The Optimal Reference Guide:

Reinventing Data Standards – Again

Extraordinary insight™ into today's education information topics

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Introduction

Data Standards

First and foremost, your longitudinal data system must have a foundation of data standards.

Data quality, comparability of accountability ratings, accuracy of AYP status, and defensibility of statistics in agency reports all depend upon well-defined data.

We don't know how to emphasize more strongly that your longitudinal data system (LDS) must have data standards—a metadata dictionary. ESP has worked in some way with every state education agency and directly or indirectly with thousands of districts on their data standards. We can say with confidence that education data quality issues trace back to one or both of two causes.

1. Inadequate clarity in the definition of data elements, codes, and business rules for reporting data.
2. Inadequate processes for managing the reporting of data.

Regardless of the stage your agency is in with your LDS, our recommendation would be to consider two actions. (Of course, these would come after reading this paper and having the context for these two actions.)

1. **Build or update your metadata dictionary** to ensure everyone has access to clear definitions that are consistent across all collections, repositories, and reports.
2. **Map your data management processes** to ensure they are efficient and effective.

We feel like saying, "Call today! Operators are standing by to take your call!" Not because this is some kind of late-night cable sales show, but because, of all the recommendations we've made that can make an immediate and significant impact on data quality, these two actions may be the most important. The very best LDS needs quality data in it, and the cycle time to improve the quality of longitudinal data is long. So, start today! Make that call.

Reinventing Data Standards – Again

We don't need to start from scratch to establish data standards for the education enterprise—despite the frequent calls for new efforts. Every state has data standards. The U.S. Department of Education (USED) has standards for the data that states report annually. In fact, USED even has a book of recommended data elements. The real issue is that we don't yet have a single, authoritative dictionary of data standards that governs all our collections, repositories, and reports throughout education. How close are we? By the end of this paper, we'll all have a common understanding of how close we are and how we might get there—without starting from the beginning—again. All this assumes that we need to have ALL of our education data elements standardized for us. That may be an issue we should hold open for debate.

There is a long history and a significant body of work that establish the *de facto* and *de jure* data standards already supporting data-driven decision making in education. Check out our previous Optimal Reference Guide, **National Education Data Standardization Efforts**, which provided the historical perspective on standards in education. Without an appreciation for that substantial history, one might think it would be necessary to begin at a basic stage to build data standards. Please move quickly beyond that notion. A primary goal of this paper is to ensure we don't waste time and resources re-inventing the standards that already exist.

These standards resources should be on our desktops as references whenever data standards are discussed. (But we will have to wait awhile for some to be finished.)

- **NCES Handbooks Online – Handbooks Online**
  (http://nces.ed.gov/programs/handbook/) NCES Handbooks Online contains a listing of data elements, code sets, definitions, and procedures that could be effectively used in the collection of education data at the local, state, or federal levels. They are presented as sound practice or principles that could be interpreted or applied according to the needs of the school or administrative unit. The elements included in the Handbooks are not required for all users; however, elements required for federal reporting are included. The components of the handbook were identified by local, state, and federal, educators, representatives of education associations, and researchers.

- **SEDCAR – Standards for Education Data Collection and Reporting**
  (http://nces.ed.gov/Pubsearch/pubsinfo.asp?pubid=92022) SEDCAR was published in 1991. SEDCAR was developed under the guidance of the National Center for Education Statistics to promote best practice in the collection, processing, analysis, and reporting of education statistics.

  NEDM - The National Education Data Model
  (http://nces.sifinfo.org/DataModel/) NEDM contains information about entities (people, places, and other concepts), attributes (measures or characteristics of each entity), and relationships that would be needed to track or answer important education questions, issues and processes related to schools, districts, state education agencies, postsecondary institutions, and early childhood schools and agencies. This conceptual data model can

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help educators and administrators, software developers, and researchers identify what data might be or should be available in comprehensive education data systems. NEDM is a project of the National Center for Education Statistics within the U.S. Department of Education's Institute of Education Sciences. The model is evolving, but will be made available online.

