



**PROFILE OF THE
DATA LITERATE
EDUCATIONAL LEADER**
(Based on the work of
Earl and Katz, 2006)

**Habits of Mind/ Data
Literacy/ Quality
Planning**

**Essential Skills to
Connect Data to
Classroom Instruction**

(K-12)



COMPONENT	DESCRIPTOR
HABITS OF MIND	
<i>Leaders who use data productively have a mind set of being in charge of their own destiny, always needing to know more and creating or locating knowledge that will be useful to them along the way.</i>	
VALUES DEEP UNDERSTANDING <i>Leaders with an inquiring habit of mind do not presume an outcome; instead they allow for a range of outcomes and keep searching for increased understanding and clarity.</i>	<ul style="list-style-type: none"> Reserves judgement and has a tolerance for ambiguity Collects and interprets evidence in ways that advocates understanding Willingness to live in dissonance long enough to investigate until there is clarity Has a deep understanding of the district assessment literacy framework and how it can connect to teacher practice and student learning
POSES INCREASINGLY FOCUSED QUESTIONS <i>Data almost never provides answers. Instead, using data usually leads to more and more focussed investigation and to better questions.</i>	<ul style="list-style-type: none"> Uses data to focus investigations Formulates focussed questions for PLC meetings Formulates focussed questions as part of the Literacy Walks process with teachers Uses focussed questions to further the investigation process and to collect meaningful data Uses the same common assessment as other schools
DATA LITERACY	
<i>Data attracts public attention. In order to face challenges and present arguments to their audiences, leaders must be able in collecting, analysing, and interpreting data.</i>	
PURPOSEFUL DATA COLLECTION <i>Leaders realize that they need different data for each purpose.</i>	Requires specific data when: <ul style="list-style-type: none"> reading the vital signs of the school setting priorities considering changes assessing existing initiatives
DATA QUALITY RECOGNITION <i>Leaders know enough about statistics to recognize and form honest and useful conclusions.</i>	<ul style="list-style-type: none"> Is confident that data provides consistent and stable information Uses data to measure what is to be understood Understands data reference points Uses a wide variety of data reference sources
STATISTICAL AND MEASUREMENT CONCEPTS <i>Leaders have a responsibility to understand the principles that underlie statistics.</i>	<ul style="list-style-type: none"> Understands the difference between causality and correlation Understands the strength, weakness, limitations and usefulness of both qualitative and quantitative data Uses a wide variety of data to support conclusions
DATA INTERPRETATION <i>Leaders exercise the opportunity presented by data to view phenomena through different lenses, to present hypotheses, and to challenge beliefs.</i>	<ul style="list-style-type: none"> Suspends beliefs in light of evidence Uses data to formulate new questions Is curious and cautious about issues raised by the data
DATA REPORTING <i>Leaders use data to explain their decisions to their audiences.</i>	<ul style="list-style-type: none"> Builds a culture of inquiry through data Reports accurately rather than confirming comfortable truths Uses data to engage different audiences Uses data to help demonstrate moral courage
QUALITY PLANNING	
<i>In order to achieve quality planning process, leaders must create a 'culture of inquiry' in their schools. Leaders must create the conditions under which data becomes an integral part of the decision making process in their schools. Leaders help to build lateral capacity in their school with a focus on results.</i>	
INVOLVEMENT OF OTHERS <i>Leaders contribute to a culture of inquiry by providing opportunities for others to become inquiry-minded and data literate.</i>	<ul style="list-style-type: none"> Convincing others to engage with data Making the data the initial focus of PLC meetings Facilitating data literacy in others Using data as a vehicle for planning and decision-making with input from others Instilling a sense of 'urgency' in others as a way of unleashing energy Facilitates learning using job-embedded strategies Use of common data allows people to learn from one another
PLANNING BASED UPON DATA ANALYSIS <i>Making sense of data and constructing meaning from it is not an overnight event. Schools are going to need time, focus, energy, vision and an opportunity for external feedback in order to plan effectively.</i>	<ul style="list-style-type: none"> Creatively making time in order to work with data and discuss important issues Organizing data and assessment planning based upon the district assessment framework Formulation of action plans based upon interpretation of data Using data as a focus for school improvement plans SMART goal setting Decision-making based upon data Use of 'critical friends' in order to look at data and/ or planning from a different lens

