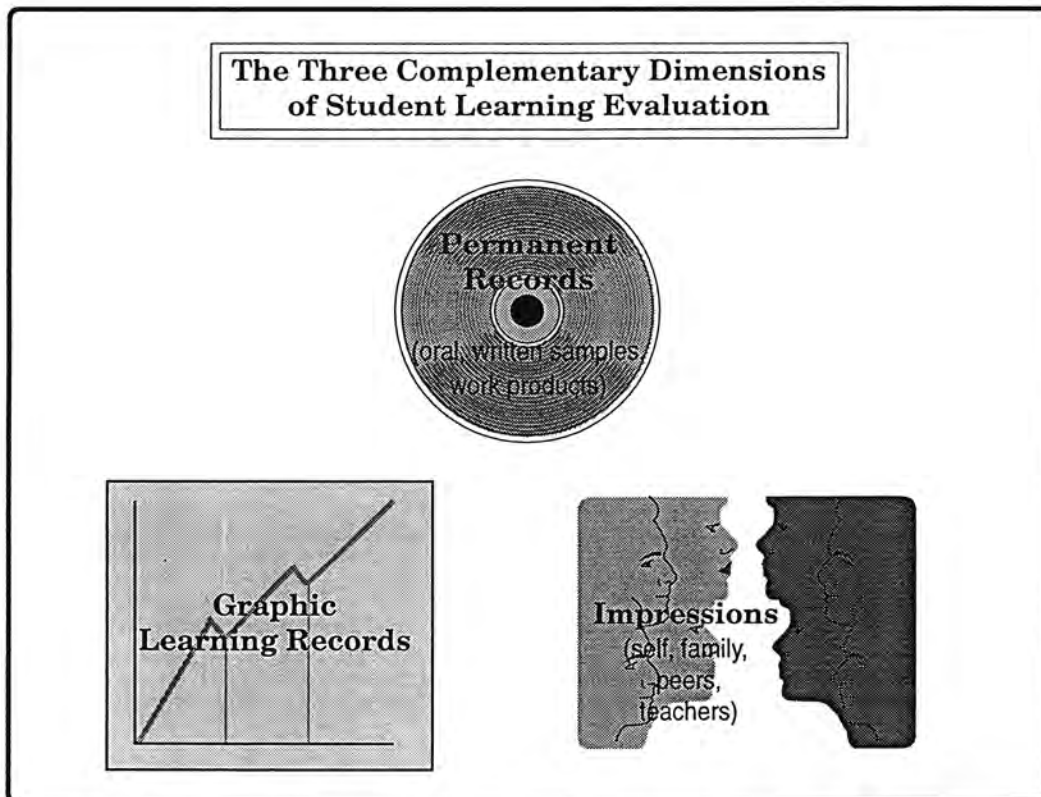are foundation skills for effective writing.)

Essential Ability Metrics and Proficiency Standards

Ability	Metric (action to count & time)	Proficiency Standard
Speaking*	words spoken/minute (correct/incorrect)	250-150 words correct/minute (with only random error)
Reading • orally*	words read orally/minute (correct/incorrect)	250-150 words correct/minute (with only random error)
• silently	words read silently/minute (correct/incorrect)	900-350 words correct/minute (with only random error)
Writing	words written/minute (correct/incorrect)	40-30 words correct/minute (with only random error)
Social Interactions*	social interactions/minute (correct/incorrect)	100% social interactions correct/minute (with only random error) (non-violent and non-coercive)
Demonstrating Thinking* (Comprehension) (Content Knowledge)	words spoken/minute (correct/incorrect) [units of information (correct/incorrect)]	250-150 words correct/minute (with only random error) (30-20 units of correct information/minute with only random error.)
Completing Tasks	tasks completed/minute (correct/incorrect)	100% tasks completed correct/minute (with only random error)

* **Note:** The central importance of oral language to these four abilities.

EVALUATION

Three complementary dimensions of student learning evaluation enable us to determine whether satisfactory learning is occurring. These dimensions are depicted in the diagram below:

The Three Complementary Dimensions of Student Learning Evaluation

Permanent Records
(oral, written samples, work products)

Graphic Learning Records

Impressions
(self, family, peers, teachers)

Permanent records allow all members of the educational community to see and hear educational progress. The graphic learning records directly display change in student performance thus providing an alternative to test scores and assisting in decision making. More holistic impressions from the student, the family, peers and teachers complete the evaluation picture.

Our proposal is to develop a student learning evaluation system, for the essential ability areas, based on these three dimensions. The intent is to ensure that all school and community members are able to understand and communicate about student progress.

The determination of whether programs are effective will be based on summarizing this information to determine whether consistent learning of the essential abilities is occuring for all students.