- **SIF -The Schools Interoperability Framework** (http://www.sifinfo.org/us/index.asp) SIF is a set of standards for sharing data between disparate software applications, such as student information systems, grade book programs, transportation systems, food service programs, and library programs. A goal of this activity is to ensure that high quality education information is available to professional educators and parents. To promote data quality and availability, information should be entered once and shared among the software applications used within a district or school. Developed by vendors of school technology along with the federal, state and local educators who use that technology, the SIF specification provides the data standards and choreography to make this happen, thus promoting the availability of data, resources, and tools to serve learners of all ages. Seamless integration of a broad spectrum of instructional, administrative and communications tools is essential to effectively address the needs of all learners.

- **PESC - The Postsecondary Electronic Standards Council** (http://www.pesc.org/) PESC is a standards-setting body focusing on formats for sharing data between members of the postsecondary community, including colleges and universities, the federal government, and other organizations. In particular, PESC is working on the efficient and secure exchange of student data from initial access of the student from high school into the college environment through successful completion of the postsecondary education experience. One goal of PESC is to promote the alignment of data across disparate systems and sectors and eliminate incompatible interfaces that present barriers to students and that inflate costs for institutions struggling to keep up with the demands of technology and real-time data exchange while maintaining competitive tuition rates. Standards have been developed for federal student aid data, student transcripts, student applications, and other areas.

- **Common Data Standards – USED** (http://nces.ed.gov/) The U.S. Department of Education (USED), under the leadership of NCES, is overseeing the development of common data standards for a core set of student-level variables and performance indicators in order to increase comparability of data across state lines, increase interoperability and portability of data, and reduce collection burden on districts. USED will convene a Technical Working Group (TWG) comprised of representatives of key stakeholders, including existing standards bodies, to identify the core subset of variables about students that all states need to define the same way and to develop common data definitions, code sets, business rules and technical specifications for these variables. These common standards for the core variables might be pulled or adapted from existing documents or might be defined by the working

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group. Once the TWG has reached agreement on the common data standards for these core variables, the list of variables and standards will be shared with the broader group of states, districts, and postsecondary stakeholders for feedback and discussion, in order to achieve broad consensus among all stakeholders. Furthermore, USED will develop a plan for long-term governance of the common data standards.

For a moment, let's step back and consider standards from a broader perspective than just data. After all, education is an enterprise that encompasses curriculum development, instruction, classroom management, counseling, physical education, sports, career education, large-scale assessment, professional training, transportation, food services, library and media services, information technology, facilities maintenance, construction, finance, human resources, and many other areas. A state education leader, local administrator, educator, policy maker, or education organization employee deals with standards and standards organizations constantly, increasingly.

Attachment A is a compilation entitled "Standards and Guidelines Related to Education Data Systems." We maintain this reference for our clients as a resource when developing their Information Systems Architecture (ISA) as a foundational component of a longitudinal data system.

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*ESP's **Information Systems Architecture (ISA)** is a foundational component of a*

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Stages of Development of a Standard

The authors have participated in quite a few standards efforts over the years. In reflection, there seem to be general stages through which these standards progress. Exceptions abound. No individual standard followed these stages exactly.

Disclaimers duly noted, however, describing these six stages helps us explain what we believe to be a simple truism that comes from all those years of working with standards. A small group of smart people doesn't suddenly realize one day the need for standards, assemble a committee of experts, and commission them to create and publish reasonable and comprehensive standards that the world will embrace. (At least, that's not the natural way.)

Standards evolve through acceptable practice, best practice, or entrenched behavior that eventually gets codified and adopted to make use of the convention even more universal.

The sense of this truism is that when the time comes for a standard to be codified and published, those designated to do so must recognize that their mandate is to document what is already in practice and to just round out the edges as needed. Here is what we have observed as the generalized stages of how a standard develops somewhat naturally.

