AN OPTIMAL REFERENCE GUIDE

Actions Speak Louder than Data

Extraordinary insight into today's education information topics

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Foreword

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—an early DOS-based "dashboard." In 1993 it was ahead its time because clients didn't have the longitudinal data systems to support those analyses. Eventually we shelved the product, though not what we learned in building it. What was clear to us was that the data infrastructure in school districts and state education agencies needed substantial work before the reporting tools could be appropriately used.

A decade later, 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. However, they couldn't tell us how they were using those data, and so it went. 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, we've 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.

This forward was adopted from one originally crafted by Dr. Barbara Clements who now serves on ESP's Board of Directors.

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, dashboards, and query tools available. However, as dynamic and interactive as the reports have become, they are still disappointing many users. That's not an insignificant conclusion from someone who has seen demonstrations and implementations of a plethora of major reporting applications over the past decade.

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

How many ways can we filter, disaggregate, drill down, and visualize the same data? In the 21st century, educators are still usually limited to readily available data. Granted, those readily available data are growing exponentially. How are we going to define the data we should be collecting and making accessible? Maybe to a large degree we need to define how we organize the wealth of data we have. 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 display 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—or at least those data as they are available to us, 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 viewing a list of them on a dashboard by classroom is large…but not nearly huge enough. Some systems even give teachers that list with a plan of action—but did the teacher ask for that instead of answers to other more pressing questions?

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. The Action Report Framework described 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.

Oh, yes, some learning management systems do some of these functions and do them well. However, how much are they limited by working with available data, standard report templates, or query systems with overwhelming options and parameters to manipulate? This paper gets back to the basics to ensure decision makers get what they need in the way they need it.

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*An **Action Report** is one that informs the user of an opportunity or a requirement and suggests what action should be taken.*

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. Even filling out a required compliance report is an action that leads bureaucrats or Congress to actions--maybe; or creating an annual statistical report or profile is an action that leads to legislators passing informed bills. 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.

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The same data may inform all five types of reports.

How do these types overlap? We should not get too focused on the taxonomy. In fact, the processes 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.

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Despite the common expression "actionable data," data are too low level, too simple.

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

In ESP's work designing and building reporting applications for state longitudinal data systems, the majority of the budget is devoted to building the data warehouse, the portal, and the analytical tool set (i.e., business intelligence tools). These are necessary deliverables in the project. Before those begin, before the basic data begin being loaded, and as a data governance plan comes in force for gathering the data required to answer decision questions, an agency should pursue implementing the Action Report Framework. Although it is tempting to rely upon bringing in a library of standard report templates developed in other states, your own data characteristics, legislative mandates, official statistics, requirements from a new P20W SLDS, and other decision support related questions require a more responsive approach to custom and *ad hoc* reporting.

There are four phases that lead the longitudinal data system managers from the statement of an action to be taken through the production of a report that informs that action—the Action Report Framework.

Phase 1 Formulate the Question

Step 1 Describe an action, 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.

Step 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.

Step 3 Set a threshold.

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

Step 4 Identify the required data elements.

The indicator and the threshold determine what data are required. The definition of the indicator determines the data elements that must be operationally defined in the organization's metadata dictionary.

Phase 2 Define the Data Sources

Step 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. More than one data collection may be required.

Step 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? More than one repository may hold the required data.

Step 7 Describe the periodicity, ownership, definition, confidentiality, and other detailed characteristics of each item/field in every collection, repository, and output/report.

There must be sufficient detail and documentation provided for each item on a data collection, each field in a repository, and each item on and output/report for the data providers, managers, and users to agree upon their definitions, interpretation, and appropriate use.

Step 8 Map these items/fields to the enterprise metadata dictionary's standard data elements.

There must be a single, central, standard definition in an agency's metadata dictionary to which each item/field is linked to allow users to follow the relationships of these data elements throughout the entire information ecosystem. This is necessary for comprehensive data governance.

Phase 3 Manage the Data Warehouse

Step 9 Define the data model that describes the relationships among the domains, entities, and elements in the data warehouse.

