

The Optimal Reference Guide:
Actions Speak Louder than Data

Extraordinary insight into today's education information topics

By Glynn D. Ligon, Ph.D., ESP Solutions Group
With a foreword by Barbara S. Clements, Ph.D., ESP Solutions Group



ESP Solutions Group

Table of Contents

Foreword.....	3
Introduction: Time to Change our Mind(set).....	5
Types of Reports.....	6
Data are NOT Actionable	7
The Action Report Taxonomy	10
Interpreting and Using Action Reports	11
Actions	12
Student Performance Reports.....	13
Conclusion	15
Attachment A: D3M Action Reports™	17
Attachment B: Decision Question Matrix for Student Performance Measures	23



Foreword

By Barbara S. Clements, Ph.D.

This Optimal Reference Guide represents a return for ESP to its roots. The first ESP product, SuccessFinder™, was a software application that conducted sophisticated analyses of student performance data. Apparently, in 1991 it was “ahead its time” because a big seller it was not. Everyone who heard about SuccessFinder said that it must be an excellent product because Glynn Ligon developed it, and he knows so much about data analysis and reporting. But eventually we shelved the product, though not what we learned in building it.

An important thing we learned in trying to market SuccessFinder was that most potential users (i.e., school districts or state education agencies) did not have the data they needed to use the application or they did not trust the data they had. It became clear to Glynn and his ESP colleagues that the data infrastructure in school districts and state education agencies needed substantial work before the data could be appropriately used.

In a decision support system project we did for the U.S. Department of Education’s Office of the Chief Information Officer, we had the opportunity to look at what states and school districts were doing with their data, and how the data were being used. Despite seeing how much data were being collected, we rarely saw any “actionable” reports being produced. One school district showed us how they had learned that attendance was down on the day before a holiday and on Fridays in general. But they couldn’t tell us how they were using those data. And so it went.

Well, now a substantial amount of work has been done on the data infrastructure in school districts and state education agencies around the nation. More data are being collected primarily in individual student records, which offer more flexibility for analysis. In addition, much work has been done on the quality of the data being collected. So maybe it’s time to drag out what we have learned about developing reports from the data and help educators make more appropriate decisions about students and schools.

In this paper, Glynn has not only dusted off and presented what we learned with our SuccessFinder experience, but also provided a more insightful and extensive understanding of how education data can be used effectively by educators. As usual, he is ahead of his time.



Introduction: Time to Change our Mind(set)

When I was a school district employee responding to *ad hoc* requests for information from principals, superintendents, and parents, I was struck by how many times the requestors didn't get back what they really wanted. After tiring of re-running analyses, I realized that the requestor's mindset was turned around. Instead of walking in and asking for specific data, they should have been telling me what they wanted to do with the data. That "aha" made life so much easier.

This Optimal Reference Guide turns around how educators are using their decision support systems. Educators look at the available data and say, "What can I learn from these data?" Instead they should be asking first, "What do I need to do that can be informed by data?"

We are doing a poor job of informing decisions with data. Certainly there are many decision support systems, reporting applications, and query tools available. However, the reports I've seen are disappointing. That's not a significant conclusion from someone who has seen demonstrations of 10 major reporting applications over the past six months.

How many ways can we disaggregate, drill down, and graph the same data? In the 21st century, educators are still limited to readily available data. How are we going to define the data we should be collecting? In the end, the majority of today's reports are still merely counts. I'm looking for more than that. Imagine reports that hit your monitor at the time an action can be taken—an action informed by the data.

 **ESP Insight**
Imagine reports that hit your monitor at the time an action can be taken—an action informed by the data.

This paper pushes us to think beyond the limits of our current data, beyond the edge of descriptive reports that display counts, all the way to relationships within the data that reveal what needs to be done. This is not simple. Groups I have worked with progress quickly from asking for tables of counts to asking for lists of students that share a characteristic that indicates action. That's leaping in the right direction. The gap between knowing there are 45 overage students who failed the mathematics assessment to getting a list of them by classroom is large...but not nearly huge enough. We need to give teachers that list with a plan of action.

Imagine getting lists of students who are likely to drop out this week because their pending report card will tell them their grades are so low that they must make all A's for the first time in their lives next reporting cycle or they will fail too many classes to graduate. Why should these students stay through Monday? Why should they come back next fall?

Imagine getting an alert through the education portal on your monitor that the new student who is coming down the hallway to enter your classroom has a hearing loss in the right ear and needs to sit on your left side in the classroom, or has to take a retest of the state assessment in reading next week because three specific standards were not met on the last assessment, or excels in group work rather than individual tasks.

This paper defines a framework for designing and producing action reports. An action report is one that informs the user of an opportunity or a requirement and



suggests what action should be taken. This action report framework does not ignore the reality that many of our reporting requirements are to comply with legal or funding mandates or to simply publish information in a profile.

Types of Reports

The action report framework developed is based upon a taxonomy of five report types. Don't be confused by the use of the word action associated with some reporting that is not traditionally considered very action oriented. I will propose that even filling out a required compliance report is an action. Even creating an annual statistical report or profile is an action. These are not as exciting as reports that reveal which reading program produces greater gains, but they are significant duties in the education world and must be fulfilled responsibly.

The report types are:

1. **Decision:** A judgment is required about the appropriate action to take.

This is what data driven decision making (D3M) is all about. There may be no law, policy, directive, or requirement that demands the decision maker use real data, but a professional knows that the best decisions are informed ones.

2. **Compliance:** A report is required to meet a mandate.