COMPONENT	AWARENESS	BEGINNING PRACTICE	ROUTINE PRACTICE	REFINEMENT
HABITS OF MIND				
VALUES DEEP UNDERSTANDING	Collects data mandated by the district based upon the assessment framework, making no judgement about the quality or results of the data.	Collects data mandated by the district, looking critically at results, predictions, patterns and the validity of the data.	Collects data mandated by the district looking critically at results, predictions, alignment with school and district goals, and questioning whether the available data is the best source and if it can be supplemented. Postulates a number of different reasons for data results.	Collects data mandated by the district as well as other sources in order to gain a deeper understanding. Keeps an open mind regarding results and reserves judgement until satisfied that there is sufficient evidence.
POSES INCREASINGLY FOCUSED QUESTIONS	Wonders to oneself about the reasons for the results. Generally occurs at critical data points during the school year.	Addresses results collected at critical points in the school year at staff meetings. Is willing to accept broad generalizations for rationale behind results.	Poses questions at staff meetings, division meetings, PLC meetings and teacher meetings that become more specific regarding results of data collection.	Data is the focus of all meetings with staff. Data questions lead to further investigation and more data collection. Discusses data in Literacy Walks process allowing teachers to think about and talk about what they are doing and why.
DATA LITERACY				
PURPOSEFUL DATA COLLECTION	Manages school planning and decision making based upon preconceived notions and past practice. Collects only data required for reporting.	Conducts occasional data assessments but only when circumstances require. Looks for one or two key indicators of school performance using one or two sampling methods. Recognizes the difference between qualitative and quantitative data.	Uses a variety of data types to provide evidence for understanding the vital signs of the school and how well existing programs are working. Uses questionnaires and several sampling methods.	Always collects data whenever significant school planning choices are to be made or when assessing school programs or performance. Is knowledgeable and critical of questionnaire design. Selects sampling methods from random, cluster, stratified, quota, or universal.
DATA QUALITY RECOGNITION	Recognizes that discussions about school often involve citing data as evidence. Knows that some of that evidence may be faulty, irrelevant or shallow. Is able to read simple charts or graphs that show data distribution.	Knows the significance of local and global data in some areas- standardized testing for example. Is able to draw some comparisons and conclusions based upon reference points. Recognizes the difference between primary and secondary data sources.	Judges in self and others the connection between data used as evidence and conclusions being drawn. Asks critical questions about data sources and manipulation. Is able to interpolate and extrapolate from data.	Confidently and correctly connects data sources to the issues being examined. Rejects arguments based on preconceived notions only. Is able to refine others' conclusions by examining local data. Detects weaknesses in studies by identifying distorted data presentation, biased data sources, or poor sampling techniques.
STATISTICAL AND MEASUREMENT CONCEPTS	Knows that different data sources are available. Uses either pre-conceived notions or limited data sources to support planning. Is aware that statistical studies may be flawed. Knows one or two ways to measure central tendency (mean, median or mode).	Can identify limitations in statistical studies. Uses one or more data sources regularly when focussed on school issues. Knows the strengths and weaknesses of measures of central tendency. Recognizes normal distribution and can determine data spread using range and standard deviation.	Views statistical studies critically and understands the underlying methodology. Knows the difference between causality and correlation and the significance of kinds of correlations. Recognizes that several data sources, both qualitative and quantitative are required to support strong conclusions. Understands the properties of normal and other (bimodal or multimodal) distributions.	Can judge whether an argument based upon data is sound or unsound, and knows how to correct it. Ties several data sources- whether qualitative or quantitative- to the issue under discussion. Is able to evaluate the quality of data by calculating measures of central tendency and spread. Knows how to measure correlation and its significance.
DATA INTERPRETATION	Relies on existing belief systems almost exclusively in decision making. Asks few questions of others or to self. Does not easily imagine a decision system beyond innate judgement. Does not usually share data with others.	Is able to draw the connection between statistical studies and own practice and school. Recognizes evidence that will challenge belief systems but does not seek it. Shares data with others but holds conversations about that data rarely. Presents data using simple graphs and charts.	Questions beliefs when confronted with contrary evidence. Regularly presents data to others for critical conversation and deeper questions. Sometimes demonstrates knowledge of data manipulation and is able to demonstrate averages and trends to others. Understands percentile distributions of a population.	Uses critical conversations with others as a regular tool in the decision-making process. Raises questions and refines beliefs based upon evidence and expects others to do the same. Regularly demonstrates knowledge of sophisticated data manipulation by drawing conclusions based upon analysis. Is able to demonstrate distributions and correlations to others. Is able to calculate percentile distributions of a population.
DATA REPORTING	Communicates with audiences routinely, but mostly repeating pre-conceived notions.	Uses data to raise questions with the leadership team. Presents evidence to others on a need to know basis. Data is presented in broad, generalized ways.	Engages staff in conversations about the school that are raised by data. Encourages staff to face the facts that are supported by the evidence – even though the facts may be uncomfortable. Educates the staff in order to be able to use different kinds of data in their conversations. Data is usually presented in ways best suited to the information. Relies on lists, graphs and charts.	Is able to present issues and understandable evidence to many audiences in many ways. Encourages and accepts evidence from all members of the school community that can refine and deepen the belief system of the school. References data distributions, averages and correlations routinely and offers explanations as required. Invites critical analysis of data by the audience.
QUALITY PLANNING				
INVOLVEMENT OF OTHERS	Makes connections between school improvement planning and data. Communicates plan and goals to stakeholders in the school community for feedback.	Seeks feedback and interpretation from others on mandated data collection. Uses the feedback to plan for school improvement and set goals.	Encourages others to analyze the data of mandated assessments and set SMART goals for student achievement. Uses the feedback and analysis for school improvement planning.	Encourages others to collect and analyze data above and beyond that mandated by the district. Staff become data literate with data being the focus of meetings. SMART goals and plans are directly tied to data and feedback from staff with major decisions being made based upon the data and staff involvement.
PLANNING BASED UPON DATA ANALYSIS	Data is analyzed by the principal and perhaps discussed at critical times with little or no plans for follow -up at the school level.	Data is analyzed by the principal and discussed at regular meetings. Action plans based upon the data are formulated and incorporated into school improvement plans.	Principals creatively make time to discuss data with staff on a constant basis. Data is the focus for SMART goals and school improvement planning and decisions are made as a staff based upon the data.	Data is a major focus at all professional meetings that occur regularly during the school year. Decisions and plans are made based upon data, and staff are data literate and are encouraged to seek other sources of data. The principal seeks the advice of critical friends on a regular basis.