	How a Standard Develops Naturally
1.	**Independent styles and formats are developed naturally by individuals or organizations.**
2.	**Proprietary styles and formats are developed for use within an automated application or product.**
3.	**A number of *de facto* standards emerge as players dominate parts or all of the market. User groups develop standards that met the needs of their members and favored technology.**
4.	**Standards groups, or major corporations adopt one or a few of the standards as others fade.**
5.	**The market determines which standard survives.**
6.	**Use determines if this standard is adequate and for how long.**

Depending upon the length of time it takes for the standard to obsolesce, the cycle starts all over again deliberately or may have already begun.

Example 1: Bright Ideas Will Look Different by 2014

In the US beginning in 2012 and ending by 2014, sales of incandescent light bulbs will be phased out by law. These bulbs failed Congress's new energy standard because they waste 90% of their energy to heat rather than to light. One alternative, the compact fluorescent bulb, currently costs six times more and lasts 10 times longer—we hope. The application of the truism (acceptable practice, best practice, or entrenched behavior) by the

light bulb standards people that saved the day for us consumers is that they held true to the core of the standard for size of the socket and 110-watt power—two entrenched behaviors that if they had changed would have caused us to replace almost all of our light fixtures and wiring.

Example 2: Seeing Stars in Las Vegas!
A standard for a five-star hotel is to have such great service at check in and out that there's no need for those now-standard, time-saving rope lines that ensure we don't get stuck behind the slowest customer while everyone else's line breezes through. Guess what? No fewer than three times in three days at my (Ligon's) five-star Las Vegas hotel did I pick the loser line and experience two clerks changing their cash drawers, a family calling over relatives to cut in, and a concierge who apparently felt obligated to explain the menu of every restaurant in Las Vegas. (Oh, yes, the in-room video checkout, another great time-saving standard for hotels, was unavailable when needed.)

Example 3: Can I Get a Transcript of That?
When SPEEDE/ExPRESS* was establishing the first national standard for electronic student transcripts, ANSI X12 EDI was selected as the standard because it was the best around. Over the next decade, EDI failed to capture the education information systems market, especially at the K-12 level, and became a negative marketing point for SPEEDE/ExPRESS. However, the data element definitions, code sets, codes, and other content specifications developed by SPEEDE/ExPRESS became the *de facto* standard that influenced vendor data models, PBDMI, SIF, EDEN, EDFacts, and all other public subsequent data standards in the education arena simply because the truism had been followed.

SPEEDE/ExPRESS is an acronym for Standardization of Postsecondary Education Electronic Data Exchange/Exchange of Permanent Records Electronically for Students and Schools. SPEEDE represents the postsecondary institutions and ExPRESS represents PK-12 education.

Example 4: VHS or Beta Max? Blu-ray or HD DVD?
The two major format wars in the home video market are great examples of stages four and five. Sony lost the Betamax (higher quality, higher price) competition to VHS when the market wouldn't pay, but later won the Blu-ray (higher quality, higher price) competition against Toshiba's cheaper HD DVD format by sewing up the corporate distribution accounts before phase five kicked in for price-conscious consumers. For VHS, use/technology advances have passed it by now as phase six takes its toll. Blu-ray is running strong with the growing popularity of Netflix downloads directly into home players. The introduction of 3D into the home market is a tangent that will be interesting to watch.

Because the authors were personally involved in the SPEEDE/ExPRESS development and later in the launch of the National Transcript Center, we continue to follow closely the evolution of the standards for exchanging electronic student records and transcripts. So let's align history with the six phases as an illustration.

Phase 1: Independent styles and formats are developed naturally by individuals or organizations.

〉 Some states develop a standard format and contents for a high school transcript; other states leave this up to the districts.
〉 Postsecondary institutions have their own formats and stress the importance of the signature and seal on the paper document to ensure authenticity.

Phase 2: Proprietary styles and formats are developed for use within an automated application or product.

〉 The Austin, Texas, school district took 9" computer tapes to The University of Texas with transcript data in the mid-80s.
〉 The Florida Department of Education was moving electronic student records among districts for mobile students in the mid-80s.
〉 The Migrant Student Records Transfer System (MSRTS) collected and exchanged data for migrant students.