These are the reports that try our patience. The requirements are established by someone else, and the burden to create the report is high. They have to be done to get funding, be accredited, or follow a law.

3. **Profile:** A descriptive report is provided (school report card, web profile).

At times, people just want information. School profiles have become common, basic statistics appear on web sites, and general information that is frequently requested is made handy.

4. **Analysis or Ad Hoc Query:** An unanticipated request or a research/evaluation question is answered.

The nature of *ad hoc* analyses is that we do not anticipate the need for them—or we do not have the resources or time to prepare for them in advance. Research and evaluation questions may be one-time events or too sophisticated to put into a scheduled production mode.

5. **Audit:** A statistical report or list is needed to monitor the functioning of a system or process.

At times we just need to know if something is working well. Financial processes are not the only ones that require us to monitor transactions frequently.

How do these types overlap? We should not get too focused on the taxonomy. In fact, the action framework developed and described here relies more on your

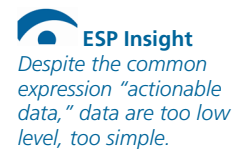


requirements for an individual report than it does on the type of report. The same data may inform all five types of reports. The formatting of the report, the access media, and the timing of each report is influenced by the type.

A report can mix purposes and types. However, especially with decision reports, delivering a simple message is helpful to the user. Producing more, single-purpose reports rather than combining purposes for a report with extensive information is recommended. This simplicity also provides a report design that better targets giving a specific audience only the information appropriate. This targeting results in reports that are easier to interpret and use.

Data are NOT Actionable

We can all agree that data are not actionable. Despite the common expression “actionable data,” data are too low level, too simple. We need action reports. However, even more specific, we need indicators on those reports that represent the information that really informs our decision. Then beyond the indicator, we need to establish thresholds on the indicator that determine the action required at each level measured by the indicator.



This paradigm led to the development of a logical process, which is called the **D3M Action Report Framework™**. There are 10 steps that lead us from the statement of an action to be taken through the production of a report that informs that action.

1. Describe a decision, compliance requirement, profile need, analysis desire, or audit need.

One of the most essential insights we were taught in our graduate inferential statistics courses was that every experiment must begin with a clear statement of the question to be answered. This is even more essential in the real world because we are too often accepting of available data or statistics rather than independently determining the data we actually need.

2. Define an indicator.

Indicators give us quick guidance for forming opinions. Indicators are data points that inform our judgment about the status of an entity (e.g., individual, program, or organization). We rely upon indicators to give us facts—even if those facts are representations of opinions from surveys.

3. Set a threshold.

The threshold sets the level on the indicator at which action is needed. There may be multiple thresholds, all indicative of different actions.

4. Identify the required data elements.

The indicator and the threshold determine what data are required. The data must be operationally defined in the organization’s data dictionary.

5. Identify the data collection that gathers the required data.

Within an organization, the identified data must be collected to match both the operational definition and the periodicity required to determine levels on the indicator.

6. Identify the data repository that is the authoritative data source for the required data.

There must be an available, trustworthy, and authoritative source for the required data. To authenticate the quality of the data, the provenance of the data must be established. For those who do not watch the phenomenon called “The Antiques Roadshow,” but view instead any one of a dozen legal dramas, the data equivalent of provenance is chain of possession. Who or what system has handled the data from its initial entry through all the exchanges to a final authoritative data store from which an action report will be produced?

7. Describe the Action Report™ to be generated to inform the action.

To plan for the production of the actual report, several characteristics must be known. These include the report’s title, periodicity (schedule), office responsible, media, confidentiality level, etc.

8. Determine the action to be taken at each threshold on the indicator.

This is the step where the process goes beyond the typical report. This is where an action report is differentiated from a compliance report or profile. Each threshold level that has been identified needs to be aligned with the action that needs to be taken.

9. Design the output format for the report.

I often caution educators to begin with the report they eventually want to see. However, the prior eight steps are necessary to get to that report ideal. Now is the time to sketch out the actual report to be generated—in the format that supports its use.

10. Access the Action Report™.

This is the action step. The intended user of the report must get it. This can be by “push” (someone sends the report to the user) or by “pull” (the user requests the report). The point of many action reports is to alert the user that something needs to be done, not to expect the user to be aware of action needed. Therefore, pushing an action report to the user should always be the first consideration.

This process assists an organization in collecting data that are valuable—and saving the time and effort to collect less valuable data. Max Yield Data™ refers to data that everyone agrees are worth the effort to collect, store, and report. (Download the *Max Yield Data* presentation, available at <http://www.espsg.com/resources.php>.)

However, even Max Yield Data must be vetted against their value for informing a decision, determining an action, or answering a question.

One criterion for Max Yield Data is that they are required to inform a decision, specifically a decision that results in action being taken. We already debunked actionable data as a misnomer because data, in their raw form, are seldom interpretable in a decision-making situation. Statistics, metrics, analytics, and indicators are the ingredients of which decisions and actions are made. These derived values are only useful when they are presented in a report that is formatted and available at the moment it is needed and the user is ready to make a decision.

If you are like me, you've seen enough reports. Tables of numbers, often beautifully presented in graphical forms—in living color. However we can be left thinking—so much data, but so little that I would actually use to form a decision. There are several reasons that have arrived at this point. The most significant one is that we have rushed to put all the data we can find into our data warehouses without a thorough vetting of which data rate the designation of Max Yield Data.

 **ESP Insight**
*Download the Max Yield
Data presentation at
www.espsg.com.*

The Action Report Taxonomy

The five types of action reports are detailed in the taxonomy chart below.