REFINEMENT CHECKLIST

The following checklist gives specific examples of things leaders know and are able to do in the refinement stage in each of the components of the profile. Use the checklist to self assess and plan for growth.

HABITS OF MIND	
VALUES DEEP UNDERSTANDING	<ul style="list-style-type: none"> ✓ I have identified and communicated a purpose for the collection of data ✓ I have made others aware of the role they will play ✓ I know and have charted the audience for whom possible changes will involve and effect ✓ I do not draw conclusions from the data collected until sufficient evidence is available
POSES INCREASINGLY FOCUSED QUESTIONS	<ul style="list-style-type: none"> ✓ I ask myself "what other data can we collect?" ✓ I ask myself and my staff "what do we already know?" ✓ I have talked to others about where we want to go ✓ We have brainstormed a list of 'possible futures' ✓ These questions and other data-related questions form the basis of all PLC meetings
DATA LITERACY	
PURPOSEFUL DATA COLLECTION	<ul style="list-style-type: none"> ✓ I collect data whenever important choices need to be made ✓ I survey in a purposeful way using high quality questionnaires and appropriate sampling techniques ✓ I routinely use a mix of qualitative and quantitative data sources
DATA QUALITY RECOGNITION	<ul style="list-style-type: none"> ✓ I evaluate other's conclusions by examining their data in a critical way ✓ I am able to form balanced conclusions by comparing local and global data trends ✓ I routinely challenge decisions and arguments that are based solely on pre-conceived notions
STATISTICAL AND MEASUREMENT CONCEPTS	<ul style="list-style-type: none"> ✓ I can use a spreadsheet or a graphing calculator to investigate the distribution patterns (including averages, standard deviation, range and percentiles) in a one variable statistical study ✓ I can use a spreadsheet or a graphing calculator to investigate the correlation of two data variables, and I understand the result
DATA INTERPRETATION	<ul style="list-style-type: none"> ✓ I can draw reasoned conclusions from raw data based upon my own analysis ✓ I use data-driven conclusions to help me make decisions and to refine my own and other's pre-conceived beliefs ✓ I use my analysis to formulate deep questions about trends in individual student and whole school performance
DATA REPORTING	<ul style="list-style-type: none"> ✓ I use data whenever possible to clarify trends in student and school performance ✓ I routinely explain to my audience how the data 'works' ✓ I always invite others to challenge my analysis and to suggest new questions that emerge from the data
QUALITY PLANNING	
INVOLVEMENT OF OTHERS	<ul style="list-style-type: none"> ✓ I share data with others regularly ✓ We discuss the interpretation of the data and come to a consensus on the results ✓ I facilitate data literacy in others ✓ I provide time for others to work with data in PLCs ✓ I make data a focus in all meetings ✓ I involve others in data-based discussions
PLANNING BASED UPON DATA ANALYSIS	<ul style="list-style-type: none"> ✓ I use data to generate school improvement plans ✓ I have created teams in the school to work on SMART goals generated by our data collection ✓ I collaborate with a 'critical friend' regarding our data and planning regularly