The data warehouse must be established upon a logical data model that unifies its parts and defines how they all relate to each other.

Step 10 Define the business rules that manage the movement of data from one repository to another.

When data elements transfer from one location to another, if they are transformed by combining them, calculating them, or changing them in any way, the formula used must be documented.

Step 11 Define the business rules that ensure the quality of the data.

The business rules/formulas used to check the accuracy, completeness, and validity of the data at various stages of collection, transformation, storage, and reporting must be documented.

Step 12 Create a map that aligns items and fields in each repository to the enterprise metadata dictionary's standard data elements.

The enterprise data dictionary's standard data elements must be mapped to each collection's items, each repository's fields, and each output/report's items.

Phase 4 Analyze and Report

Step 13 Produce official statistics and reports.

The report must produce the official statistics for the organization according to the established periodicity.

Step 14 Submit mandated reports.

Mandated reports must be produced on time in the required format.

Step 15 Produce custom and *ad hoc* reports.

The system must provide the capacity for both custom and *ad hoc* reporting.

Step 16 Protect the confidentiality of personally identifiable information.

The report formatting and data access options must de-identify personally identifiable data not authorized for the intended audiences.

Phase 5 Take Action

Step 17 Describe the Action Report to be generated to inform the action.

Sketching out the way the data will be presented helps to clarify that the data to be collected and the way they will be presented will really answer the question in the end. To plan for the production of the actual report, several characteristics must be known. These include the report's general layout, periodicity (schedule), office responsible, media, confidentiality level, etc. Beginning to complete the template in Attachment B is timely.

Step 18 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 will be taken.

Step 19 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 detail the actual report to be generated—in the format that supports its use. See Attachment B.

Step 20 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.

Step 21 Define new questions?

What new questions arise based upon the data being discovered and reviewed?

Step 22 Improve the decision support system

What modifications are needed in the data sources, analytics, and reporting to improve the decision support system?

An example of a report designed using this type of approach is provided in Attachment A. ESP consulted with the Texas Education Agency to design a set of Action Reports using their PEIMS data warehouse data and addressing decision questions formulated by their staff.

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

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Download the Max Yield Data presentation at www.espsg.com.

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.

The Action Report Taxonomy

The five types of Action Reports are detailed in the taxonomy chart below.

Report 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 *ad hoc* 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	Driven by 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, personal presentation	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 and compared to other reporting agencies	Dependent upon the practices, policies, and standards of the analyst	Transactional data quality imbedded in the analytics and business rules
Example Reports	Alert of Students At Risk for Dropping Out	Accreditation Annual Report Card	USED ED*Facts* reporting; Office for Civil Rights Report	Annual Evaluation of Alternative Reading Programs	Daily Meals Served Report for the National School Lunch Program

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.

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

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

Student Performance Reports

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Action reports definitely encompass the administrative services of a school system as well as the instructional services.

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.

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

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

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

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.

Conclusion

The Action Report Framework™ was developed to provide educators with a comprehensive process for getting the 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 (May 1) 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.

Attachment A: Sample Growth Model/Value-Added Report Design

ESP Solutions Group for the Texas Education Agency

This sample is from a set of reports designed by ESP for the Texas Education Agency. This represents how ESP guides an agency through a process of beginning with a policy question, identifying potential actions that might be taken from the data, defining the data required for a report, then designing the report with user guidance for interpretation.

TEA Teacher/Student Data Link Report

Prepared for the Texas Education Agency by ESP Solutions Group, Inc.

Report 6: Student TAKS Value-Added Performance by Years of Teacher Classroom Experience and Teacher Preparation Program Type

1. Title to Appear on the Report

Student TAKS Value-Added Performance by Years of Teacher Classroom Experience and Teacher Preparation Program Type

2. Education Policy Questions That Might be Informed by the Report

Do students gain more on TAKS in classes taught by teachers with more years of classroom teaching experience and different types of teacher preparation programs (when adjustments are made for the student's prior achievement and demographic characteristics)? Do experienced teachers from different types of teacher preparation programs have similar student performance gains?