Type	Decision	Profile	Compliance	Analysis (<i>Ad Hoc</i>)	Audit
Purpose	To trigger an action, inform a decision, or answer a question	To provide general descriptions	To meet a mandate	To answer <i>ad hoc</i> questions or inform research and evaluation	To monitor processes
Content/ Scope	Targeted for a specific response	Matched to the audience	Specified by mandating agency	Determined by research question	Metrics describing process
Audience	Individuals who are responsible for taking the action	General audiences that have a broad range of interests	Governance body	Requestor or analyst	System administrator
Media	Quick delivery media, e.g., e-mail, web portal	Stable, official media, e.g., web page, printed report	Mandated media, e.g., data file	Determined by audience	Electronic
Periodicity	Determined by when the action will occur	Determined by availability of the data	Determined by mandating agency	On demand	Continuous, on demand
Analytics	Derivation of an indicator	Statistics and text as desired	Statistics or unit records as mandated	Parametric and nonparametric inferential and descriptive statistics as appropriate	Metrics descriptive of the processes
Data Quality	Ranges from high stakes, high quality demand to soft heads up for possible issues	Court of Public Opinion	May be audited, compared to other reporting agencies	Dependent upon the practices of the analyst	Transactional data quality is imbedded in the analytics
Example Reports	Alert of Students At Risk for Dropping Out	No Child Left Behind Annual Report Card	USED Consolidated Report for Title I and Other Programs; Office for Civil Rights Report	Annual Evaluation of Alternative Reading Programs	Daily Meals Served Report for the National School Lunch Program

Attachment A is an example of an Action Report™ for a school or local education agency (LEA). There are certainly more complex indicators, thresholds, and reports than one focusing on attendance, but this example is intended merely as an illustration. For a state education agency, a more typical example may be a report that identifies students who have been reported as dropouts by one district but who show up on an enrollment report for another. Reclassifying these non-dropouts as

transfer students improves the accuracy and potentially the annual yearly progress (AYP) status of the first school.

The example in Attachment A could have been filled in using the D3M Action Report Framework™ as a template or the metadata descriptions could be entered into DataSpecs™ and the Action Report™ description generated from that database. (DataSpecs™ is a data dictionary tool developed by ESP Solutions Group to document an organization's data standards, collections, repositories, and reports.)

Interpreting and Using Action Reports

Action reports should come with consumer warnings. The reliability of the indicators, statistics, and counts should be explicit.


Type 1 errors are more desirable than type 2 errors. We create less harm over-identifying students than we do when we miss one who really needs attention.

The value added in terms of statistical significance and educational importance of the actual differences teased out by popular sophisticated techniques such as hierarchical linear models (HLM) must be clearly presented. I have seen instances where these impressive analyses are run only to provide miniscule information beyond what we already knew from more straightforward and, quite frankly, more understandable analyses.

Growth measures are becoming not only popular but politically mandatory. I would also caution that growth, as compelling as the rationale is to consider it, typically does not reverse our prior judgment of success for individual schools. In other words, a low-performing school usually is one that is delivering low growth as well. However, in this instance, we should be alert for the exceptions. Those exceptional schools that can produce academic growth within a low-performing student population are worthy of identification.

So here are some caveats I have found to be useful when interpreting reports.

- Don't discount the value of an education professional's opinion of a student's status.
- Don't make the mistake of placing too much importance on variables that make too little difference. Occam's Razor tells us that all things being equal, the simplest solution tends to be the best one.
- On the other hand, accept that the interaction of all variables might make the outcome being predicted almost impossible to know.
- Don't place too much trust in averages. A subgroup's average assessment score may not have been made by any single student in the school.
- Look for the quiet, forgotten student who is not being engaged or involved by any teacher, staff member, or other students. That student may be at risk regardless of never being on an action report.
- Perpetual bubble students who do not fall into any one risk category may on balance be at risk.
- If a variable is not measured very precisely, then it likely is adding noise not clarity in a data driven decision making process.
- Given these incomprehensible limitations, don't give up on data.

 **ESP Insight**
*HLM may only tease out
miniscule information
beyond what we already
know.*

 **ESP Insight**
Don't give up on data.

Over the years, I have read and participated in setting numerous strategic goals—aligned with an organization’s mission. If I were to nominate the most representative goals from across all these efforts, they would be translated into these indicators of success for students.

- What is the quintessential indicator for education organizations?
 - Graduation from high school
- What is the penultimate indicator?
 - Enrollment in higher education
- What is the societal indicator?
 - Graduates who are productive citizens

The importance of indicators in the action report arena cannot be overstated. Analyzing indicators, however, is beyond the scope of this paper. A second Optimal Reference Guide will follow with a thorough analysis of education indicators.

Actions

In all the discussions of and calls I’ve heard for actionable data, I’ve never seen a list of actions someone needs to take when the data are available. So, on a recent flight, I began making a list of over 100. When I scanned this list, the first thought I had was, “Some of these questions demand different data than we find in the standard data warehouse. Some of those data are not even collected by most information systems.”

To ensure that we do not restrict our thinking of action reports to assessment and enrollment data, I’ll point out that our school systems are some of the largest employers, food service providers, transportation systems, facilities managers, financial institutions in the nation. Action reports definitely encompass the administrative services of a school system as well as the instructional services.

There are a surprising number of verbs that describe the action educators take. A few are...