Phase 3: A number of *de facto* standards emerge as players dominate parts or all of the market. User groups develop standards that meet the needs of their members and favored technology.

〉 Interest by a few postsecondary institutions motivated the American Association of Collegiate Registrars and Admissions Officers (AACRAO) to form a group to study development of a standard. This group was called SPEEDE. An elementary/secondary group sponsored by NCES was called ExPRESS. Together they developed an EDI format for a student transcript that covered elementary through postsecondary education which was called SPEEDE/ExPRESS.
〉 PESC College Transcript is adopted to take advantage of the Internet and xml. It is based on the SPEEDE/ExPRESS format.
〉 PESC High School Transcript is adopted representing what colleges and universities want to receive from high schools and is based upon the college transcript.
〉 SIF Student Record Exchange Object is adopted to reflect the needs of elementary and secondary schools to send and receive more detailed data about students.

Phase 4: Major corporations adopt one or a few of the standards as others fade.

〉 The University of Texas at Austin sponsors the SPEEDE server that allows postsecondary institutions and schools to send EDI transcripts for free. They are moving to translate XML transcripts into EDI and vice versa.
〉 National Transcript Center (NTC) provides the capacity for any of the existing electronic standards to be used to exchange transcript data.
〉 Other organizations involved in transcript exchanges use pdfs, PESC, or SPEEDE/ExPRESS.

Phase 5: The market determines which standard survives.

〉 TBD

Phase 6: Use determines if this standard is adequate and for how long.

〉 TBD

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Surviving the Life Cycle

Standard definitions for education data elements must exist and survive through a multi-stage life cycle for us to pass quality data among ourselves. These stages are described here. For each stage, a DANGER will be described that poses a risk to the quality of the data. These dangers emphasize how difficult it is to maintain the standard throughout the life cycle.

- **Definition**
  First and foremost, we must agree upon a definition. In research, this is the operational definition: the way something is defined for this particular use or circumstance. To illustrate, a "student" has a generic definition that is not very useful when a state education agency is determining a funding allocation for schools. Student needs to be defined precisely by characteristics such as age, enrollment, attendance, school, family income, handicapping condition, and any other variable that weights the individual for funding purposes.

  > **DANGER: The definition may be vague, open to interpretation, not specific about periodicities, or otherwise imprecise.**

- **Adoption**
  The definition must be adopted by a governing group with the authority to make it official.

  > **DANGER: The adoption may modify the definition, be partial, or the group may not communicate that it is to be followed exactly.**

- **Acceptance**
  The definition must be accepted by the organizations governed by that group and designated for implementation.

  > **DANGER: The definition may not be fully accepted for use by all the organizations or individuals within them. The communication that the definition is to be accepted and implemented may not be made. The definition may be modified by some of the organizations.**

- **Practice**
  The definition must be embraced by the practitioners, meaning it must be faithfully put into practice. Many school clerks should continue to keep records the way they have always been kept even after the new software has been installed.

  > **DANGER: The definition may not fully replace a pre-existing definition. The definition may not be put into practice true to the terms of the definition.**

- **Use**
  The definition must find its way into common use. The definition must take over as the one everyone uses.

  > *DANGER: Vestiges of any prior definition must disappear from everyday use. The definition must become the way everyone behaves and works. For example, the superintendent continues to want reports published the old way to maintain historical trends. DANGER: The definition is used at times but at other times is not, so users of the data may confuse the multiple definitions. The official definition may not be the one reported even though it is assumed to be the one in use.*

- **Submission**
  The definition must become the one that is actually submitted in official reports. Maybe the definition is available, but it must replace any and all prior or available other definitions.

  > *DANGER: Another definition is used when the data are submitted.*

- **Processing**
  The definition must remain unchanged during processing. This is an issue of both use of the correct and accurate definition and of maintaining the quality and accuracy of the data themselves during their handling.