- Should schools and districts assign students to teachers based upon the students' academic needs and the teachers' years of classroom teaching experience?

3. Possible Actions That Could be Taken by the State/Districts/Campuses as a Result of the Report

Student TAKS Value-Added Performance by Years of Teacher Classroom Experience and Type of Preparation Program

- Identification of low-performing schools for intervention

- Identification of low-performing and high-performing schools for matching in knowledge sharing, mentoring programs
- Validation of evaluations of schoolwide programs or grants

4. Report Description

The Texas Projection Measure (TPM) was approved by the U.S. Department of Education (USED) for use with determining adequate yearly progress. TPM is a multi-level regression-based projection model for TAKS, TAKS (Accommodated), and linguistically accommodated versions of TAKS. TPM projects student performance separately in reading/English language arts and mathematics in the next high-stakes grade level (defined by Texas legislation as grades 5, 8, and 11) using students' current year scale scores in both reading/English language arts and mathematics and average campus scale scores in the projection subject (i.e., reading campus mean for reading projections and mathematics campus mean for mathematics projections).

For this report, the TPM projected scale score for a student is subtracted from the student's actual scale score to derive a residual scale score. The mean residual scale scores are reported for teachers within ranges of classroom teaching experience.

The linkages between the content of high school courses (English I and II, Geometry, and Algebra I and II) and the Grade 11 TAKS may not be sufficient to include in this type of report. The TEA curriculum and assessment staff should be included in the decision about whether to include these linked data in a report such as the one suggested here.

This is a descriptive report. The data should be made available to users of SAS/SPSS to determine the statistical reliability of the differences among the groups and levels defined.

An example of the layout of the report is provided at the end of this section - Report 6: Student TAKS Value-Added Performance by Years of Teacher Classroom Experience and Teacher Preparation Program Type.

The Web report query would include a header section that provides the user interface for selecting the parameters available.

5. Report Data

Table 1 contains the list of data elements needed to create this report.

Table 1. Data Elements

Element	PEIMS File	PEIMS Element Name	Categories	Use
TEACHER				
District ID	A.-orP.TEACHER_CLASS_ASSIGNyr	DISTRICT (E0212)		Used to identify set of teachers to be included.
Staff ID	A.-orP.TEACHER_CLASS_ASSIGNyr	STAFFID (E0505)		Used to identify a specific teacher to make a link to a class.
Class ID	A.-orP.TEACHER_CLASS_ASSIGNyr	CLASS_ID (E1056)		Used to identify a class that is linked to a teacher and a student.
Assignment Begin Date	A.-orP.TEACHER_CLASS_ASSIGNyr	ASSIGN_BEGIN_DATE (E1065)		Used to determine how long the teacher has held assignment.
Assignment End Date	A.-orP.TEACHER_CLASS_ASSIGNyr	ASSIGN_END_DATE (E1066)		Used to determine how long the teacher has held assignment.
Role	A.-orP.TEACHER_CLASS_ASSIGNyr	ROLE (E0721)	C021-087	Identifies that the role of the person is the Teacher, not other support personnel.
Service	A.-orP.TEACHER_CLASS_ASSIGNyr	SERVICE (E0724)	C022-See below	Identifies service codes that can be linked to specific tests.
Teacher Years of Experience Ranges	A.-or-P.EMPLOYyrF	EXPER (E0130)	0, 1-2, 3-10, 11-20, 21+	From the continuous variable of Experience, compute ranges of experience.