1. Deciding
2. Recommending
3. Approving
4. Choosing
5. Selecting
6. Determining
7. Assigning
8. Aligning
9. Identifying
10. Alerting
11. Fixing
12. Voting
13. Forming (an opinion)
14. Counseling
15. Disciplining
16. Honoring
17. Scheduling
18. Presenting

19. Writing (a report)
20. Grading (an assignment, determining promotion, determining graduation eligibility)
21. Reporting (compliance)
22. Describing (profiling)
23. Researching
24. Evaluating

The sequence of actions for an educational intervention is:

Design

1. Identifying a decision or an action that is driven by data.
2. Defining the indicator used to trigger or inform the action.
3. Establishing a threshold—at what value on a scale is action required?
4. Identifying the data elements required to derive the metric/indicator.
5. Identifying the collection for acquiring the data.
6. Identifying the authoritative data repository where the data can be accessed.
7. Designing a report or alert to go to the person(s) who will take action.
8. Determining an action that will be taken at each threshold level on the indicator.
9. Designing the output format.

Action

10. Collecting, analyzing the data.
11. Identifying individuals or groups passing (or not passing) that threshold.
12. Alerting the right people to respond by providing them the report.
13. Determining a plan of intervention/action.
14. Taking that action.

Evaluation


15. Evaluating the outcome or effectiveness of the action taken.
16. Recommending changes or continuation of the intervention.
17. Modifying 1-9.
18. Repeating 10-17.

D3M is a complex process.

Student Performance Reports

Student performance reports get the most attention in education these days. The standard reports provided by a state's assessment vendor are descriptive—lists of students by subgroup or classroom, percents of students by proficiency levels, and maybe even some old-fashioned average scale scores. Many education agencies have purchased or developed reporting software packages that create OLAP cubes or flat analysis tables from which standard reports or *ad hoc* queries can be run. The training and understanding of the data that are required for a typical educator to use these systems is often too great—not unrealistic, merely requiring time that just isn't available.

Adding to this conundrum is the reality that analyzing and reporting assessment results requires a thorough understanding of both psychometrics and the actual

 **ESP Insight**
The training and understanding of the data that are required for a typical educator to run ad hoc queries is often too great.

assessment. A busy educator may not have the time to learn what the assumptions are underlying the data, what changes have occurred from one year to the next in the scaling, the inclusion/exclusion rules that impact the availability of scores, or the proper way to account for missing data. That's all before the educator gets to the point of measuring the reliability of any statistics generated in an *ad hoc* report.

Over the years, my ESP colleagues and I have created a chart of the questions that people ask about performance results. Each question requires its own type of analysis and interpretation. Now with the D3M Action Report Framework™, we can align each with an example of the action that would be associated with each question.

Attachment B details examples of decisions that are based upon data from student performance measures. The charts describe each question in these terms:

- Decision to be informed
- Question to be answered
- Level of analysis (e.g., individual student or group)
- Narrative of the question for the level of analysis
- Descriptive statistics required
- Actual difference determined
- Statistical significance measure
- Effect size measure
- Analysis of why differences were found

Two perspectives are presented in each chart. The first takes the perspective of informing decisions using status, meaning a single point-in-time measurement. The second perspective uses trend data, meaning how performance changed over time. Growth measures would be in this second category.

These charts illustrate how many questions are not answered by simple tables of data. In fact, the major shortcoming of most decision support systems and their reporting tools is that they provide mostly descriptive statistics.

 **ESP Insight**
The major shortcoming of most decision support systems and their reporting tools is that they provide mostly descriptive statistics.

Conclusion

The D3M Action Report Framework™ was developed to provide educators with a comprehensive process for getting reports they really can use. The process turns out to be rather complex with many moving parts. Not only do compelling reports need to be designed, they also need to be matched to the required data to fill them.

I was handed one of the first Migrant Student Record Transfer System (MSRTS) reports in 1971 while I was teaching at Mission Migrant School in Mission, Texas. Those green-bar, ledger-size printouts were something to behold at the time. Unfortunately, they arrived the last week of school with the requirement that I fill in the data for the school year just ending. Then the sheets went to Little Rock, where they were keyed into the MSRTS system for delivery at the end of the next year to someone else. Useless? Yes.

Ironically, while many of the migrant families have become more stable over the years, the general population has become more mobile.

Mobility, accountability, and professional responsibility are merely three of the compelling reasons to drive our decisions about students with data. I am still working to improve our education reports. I believe we now know what to do.

ESP Solutions Group owns the rights to the following trade marked names and the copyrighted formats accompanying them.

- D3M Action Report Framework™
- D3M Action Reports™
- D3M Decision Support Suite™
- D3M Education Portal™
- DataSpecs™
- Periodicity™



Attachment A: D3M Action Reports™

(a component of DataSpecs™)—An LEA/School Example

D3M Action Reports Framework™

This planning framework provides the structure for specifying how actionable data will be provided in a D3M Action Report™ to inform a specific decision, compliance report, profile, analysis, or audit report.

This Framework may be completed from this template or generated as a standard metadata report from DataSpecs™.

NAME OF ACTION:

Attendance Alert for Students At Risk of Truancy

Step 1a. Describe an ACTION.

Describe a decision or question that must be informed by data. (*DataSpecs contains a library of decisions, compliance reports, profiles, analyses, or audit reports.*)

Action	Action Identifier in DataSpecs	Description
Intervene for a student with a history of truancy	A0001	A teacher or counselor should intervene early, contact parents, whenever a student with a history of excessive absences first displays the same pattern in a new school year.