  > *DANGER: During data processing, the data are changed, damaged, or invalidated such that the definition no longer applies precisely.*

- **Analysis**
  The definition must be respected during analysis.

  > *DANGER: The assumptions of the data are violated making the analysis invalid.*

- **Reporting**
  The definition must be accurately provided to the user of reports. The presentation of the data must be consistent with the definition of the data.

  > *DANGER: The definition that matches the data reported is not the one provided along with the data that are in the report; or a definition is not provided. The data might also be misrepresented in a report. For example, student counts that are reported as membership on October 1 may actually be attendance on that date.*

- **Interpretation**
  The definition must be properly used and interpreted by the user of reports. This issue now moves out of the control of the provider, collector, analyzer, and reporter of the data. Even with all the prior conditions for maintaining

the quality of the data intact, the persons interpreting the data may interject their own biases and perspectives.

> ***DANGER: The assumptions of the data are violated making the analysis invalid.***

- **Decision Making**
  The definition must be properly applied in the decision-making process.

> ***DANGER: The decision maker uses the data inconsistently with the proper definition of the data and, thus, the decision made is faulty.***

If throughout all of these stages, the definition remains true, unchanged, and recognized, then the standard has been followed. Standard definitions must survive the handling of humans, software code, electronic networks, storage systems, analysis applications, display/reporting techniques, etc.

So we have TWO challenges.

1. **RULES:** We must adopt definitions for our data elements to establish a standard.
   - A metadata dictionary contains the rules (e.g., definitions of data elements, option/code sets, business rules, periodicities, etc.)

2. **COMPLIANCE:** We must follow our standard to achieve comparable data for decision making.
   - Process management, enforcement of business rules through automated data exchange applications with edit reports and error messages, certified data submissions, etc.

In our work with education agencies, we find those that tend to emphasize establishing rules and those that tilt toward enforcing compliance. The two work together, so let's state the obvious here for clarity.

> Without clearly stated rules (a.k.a. data standards), even the most conscientious provider of data cannot comply and provide quality data.

> Without conscientious compliance, even the most clearly stated rules will not produce quality data.

Over the course of ESP's 17 years of work with our clients, we have found it necessary to provide expert services for both. In doing so, we have developed with our education agency clients a software application that provides management of the functions of each.

> **Rules:** DataSpecs™ manages the metadata for an education agency.

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Standard definitions must survive the handling of humans, software code, electronic networks, storage systems, analysis applications, display/reporting techniques, etc.

Compliance: State Report Manager™ (SRM) manages the collection of data from LEAs to the SEA while providing edit reports that explain any business rules that were violated.

What this means is that education is challenged both by a need for setting the standards and by a need to follow the standards. There's no shortage of people calling for setting the standards. Following the standard has fewer clarion leaders. We need more of what Jack Grayson of the American Productivity and Quality Center preaches—process management. We need processes that ensure quality data that are compliant with the standards that are collected, stored, and reported.

Comparability!

In the end, what we seek is comparability. The goal is for our data to be
- Comparable,
- Fair,
- Unbiased,
- Identical regardless of
    - Who collected or reported the data,
    - What software application was used, or
    - What exchange mode was utilized.

To the educators, the public, policy makers, and parents, "comparability and fairness" seem to be the terms they understand. They want to be able to lay the data for multiple entities side-by-side and make fair comparisons.

To a statistician, the term is "reliability." Keep in mind that reliability assumes accuracy and validity. Reliability means that if the measure is made multiple times, it will be the same each time. (Have a field day with that statement, you researchers. Of course, there are measurement errors, changes over time, etc. Just read this as "the same each time within a margin of error.")

How Close Are We?

We are very close to having *de facto* standards. That means without any action at all, some of our data are somewhat comparable for some purposes. If we could take time out, gather together all the local, state, and federal definitions in practice today, we would find commonalities that most reasonable people could agree upon enough to convince a standards group to adopt. Taking a wild guess, this might comprise about 75% of our "core" data elements. Don't scoff at this accomplishment. This would be highly significant right out of the chute. The next 10% would require compromise, leadership, or voting. Then you can refer to the life cycle stages described in this paper of acceptance, practice, use, etc. that would determine the quality of the data.