Glossary of Terms

Achievement- The demonstration of student performance measured against learning goals, learning objectives or standards.
Accountability- The act of being responsible to someone else or to others. It also means capable of being explained.
Assessment- Gathering and interpretation of student performance, primarily for the purpose of enhancing learning. Also used for the improvement of a program and/or strategies.
Benchmark- A standard against which something can be measured or assessed.
Causality - When one thing causes another. This is not correlation which measures how two things move together, possibly both caused by a third factor.
Cohort- A group of individuals sharing a particular statistical or demographic characteristic, such as the year they were in a specific school grade level. Following cohorts over time helps teachers understand the effects particular circumstances may have on results. Matched cohort studies follow the same individuals over time, and unmatched cohort studies follow the same group over time.
Continuous Improvement- Keeping the process of planning, implementing, evaluating and improving alive over time.
Control Groups- Control groups serve as a baseline in making comparisons with treatment groups and are necessary when general effectiveness of the treatment is unknown. During an experiment, the control group is studied the same as the experimental groups, except that it does not receive the treatment of interest.
Correlation- A statistical analysis that helps one see the relationship of scores in one distribution to scores in another distribution. Correlation coefficients have a range of -1.0 to + 1.0. A correlation of around zero indicates no relationship. Correlations of .8 and higher indicate strong relationships. Caution should be exercised in drawing conclusions about correlations between -0.5 and +0.5. Correlation is not causality.
Criterion-Referenced Tests- Tests that judge how well a test taker does on an explicit objective, learning goal, or criteria relative to a pre-determined performance level. There is no comparison to any other test takers.
Data Mining- Techniques for finding patterns and trends in large data sets. The process of automatically extracting valid, useful, previously unknown, and ultimately comprehensible information from large databases. Just doing common data analysis is not data mining.
Database- A storage mechanism for data that eliminates redundancy and conflict among multiple data files. Data is entered once and is then available to all programs that need it.
Diagnostic- Assessment/evaluation carried out prior to instruction that is designed to determine a student's attitude, skill or knowledge in order to identify specific student needs.
Educationally Significant- Gains in student achievement, school or program results can be considered educationally significant, even though they are not statistically significant.
Evaluation- Making judgement about the quality of overall student performance for the purpose of communicating student achievement. Evaluation also is the study of the impact of a program or process.
Extrapolation- When an educated guess is made regarding data outside the range of the study (eg. Measure the height of grade 3 students and speculate on their heights in grade 9). Extrapolation should be used with extreme caution.
Formative- Assessments at regular intervals of a student's progress, with accompanying feedback in order to help the student's performance and to provide direction for improvement of a program for individual students or for the whole class.
Goals- Achievements or end results. Goal statements describe the intended outcome of the vision and are stated in terms that are broad, general, abstract, and non-measurable. Schools should have only two or three goals.
Histogram- A bar chart that shows the population distribution in a single-variable study. When a study is large and there is lots of data, a histogram may be conveniently changed to a distribution curve.
Interpolation -When an educated guess is made regarding data that is unknown but within the range of the study. (eg Measure the heights of grade 3 students, then repeat in grade 6. Speculate on their heights in grade 5).
Mean- Average score in a set of scores; calculated by summing all of the scores and dividing by the total number of scores.
Median- The score that splits a distribution in half; 50 percent of the scores lie above and 50 percent of the scores lie below the median. If the number of scores is odd, the median is the middle score, if the number of scores is even, one must total the two middle scores and divide by two to calculate the median.
Mission- A brief, clear and compelling statement that serves to unify an organization's efforts. A mission has a finish line for its achievement and is proactive. A mission should walk the boundary between the possible and impossible.
Mode- The score that occurs most frequently in a scoring distribution.
Needs Assessment- Questions that help staff understand their professional development needs. At the same time, if done well, this assessment can lead to quality staff conversations and sharing of knowledge.
Normal Distribution- A symmetric, bell-shaped curve formed from the population distribution in a single-variable study of a large population. This distribution is often assumed for the purposes of statistical analysis of a sample of the population.
Norm-References Test- Any test in which the score acquires additional meaning by comparing it to the scores of people in an identified norming group. A test can be both norm- and criterion-referenced. Most standardized achievement tests are referred to as norm-references.