D3M Action Reports™ and the D3M Education Portal™ are trademarks of ESP Solution Group. The D3M Action Reports™ are copyrighted by ESP Solutions Group, Austin, Texas, 2007. The D3M Action Reports Framework™ is a component of DataSpecs™ a patent-pending process of ESP Solutions Group.

Step 1b. Categorize the report by DECISION (D), PROFILE (P), COMPLIANCE (C), ANALYSIS (An), or AUDIT (Au).

The report type helps determine how the Action Report is designed and managed.

In each step, whether the step is required (R) or optional (O) is shown for each report type, e.g., **D = R P = O C = O An = O Au = O.**

Type	Decision	Profile	Compliance	Analysis (Ad Hoc)	Audit
Purpose	To trigger an action, inform a decision, or answer a question	To provide general descriptions	To meet a mandate	To answer <i>ad hoc</i> questions or inform research and evaluation	To monitor processes
Content/ Scope	Targeted for a specific response	Matched to the audience	Specified by mandating agency	Determined by research question	Metrics describing process
Audience	Individuals who are responsible for taking the action	General audiences that have a broad range of interests	Governance body	Requestor or analyst	System administrator
Media	Quick delivery media, e.g., e-mail, web portal	Stable, official media, e.g., web page, printed report	Mandated media, e.g., data file	Determined by audience	Electronic
Periodicity	Determined by when the action will occur	Determined by availability of the data	Determined by mandating agency	On demand	Continuous, on demand
Analytics	Derivation of an indicator	Statistics and text as desired	Statistics or unit records as mandated	Parametric and nonparametric inferential and descriptive statistics as appropriate	Metrics descriptive of the processes
Data Quality	Ranges from high stakes, high quality demand to soft heads up for possible issues	Court of Public Opinion	May be audited, compared to other reporting agencies	Dependent upon the practices of the analyst	Transactional data quality is imbedded in the analytics
Example Reports	Alert of Students At Risk for Dropping Out	No Child Left Behind Annual Report Card	USED Consolidated Report for Title I and Other Programs; Office for Civil Rights Report	Annual Evaluation of Alternative Reading Programs	Daily Meals Served Report for the National School Lunch Program

Step 2. Define an INDICATOR.

D = R P = O C = O An = O Au = O

Describe the indicator that determines the appropriate action, decision, or answer. (*DataSpecs™ contains a library of predefined indicators.*) The level of analysis, e.g., student, class, teacher, school, district must be chosen for the indicator.

Indicator Name	Description	Formula/Derivation	Periodicity	Data Elements Required
Days Absent	Count of days absent for current school year	Sum number of absences for the school year	Daily	Absent (yes, no) by class
	Count of days absent for prior school year(s)			

Step 3. Set a THRESHOLD.

D = R P = O C = O An = O Au = O

Describe the threshold, benchmark, or objective that defines when action is required and what action is appropriate.

Threshold Name	Description	Value on Indicator
Excessive Absences—Current School Year	Excessive number of absences for the current school year	>2
Excessive Absences—Prior School Year	Excessive number of absences for the prior school year	>9

Step 4. Identify the Required DATA ELEMENTS.

D = R P = R C = R An = R Au = R

DataSpecs contains metadata standards aligned with NCES’s Data Handbooks, SIF, EDEN/EDFacts, and other national and state standards for education data elements.

Data Element Name	Element Identifier(s)	Definition	Code Set	Standards Linked to Element
Absent	E0001	Code indicating the student was absent	Yes, No	NCES Student Data Handbook (Element 234); SIF (Attendance Object)

Step 5. Identify the DATA COLLECTION that gathers the required data.

D = R C = R P = R An = R Au = R

To ensure that the required data are actually collected, the process for that collection must be determined and documented.

Collection	Collection Identifier	Date(s) & Periodicity	Office Responsible	Data Elements Collected
Teacher/Class/Student Report	C0001	Every two weeks	Core Data Office	Student ID, Student Name, District, School, Teacher, Class, Absent

Step 6. Identify the DATA REPOSITORY that is the authoritative data source for the required data.

D = R C = R P = R An = R Au = R

To ensure that the required data are available when needed and to determine where the authoritative source of those data exists, the data repository must be identified and documented.

Repository	Repository Identifier	DBA	Table(s)	Data Elements Stored
Data Warehouse	DW01	Sadie Smith	ATTN	Absence

Step 7. Describe the D3M ACTION REPORT to be generated to inform the action, decision, or question, or to satisfy the profile or compliance requirement.

D = R C = R P = R An = R Au = R

The characteristics of the output of the report must be described to ensure that the audiences can understand and interpret the information as easily as possible.

D3M Action Report Name	Media Available	Date(s) & Periodicity	Office Responsible	Process for Accessing the Report-- FERPA
Attendance Alert for Students at Risk of Excessive Absences	Alert on Web Portal; E-mail; PDF	Daily	Core Data Office	Web Portal or E-Mail

Step 8. Determine the Action on the indicator that is to be taken at each threshold level.

D = R C = O P = O An = O Au = O

Various values on the indicator will be associated with different actions. Both those values and the associated action must be determined and documented.

Level 1	Level 2	Level 3
<p>Status: Student meets or exceeds threshold of >2 absences in current school year AND threshold of >9 absences in prior school year.</p> <p>Action: Counselor and teacher coordinate contact with parents.</p>	<p>Status: Student meets threshold of >9 absences in prior school year but not >2 absences in current school year.</p> <p>Action: Counselor and teacher coordinate monitoring of student behavior.</p>	<p>Status: Student does not meet prior year threshold.</p> <p>Action: Student is not included in this D3M Action Report. Counselor and teacher monitor attendance for changes.</p>

Step 9. Design the output format for the Action Report.