Element	PEIMS File	PEIMS Element Name	Categories	Use
Teacher Certification Program Type	F_EDUCATOR_CERTIFICATON	CERT_PROG_KEY		Identifies the type of preparation program attended by the teacher.
STUDENT				
Student ID	A.-or-P.STUD_CLASS_ENROLLyr	STUDENT ID		Links the student in the class to the assessment score record.
Class ID	A.-or-P.STUD_CLASS_ENROLLyr	CLASS_ID (E1056)		Links the student to the teacher.
Grade Level of Student	F_TAKS_STUDENT_SCORE	GRADE_KEY		Included in the inclusion decision.
TAKS Test Subject	F_TAKS_STUDENT_SCORE	TAKS_SUBJECT_KEY		Identifies the specific TAKS assessment.
School Year of Test Administration	F_TAKS_STUDENT_SCORE	SCHL_YEAR		Identifies the year of the TAKS assessment.
Scale Score	F_TAKS_STUDENT_SCORE	SCALE_SCORE		Identifies the scale score of the student, used as the outcome variable.
Fall School Attended	F_TAKS_STUDENT_SCORE	PEIMS_CDC_FALL_SCHL_KEY		Used to determine whether the student was enrolled in the school where the student was tested at the time of the PEIMS Fall Collection.

Element	PEIMS File	PEIMS Element Name	Categories	Use
Current School Attended	F_TAKS_STUDENT_SCORE	SCHL_CODE_RPT_SCHL_KEY		Used to determine whether the student was enrolled in the school where the student was tested at the time of the PEIMS Fall Collection.
Texas Projection Measure	Not currently in the data warehouse		TAKS Scale Score	Used to calculate the residual for the metric in cells for report
Teacher Residual Mean Texas Projection Measure TAKS Scale Score	Not currently in the data warehouse		Scale score	Metric displayed in the report
Percent African American students enrolled in prior school year			0-100	Used to calculate AEIS campus group for inclusion in report
Percent Hispanic students enrolled in prior school year			0-100	Used to calculate AEIS campus group for inclusion in report
Percent White students enrolled in prior school year			0-100	Used to calculate AEIS campus group for inclusion in report

Element	PEIMS File	PEIMS Element Name	Categories	Use
Percent economically disadvantaged students enrolled in prior school year			0-100	Used to calculate AEIS campus group for inclusion in report
Percent LEP students enrolled in prior school year			0-100	Used to calculate AEIS campus group for inclusion in report
Percent mobile students as determined from prior school year cumulative attendance			0-100	Used to calculate AEIS campus group for inclusion in report
District Community Type			Major Urban, Major Suburban, Other Central City, Other Central City Suburban, Independent Town, Non-Metropolitan: Fast Growing, Non-Metropolitan: Stable, Rural, Charter School Districts	Used to filter districts to include in the report

Table 2. Service Codes (C022) and Related Assessments

Service Code	Service	Assessment
02620050	Reading, Grade 5	Grade 5 Reading TAKS
03273450	Reading, Grade 8	Grade 8 Reading TAKS
02640050	Mathematics, Grade 5	Grade 5 Mathematics TAKS
03103100	Mathematics, Grade 8 (1 Unit)	Grade 8 Mathematics TAKS
02630050	English Language Arts, Grade 5	Grade 5 Reading TAKS
03200550	English Language Arts, Grade 8	Grade 8 Reading TAKS
02050000	Grade 5	Grade 5 Reading TAKS, Grade 5 Mathematics TAKS
02080000	Grade 8, Self-Contained	Grade 8 Reading TAKS, Grade 8 Mathematics TAKS
03200530	English Language Arts And Reading, Grade 8	Grade 8 Reading TAKS
03220100	English I (1 Unit) (ENG 1)	Grade 11 Reading TAKS
03220200	English II (1 Unit) (ENG 2)	Grade 11 Reading TAKS
03100700	Geometry (1 Unit) (GEOM)	Grade 11 Math TAKS
03100500	Algebra I (1 Unit) (ALG 1)	Grade 11 Math TAKS
03100600	Algebra II (1/2-1 Unit) (ALG 2)	Grade 11 Math TAKS

A new element will need to be imported into the data warehouse:

- Data Element: Student **Texas Projection Measure Scale Score**
  - School years beginning in 2008-09
  - Reading/English language arts and mathematics
  - Grades 5, 8, and 11

A new derived element will be calculated for each eligible teacher included in the report using the Texas Projection Measure (TPM) TAKS results for individual students linked to the teacher.