Glossary of Terms

Norms- The distribution of test scores and their corresponding percentile ranks, standard scores or other derived scores of some specified group called the norming group. For example, this may be a national sample of all fourth graders, a national sample of all fourth grade males or perhaps all fourth graders in some local district.

Observation- Teacher and observer agree on what is being observed, the type of information to be recorded, when the observation will take place, and how the information will be analyzed. The observee is someone implementing strategies and actions that others want to know. Observer might be a colleague, a supervisor or a visitor from another location.

Percentile- A point on the normal distribution below which a certain percentage of the scores fall. For example if 70 percent of the scores fall below a raw score of 56, then the score of 56 is at the 70th percentile. The term *local percentile* indicates that the norm group is obtained locally. The term *national percentile* indicates that the norm group represents a national group.

Percentile Rank- Percentage of students in a norm group (e.g. national or local) whose scores fall below a given score. Range is from 1 to 99. A 50th percentile ranking would mean that 50 percent of the scores in the norming group fall below a specific score.

Performance Assessment- Refers to assessments that measure skills, knowledge and ability directly- such as through performance. In other words, if you want students to learn to write, you assess their ability of a writing activity.

Population- Statisticians define a population as the entire collection of items that is the focus of concern. Descriptive Statistics describe the characteristics of a given population by measuring each of its items and then summarizing the set of measures in various ways. Inferential Statistics make educated inferences about the characteristics of a population by drawing a random sample and appropriately analyzing the information it provides.

Qualitative Data – Data that consists of names and descriptions. This kind of data is often found in surveys and questionnaires that ask individuals to give opinions or preferences.

Quantitative Data – Numerical data. This kind of data is either discrete (eg. The numbers that can appear on the face of a die) or continuous (eg. The height of grade 4 students).

Range- A measure of the spread between lowest and highest scores in a distribution, calculated by subtracting the lowest score from the highest score.

Raw Scores- A person's observed raw score on a test or subtest. The number of questions answered correctly on a test or subtest. A raw score is simply calculated by adding the number of questions answered correctly.

Reliability- The consistency with which an assessment measures what it intends to measure.

Rubric- A scoring tool that rates performance according to clearly stated levels of criteria. The scales can be numeric or descriptive.

Sample- A relatively small amount of data taken from a large population. To be useful it must be unbiased and purposeful. There are several methods of sampling, depending upon the nature of the study.

School Portfolio- A professional development tool that gathers evidence about the way work is done in the school and a self assessment tool to ensure alignment of all parts of the learning organization to the vision. A school portfolio can also serve as a principal portfolio.

Standard- A guideline or description that is used as a basis for judgement. Exemplary performance; an objective ideal; a worthy and tangible goal.

Standard Deviation- Measure of variability in a set of scores. The standard deviation is the square root of the variance. Unlike the variance, the standard deviation is stated in the original units of the variable. Approximately 68 percent of the scores in a normal distribution lie between plus one and minus one standard deviation. The more scores cluster around the mean, the smaller the variance.

Standardized Tests- Tests are uniform in content, administration, and scoring. Standardized tests can be used for comparing results across classroom, schools, school districts and provinces.

Standards- Consistent expectations of all learners.

Statistically Significant- Statistical significance indicates that there is at least a 95% probability of the result that did not happen by chance.

Student Achievement Data- Information that reflects a level of knowledge, skill or accomplishment, usually into something that has been explicitly taught.

Summative- Assessment or evaluation designed to provide information. Used in making judgements about a student's achievement at the end of a period of instruction.

Triangulation- The term used for combining three or more student achievement measures to get a more complete picture of student achievement.

Validity- The degree to which an assessment strategy measures what it is intended to measure.

Variance- A measure of the dispersion, or variability, of scores about their mean. The population variance is calculated by taking the average of the squared deviations from the mean- a deviation being defined as an individual score minus the mean.

Vision- A specific description of what the learning organization will be like when the mission is achieved. A vision is a mental image. It must be written in practical, concrete terms that everyone can understand and see in the same way.