D = R C = R P = R An = R Au = R

Create the display template for the access of the data. Specify the RDL code for the report and provision it to the report generation application.

Action Report: Attendance Alert for Students At Risk of Excessive Absences				
Date: Wednesday, February 21, 2007	School: Jefferson Middle School	Grade Level: 7	Students Listed: >2 current year absences AND >9 prior year absences	Action Required: Parent conference within two days
Student	MOSIS ID	Teacher	Current Year Absences	Prior Year Absences
Abrams, Joe	1234567891	B. Wilson	3	12
Zamora, Billy	1234543216	A. Ramos	3	21
Zimmer, Jane	1234565432	K. Clark	3	10

Step 10. Access the Action Report.

D = R C = R P = R An = R Au = R

Ensure that the intended audience has access to the Action Report. The D3M Education Portal™ provides a means for delivering action alerts directly to individuals' monitors.

Attachment B: Decision Question Matrix for Student Performance Measures

Status – single measurement Trend – multiple measures over time

Decision Example 1	Question (Comparison for Interpretation)	Level of Analysis	Narrative	Descriptive Statistics	Actual Difference	Statistical Significance	Effect Size	Analysis
Are we satisfied with the performance of our students?	STATUS: How did the students perform? (None, Self)	Individual	How did the individual perform? (Text)	How did the individual perform? (Descriptive)	Not Applicable	Not Applicable	Not Applicable	What factors explain the results?
		Group	How did the group perform? (Text)	How did the group perform? (Descriptive)	Not Applicable	Not Applicable	Not Applicable	What factors explain the results?
	TREND: How did the students perform? (None, Self)	Individual	How did the individual perform over time? (Text)	How did the individual perform over time? (Text)	Not Applicable	Not Applicable	Not Applicable	What factors explain the results?
		Group	How did the group perform over time? (Text)	How did the group perform over time? (Text)	Not Applicable	Not Applicable	Not Applicable	What factors explain the results?

Decision Example 2	Question (Comparison for Interpretation)	Level of Analysis	Narrative	Descriptive Statistics	Actual Difference	Statistical Significance	Effect Size	Analysis
Which schools should be investigated to determine if they have effective practices to share with others?	STATUS: How did performance compare to the performance of a reference group? (Norm, Group)	Individual	How did the individual perform compared to the reference group? (Text)	How did the individual perform compared to the reference group? (Descriptive)	What was the actual performance difference between the individual and the reference group? (Descriptive)	Was there a statistically significant difference between the individual's performance and the reference group performance?	Was there a practically significant difference between the individual's performance and the reference group performance? (Effect Size)	What factors explain the results?
		Group	How did the group perform compared to the reference group? (Text)	How did the group perform compared to the reference group? (Descriptive)	What was the actual performance difference between this group and the reference group? (Descriptive)	Was there a statistically significant performance difference between this group and the reference group? (ANOVA)	Was there a practically significant performance difference between this group and the reference group? (Effect Size)	What factors explain the results?
	TREND: How did performance compare to the performance of a reference group? (Norm, Group)	Individual	How did the individual's performance over time compare to that of a reference group? (Text)	How did the individual's performance over time compare to that of a reference group? (Text)	What was the actual performance difference between the individual and the reference group over time? (Descriptive)	Was there a statistically significant difference between the individual's performance and the reference group performance over time?	Was there a practically significant difference between the individual's performance and the reference group performance over time? (Effect Size)	What factors explain the results?
		Group	How did the group's performance over time compare to that of a reference group? (Text)	How did the group's performance over time compare to that of a reference group? (Text)	What was the actual performance difference between this group and the reference group over time? (Descriptive)	Was there a statistically significant performance difference between this group and the reference group over time? (ANOVA)	Was there a practically significant performance difference between this group and the reference group over time? (Effect Size)	What factors explain the results?

Decision Example 3	Question (Comparison for Interpretation)	Level of Analysis	Narrative	Descriptive Statistics	Actual Difference	Statistical Significance	Effect Size	Analysis
Which schools failed to meet the annual objectives for No Child Left Behind and require intervention?	STATUS: Were the objectives met? (Goals or Standard)	Individual	Did the individual meet the goal/standard? (Text)	Did the individual meet the goal/standard? (Descriptive)	What was the actual difference between the individual's performance and the goal/standard? (Descriptive)	Was there a statistically significant difference between the individual's performance and the goal/standard?	Was there a practically significant difference between the individual's performance and goal/standard? (Effect Size)	What factors explain the results?
		Group	Did the group meet the goal/standard? (Text)	Did the group meet the goal/standard? (Descriptive)	What was the actual difference between the group performance and the goal/standard? (Descriptive)	Was there a statistically significant difference between the group performance and the goal/standard?	Was there a practically significant difference between the group's performance and the goal/standard? (Effect size)	What factors explain the results?
	TREND: Were the objectives met? (Goals or Standard)	Individual	Did the individual improve in meeting the goal/standard over time? (Text)	Did the individual improve in meeting the goal/standard over time? (Text)	What was the actual difference between the individual's performance and the goal/standard over time? (Descriptive)	Was there a statistically significant difference between the individual's performance and the goal/standard over time?	Was there a practically significant difference between the individual's performance and goal/standard over time? (Effect Size)	What factors explain the results?
		Group	Did the group improve in meeting the goal/standard over time? (Text)	Did the group improve in meeting the goal/standard over time? (Text)	What was the actual difference between the group performance and the goal/standard over time? (Descriptive)	Was there a statistically significant difference between the group performance and the goal/standard over time?	Was there a practically significant difference between the group's performance and the goal/standard over time? (Effect size)	What factors explain the results?