- Derived Element: **Teacher Residual Mean Texas Projection Measure TAKS Scale Score**
  - Display name of element for the report: Residual Scale Score (RSS)
  - Calculation
    - **Actual TAKS Scale Score minus Texas Projection Measure Scale Score**

6.0 Comparison Groups

Groups that may be selected for individual report iterations:

- State
- Individual districts selected by user
- Individual regions
- AEIS campus group (A single campus would be entered to generate the AEIS campus group.) Each campus is in a unique comparison group of 40 other public schools (from anywhere in the state), that closely matches that campus on six characteristics. The demographic characteristics used to construct the campus comparison groups are:
    - the percent of African American students enrolled for prior school year;
    - the percent of Hispanic students enrolled for prior school year;
    - the percent of White students enrolled for prior school year;
    - the percent of economically disadvantaged students enrolled for prior school year;
    - the percent of limited English proficient (LEP) students enrolled for prior school year; and
    - the percent of mobile students as determined from prior school year cumulative attendance.
- District community types (TEA classifies Texas public school districts into community types using factors such as enrollment, growth in enrollment, economic status, and proximity to urban areas. These community types, or "district types," group districts into eight categories ranging from major urban to rural. Charter school districts make up a ninth category. The categories are as follows:
    - Major Urban
    - Major Suburban
    - Other Central City
    - Other Central City Suburban
    - Independent Town
    - Non-Metropolitan: Fast Growing
    - Non-Metropolitan: Stable
    - Rural
    - Charter School Districts
- School years (beginning with 2008-09)

7. Report Parameters

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Metrics to display:

- Residual Scale Score
    - School years beginning in 2008-09
    - Reading/English language arts and mathematics
    - Grades 5, 8, and 11

Teacher classroom years experience ranges to display:

- 0, 1-2, 3-7, 8-12, 13-20, 21+
- TEA may select different ranges to match other reports or prior research.
- Separate reports may be made available with different ranges.
- (Can BI tool give user the capability to set the ranges?)

Types of Teacher Preparation Programs to display:

- University-Based, Post-Baccalaureate, Alternative/Accelerated
-

Teachers to include:

- Grade level(s) – 5, 8, 11
- Subject/course - Reading/English/Language Arts, Mathematics, Algebra, Geometry, Grade 5, Grade 8 Self-Contained
- Teacher years of experience – 0+

Cell size considerations:

- TEA should use current cell size minimum of 5 or more to report a value within a range of years experience.
    - Alternatives for masking small cells include:
        - Displaying an * in a small cell with the footnote, “Value not reported because the number of teachers is fewer than 5.”
        - Combining a small cell with the smaller of adjacent cells to achieve a cell with at least 5 and displaying the footnote, “Values combined because the number of one or more cells is below 5.
- Standard cell size suppression rules do not apply directly to this report. The number of students in a single teacher’s class will typically be fewer than the 50

specified for reporting mean TAKS scale scores for groups in TEA's AYP guidelines.

- Typically, systems select a minimum number of students for a teacher/class/school based upon practical factors such as at what point an intolerable number/percentage of teachers/classes/schools are eliminated from reporting.
    - The Dallas ISD's Pay for Performance Program uses a minimum number of students of eight to include a teacher.
    - The Las Angeles Unified School System reports using a minimum of 10.
- The recommended minimum number of students linked to a teacher for inclusion in this report is 10.
    - Can the UI allow the user to set this minimum number?
    - Could this report be provided with different levels of the minimum number?
        - 8
        - 10
        - 12

8. Grouping Requirements

Following are the inclusion/exclusion rules for the second report described.

Include any teacher who:

- Was teacher of record for more than 2/3 of the available instructional days.
    - At future date, use beginning and ending date to determine inclusion.
- Is the primary teacher for the class (teacher of record).
- Has a service code linkable to a specific test. Only reading and mathematics tests are used. See Table 2 for specific combinations.
- Received his/her first teacher certification through a Texas teacher preparation program.