Decision Example 4	Question (Comparison for Interpretation)	Level of Analysis	Narrative	Descriptive Statistics	Actual Difference	Statistical Significance	Effect Size	Analysis
Within low-performing schools, which subgroups require focus to meet performance objectives?	STATUS: How did the subgroups perform? (Disaggregated Group)	Individual	How did the student perform compared to others in each subgroup? (Text)	How did the student perform compared to others in each subgroup? (Descriptive)	What was the actual difference between the individual and the subgroups? (Descriptive)	Was the difference between the individual and the subgroups statistically significant?	Was the difference between the individual and the subgroup practically significant? (Effect Size)	What factors explain the results?
		Group	How did the group perform compared to each subgroup? (Text)	How did the group perform compared to each subgroup? (Descriptive)	What is the actual difference between this group and the subgroups? (Descriptive)	Was the difference between this group and the subgroups statistically significant? (ANOVA)	Was the difference between subgroups practically significant? (Effect Size)	What factors explain the results?
	TREND: How did the subgroups perform? (Disaggregated Group)	Individual	Did the individual improve in meeting the goal/standard over time compared to the performance of subgroups? (Text)	Did the individual improve in meeting the goal/standard over time compared to the performance of subgroups? (Text)	What was the actual difference between the individual and the subgroups over time? (Descriptive)	Was the difference between the individual and the subgroups statistically significant over time?	Was the difference between the individual and the subgroup practically significant over time? (Effect Size)	What factors explain the results?
		Group	Did the group improve in meeting the goal/standard over time compared to the performance of subgroups? (Text)	Did the group improve in meeting the goal/standard over time compared to the performance of subgroups? (Text)	What is the actual difference between this group and the subgroups over time? (Descriptive)	Was the difference between this group and the subgroups statistically significant over time? (ANOVA)	Was the difference between subgroups practically significant over time? (Effect Size)	What factors explain the results?

Decision Example 5	Question (Comparison for Interpretation)	Level of Analysis	Narrative	Descriptive Statistics	Actual Difference	Statistical Significance	Effect Size	Analysis
Where do we focus our remediation resources?	STATUS: How did performance across skill areas compare? (Content / Skill Breakouts)	Individual	How did the individual's performance compare across skill areas? (Text)	How did the individual's performance compare across skill areas? (Descriptive)	How did the individual's performance compare across skill areas? (Descriptive)	Was there a statistically significant difference in the individual's performance across skill areas?	Was there a practically significant difference between the individual's performance across skill areas? (Effect Size)	What factors explain the results?
		Group	How did the group's performance compare across skill areas? (Text)	How did the group's performance compare across skill areas? (Descriptive)	How did the group's performance compare across skill areas? (Descriptive)	Was there a statistically significant difference in the group's performance across skill areas? (ANOVA)	Was there a practically significant difference between the group's performance across skill areas? (Effect Size)	What factors explain the results?
	TREND: How did performance across skill areas compare? (Content / Skill Breakouts)	Individual	How did the individual's performance over time compare across skill areas? (Text)	How did the individual's performance over time compare across skill areas? (Text)	How did the individual's performance compare across skill areas over time? (Descriptive)	Was there a statistically significant difference in the individual's performance across skill areas over time?	Was there a practically significant difference between the individual's performance across skill areas over time? (Effect Size)	What factors explain the results?
		Group	How did the group's performance over time compare across skill areas? (Text)	How did the group's performance over time compare across skill areas? (Text)	How did the group's performance compare across skill areas over time? (Descriptive)	Was there a statistically significant difference in the group's performance across skill areas over time? (ANOVA)	Was there a practically significant difference between the group's performance across skill areas over time? (Effect Size)	What factors explain the results?

Decision Example 6	Question (Comparison for Interpretation)	Level of Analysis	Narrative	Descriptive Statistics	Actual Difference	Statistical Significance	Effect Size	Analysis
Which schools perform poorly on multiple measures and require intervention?	STATUS: Did multiple performance measures agree? (Multiple Measures)	Individual	How did the individual's performance compare across multiple measures? Did they agree? (Text)	How did the individual's performance compare across multiple measures? Did they agree? (Descriptive)	Was there an actual difference across multiple measures of the individual's performance? (Descriptive)	Was there a statistically significant correlation across multiple measures of the individual's performance? (Correlation)	Was there a practically significant difference across multiple measures of the individual's performance? (Effect Size)	What factors explain the results?
		Group	How did the group's performance compare across multiple measures? Did they agree? (Text)	How did the group's performance compare across multiple measures? Did they agree? (Descriptive)	Was there an actual difference across multiple measures of the group's performance? (Descriptive)	Was there a statistically significant correlation across multiple measures of the group's performance? (Correlation)	Was there a practically significant difference across multiple measures of the group's performance? (Effect Size)	What factors explain the results?
	TREND: Did multiple performance measures agree? (Multiple Measures)	Individual	How did the individual's performance over time compare across multiple measures? (Text)	How did the individual's performance over time compare across multiple measures? (Text)	Was there an actual difference across multiple measures of the individual's performance over time? (Descriptive)	Was there a statistically significant correlation across multiple measures of the individual's performance over time? (Correlation)	Was there a practically significant difference across multiple measures of the individual's performance over time? (Effect Size)	What factors explain the results?
		Group	How did the group's performance over time compare across multiple measures? (Text)	How did the group's performance over time compare across multiple measures? (Text)	Was there an actual difference across multiple measures of the group's performance over time? (Descriptive)	Was there a statistically significant correlation across multiple measures of the group's performance over time? (Correlation)	Was there a practically significant difference across multiple measures of the group's performance over time? (Effect Size)	What factors explain the results?

Decision Example 7	Question (Comparison for Interpretation)	Level of Analysis	Narrative	Descriptive Statistics	Actual Difference	Statistical Significance	Effect Size	Analysis
Which schools require changes to perform at the level of similar schools?	STATUS: How did similar students perform? (Prior Performance and Student Characteristics)	Individual	How did the student perform compared to predicted performance based upon similar students' performance? (Text)	How did the student perform compared to predicted performance based upon similar students' performance? (Descriptive)	How did the student perform compared to predicted performance based upon similar students' performance? (Regression/HLM)	How did the student perform compared to predicted performance based upon similar students' performance? Was the difference statistically significant? (Regression/HLM)	How did the student perform compared to predicted performance based upon similar students' performance? Was the difference practically significant? (Effect Size)	What factors explain the results?
		Group	How did the group perform compared to predicted performance based upon similar students' performance? (Text)	How did the group perform compared to predicted performance based upon similar students' performance? (Descriptive)	How did the group perform compared to predicted performance based upon similar students' performance? (Regression/HLM)	How did the group perform compared to predicted performance based upon similar students' performance? Was the difference statistically significant? (Regression/HLM)	How did the group perform compared to predicted performance based upon similar students' performance? Was the difference practically significant? (Effect Size)	What factors explain the results?
	TREND: How did similar students perform? (Prior Performance and Student Characteristics)	Individual	How did the student perform over time compared to predicted performance based upon similar students' performance? (Text)	How did the student perform over time compared to predicted performance based upon similar students' performance? (Text)	How did the student perform compared to predicted performance based upon similar students' performance over time? (Regression/HLM)	How did the student perform compared to predicted performance based upon similar students' performance over time? Was the difference statistically significant? (Regression/HLM)	How did the student perform compared to predicted performance based upon similar students' performance over time? Was the difference practically significant? (Effect Size)	What factors explain the results?
		Group	How did the group perform over time compared to predicted performance based upon similar students' performance? (Text)	How did the group perform over time compared to predicted performance based upon similar students' performance? (Text)	How did the group perform compared to predicted performance based upon similar students' performance over time? (Regression/HLM)	How did the group perform compared to predicted performance based upon similar students' performance over time? Was the difference statistically significant over time? (Regression/HLM)	How did the group perform compared to predicted performance based upon similar students' performance over time? Was the difference practically significant? (Effect Size)	What factors explain the results?

Decision Example 8	Question (Comparison for Interpretation)	Level of Analysis	Narrative	Descriptive Statistics	Actual Difference	Statistical Significance	Effect Size	Analysis
Where should we invest our money to achieve the most learning?	STATUS: What was the cost / benefit? (Cost Per Unit Difference)	Individual	What was spent to achieve the measured performance level of the student? (Text)	What was spent to achieve the measured performance level of the student?	What was spent to achieve the measured performance level of the student?	Not Applicable	Not Applicable	What factors explain the results?
		Group	What did it cost to achieve the measured performance level of the group? (Text)	What did it cost to achieve the measured performance level of the group? (Descriptive)	What did it cost to achieve the measured performance level of the group? (Descriptive)	Not Applicable	Not Applicable	What factors explain the results?
	TREND: What was the cost / benefit? (Cost Per Unit Difference)	Individual	What was spent to achieve the measured performance level of the student over time? (Text)	What was spent to achieve the measured performance level of the student over time? (Text)	What was spent to achieve the measured performance level of the student over time?	Not Applicable	Not Applicable	What factors explain the results?
		Group	What did it cost to achieve the measured performance level of the group over time? (Text)	What did it cost to achieve the measured performance level of the group over time? (Text)	What did it cost to achieve the measured performance level of the group over time? (Descriptive)	Not Applicable	Not Applicable	What factors explain the results?



About ESP Solutions Group

ESP Solutions Group provides its clients with *Extraordinary Insight*™ into K-12 education data systems and psychometrics. Our team is comprised of industry experts who pioneered the concept of “data driven decision making” and now help optimize the management of our clients’ state and local education agencies.

ESP personnel have advised school districts, all 52 state education agencies, and the U.S. Department of Education on the practice of K-12 school data management. We are regarded as leading experts in understanding the data and technology implications of the **No Child Left Behind Act (NCLB)**, **Education Data Exchange Network (EDEN)**, and the **Schools Interoperability Framework (SIF)**.

Dozens of education agencies have hired ESP to design and build their student record collection systems, federal reporting systems, student identifier systems, data dictionaries, evaluation/assessment programs, and data management/analysis systems.

To learn how ESP can give your agency *Extraordinary Insight* into your PK-12 education data, contact Greg Nadeau at (512) 879-5346 or gnadeau@espsg.com.

This document is part of *The Optimal Reference Guide Series*, designed to help education data decision makers analyze, manage, and share data in the 21st Century.

Actions Speak Louder than Data, Copyright © 2007 by ESP Solutions Group. All rights reserved. No part of this paper shall be reproduced, stored in a retrieval system, or transmitted by any means, electronic, mechanical, photocopying, recording, or otherwise, without written permission from the publisher.



ESP Solutions Group

(512) 879-5300

www.espsolutionsgroup.com

Austin • Boston • Washington DC