Include any student who:

- Is in a class related to an assessment area. See Table 2 for Teacher Service Codes and Assessments.
- Is in grades 5, 8, or 11.
- Was enrolled in the same school at the PEIMS fall collection.

- Has a valid TAKS score in reading and/or mathematics for the current year.
- Has a valid Texas Projection Measure scale score.

9. Sorting Requirements

Output from the report should be sorted as follows:

- Many reports will be a single group/report—1 page.
- If multiple grade levels, sort 5 then 8 then 11.
- If multiple subject areas, sort reading/English language arts then mathematics.
- If multiple subject and multiple grade levels, sort subject area and grade level within subject area.
- If multiple districts, sort alphabetical. (Assume these were selected by the user, so most likely the user chose specific districts by name.)
- If multiple regions, sort by region number.
- If multiple AEIS campus groupings, sort by campus grouping
- If multiple district community types, sort by
    - Major Urban
    - Major Suburban
    - Other Central City
    - Other Central City Suburban
    - Independent Town
    - Non-Metropolitan: Fast Growing
    - Non-Metropolitan: Stable
    - Rural
    - Charter School Districts

10. Navigation Suggestions

Pages should break before and after the start and end of complete charts, text fields, or tables. These should not be larger than a page.

Any drop-downs or navigations would be native to the BI tool used.

11. Post Conditions

Headers:

- Group Reported

- If state, print: “State”
- If individual district, print: Name of district and county/district number
- If Region, print: Region #
- If AEIS comparison group, print: “AEIS Comparison Group for (Name of District)”
- If district community type, print: “District Community Type: (Type)”

Disclaimers that accompany the reports:

Student TAKS Value-Added Performance by Years of Teacher Classroom Experience

- This graph shows the relationship between teachers’ teaching experience and preparation program type on student gains on TAKS. The scale score value displayed represents the average difference between the students’ actual TAKS scale scores and their Texas Projection Measure scale scores.
- The Texas Projection Measure (TPM) is a multi-level regression-based projection model for TAKS, TAKS (Accommodated), and linguistically accommodated versions of TAKS. TPM projects student performance separately in reading/English language arts and mathematics in the next high-stakes grade level (defined by Texas legislation as grades 5, 8, and 11) using students’ current year scale scores in both reading/English language arts and mathematics and average campus scale scores in the projection subject (i.e., reading campus mean for reading projections and mathematics campus mean for mathematics projections).
- The TPM line on the graph represents where students scored on TAKS at the same level the TPM projected them to score; the residual is zero. The residual scale score value displayed represents the mean difference between the students’ actual TAKS scale scores and their mean TPM TAKS scale scores. The bars represent the mean residual score obtained by students in classes taught by teachers in different ranges of experience and teacher preparation program type.
- It is important to keep in mind that the scale score range for Grade 4 Reading TAKS test is 117 - 853, thus

spanning 736 points. In that context, the difference of -35 or + 94 scale scores must be interpreted.

12. Page Orientation

All pages should be oriented portrait for display and printing.

13. Access Parameters

This will be a public report; therefore, the masking rules described for small cells must suffice for meeting TEA's purposes of protecting the identities of teachers. Student identities will be masked through the calculations of the metric.

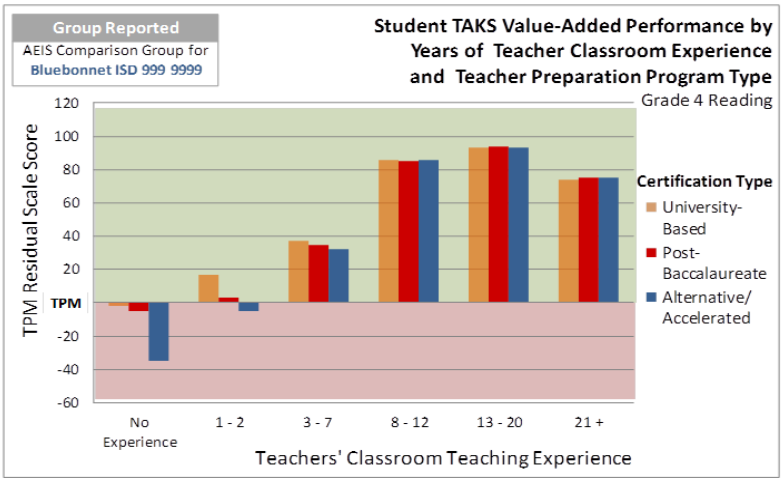
Report 6: Student TAKS Value-Added Performance by Years of Teacher Classroom Experience and Teacher Preparation Program Type

TEXAS EDUCATION AGENCY

Teacher/Student Data Link Reports

This report displays example data.

Certification Type	No Experience	1 - 2	3 - 7	8 - 12	13 - 20	21 +
University-Based	**-2**	**17**	**37**	**86**	**93**	**74**
Number of Teachers	145	243	332	321	354	256
Number of Students	1,987	3,233	4,546	4,452	5,123	3,544
Post-Baccalaureate	**-5**	**3**	**35**	**85**	**94**	**75**
Number of Teachers	116	194.4	265.6	256.8	283.2	204.8
Number of Students	1589.6	2586.4	3636.8	3561.6	4098.4	2835.2
Alternative/ Accelerated	**-35**	**-5**	**32**	**86**	**93**	**75**
Number of Teachers	92.8	155.52	212.48	205.44	226.56	163.84
Number of Students	1271.68	2069.12	2909.44	2849.28	3278.72	2268.16



This graph shows the relationship between teachers' teaching experience and prepaaration program type on student gains on TAKS. The scale score value displayed represents the average difference between the student's actual TAKS scale scores and thetheir Texas Projection Measure scale scores.

The Texas Projection Measure (TPM) is a multi-level regression-based projection model for TAKS, TAKS (Accommodated), and linguistically accommodated versions of TAKS. TPM projects student performance separately in reading/English language arts and mathematics in the next high-stakes grade level (defined by Texas legislation as grades 5, 8, and 11) using students' current year scale scores in both reading/English language arts and mathematics and average campus scale scores in the projection subject (i.e., reading campus mean for reading projections and mathematics campus mean for mathematics projections).

The TPM line on the graph represents where students scored on TAKS at the same level the TPM projected them to score; the residual is zero. The residual scale score value displayed represents the mean difference between the students' actual TAKS scale scores and their mean TPM TAKS scale scores. The bars represent the mean residual score obtained by students in classes taught by teachers in different ranges of experience and teacher preparation program type.

It is important to keep in mind that the scale score range for Grade 4 Reading TAKS test is 117 - 853, thus spanning 736 points. In that context, the difference of -35 or + 94 scale scores must be interpreted.

The range of possible values on the graph varies depending the distribution of scores.

During the first year of the collection of student-teacher link data, only the last teacher of record is being used. Alternatives may be used in the future as more complete data are available.

Reports are based on data from the primary administration of TAKS only.

Attachment B: Decision Question Matrix for Student Performance Measures

Status – single measurement **Trend – multiple measures over time**

Decision Question 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 status of our students, or is action needed to improve?	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?	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?	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? 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 P20W 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' information systems.

ESP personnel have advised school districts, all state education agencies, and the U.S. Department of Education on the practice of P20W data management. We are regarded as leading experts in understanding the data and technology implications of NCLB, SIF, ED*Facts*, CEDS, state reporting, metadata standards, data governance, data visualizations, and emerging issues**.**

Dozens of education agencies have hired ESP to design and build their longitudinal data systems, state and federal reporting systems, metadata dictionaries, evaluation/assessment programs, and data management/analysis and visualization systems.

To learn how ESP can give your agency *Extraordinary Insight* into your P20W education data, contact us at (512) 879-5300 or info@espsg.com.

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

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