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Can We Use a Wiki Approach?

Maybe we can build a Wiki-NEDM.

Wiki – a type of website that allows the visitors themselves to easily add, remove and otherwise edit and change some available content, sometimes without the need for registration. This ease of interaction and operation makes a wiki an effective tool for collaborative authoring. (source: Wikipedia)

Wiki-NEDM – the National Education Data Model website that allows the visitors themselves to easily add, remove and otherwise edit and change some available metadata content, sometimes without the need for registration. This ease of interaction and operation makes a wiki an effective tool for collaborative authoring.

High-Level Process:

1. The USED establishes the NEDM metadata dictionary
   a. EDFacts submission objects are defined and maintained
   b. OCR submission elements, option sets, and business rules are defined and maintained
   c. All other federal elements, option sets, and business rules are defined and maintained
2. Each SEA establishes a core metadata dictionary subset with its official definitions, code sets, and business rules
   a. SEA collections are detailed
   b. SEA repositories are detailed (with appropriate restrictions on access or security)
   c. SEA outputs/reports are detailed
3. An LEA can associate its local metadata dictionary with its SEA's core metadata dictionary
   a. LEA collections are detailed
   b. LEA repositories are detailed (with appropriate restrictions on access or security)
   c. LEA outputs/reports are detailed
4. Reports are Published
   a. Element Details
   b. Collection Details
   c. Repository Details (Public Characteristics)
   d. Output/Report Details
   e. Analysis Reports (e.g., burden, redundancy, map & gap, etc.)

The notion is that instead of trying to create a national standards group to build the "book," let's use a collaborative process. With this approach, the federal government and foundations would act as catalysts and provide web resources rather than try to guide the processes more directly. The individual states would independently contribute their data standards from which commonalities could emerge.

ESP, specifically the authors, invites interested individuals, companies, foundations, groups, education agencies, and organizations to contact us to explore this and other ideas. We are open to leveraging the wealth of metadata intelligence available to formulate strategies for advancing data quality for the education community and to improve data-driven decision making.

ESP created a glossary of education technology terms for collaboration purposes. It is a central repository of common definitions and definitions that are meaningful to education. The glossary can be found at www.edtechglossary.com or through the ESP website. Here are just a few of the more than 400 terms and their definitions.

EDTech Glossary

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ESP's role as a thought leader in the education information space includes helping to clarify the precise meanings of the terms we use to describe solutions for data-driven decision making needs. At edtechglossary.com we have compiled almost 400 terms so far and will continue to add more. You can submit your own term using the button to the right. For each term, we have provided a common definition, then a description of "What this Means."

Submit a Term

A B C D E F G H I J K L M N O P Q R S T U V W X Y Z

M

Mainframe
Malcolm Baldrige National Quality Award
Mandate
Mapping
Master
Max Value
Max Yield Data
Message Queues
Metadata
MHz (MegaHertz)
Min Value
Month Collected
Month Reported
MOTS (Modified Off-the-Shelf)

N

Metadata
Definition: Data about data, metadata are used to facilitate the understanding, characteristics, use, and management of data.

What This Means:
Every education agency must have control over its metadata. Metadata standards are part of a comprehensive Information Systems Architecture. Metadata are the authority for how data elements are defined, reported, and stored across all information systems. Metadata are the single most important part of reducing reporting burden from schools to districts to states. Consistent compliance with metadata standards negates the necessity for crosswalks and other burdensome processes to share the data across individual systems.

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Submit a Term

\# A B C D E F G H I J K L M N O P Q R S T U V W X Y Z

D
- D3M (Data-Driven Decision Making)
- D3M Framework
- Dashboard
- Data Access and Management Policy
- Data Architecture
- Data Dictionary
- Data Grid View
- Data Length
- Data Management
- Data Model
- Data Object
- Data Quality
- Data Quality Rules
- Data Source
- Data Steward
- Data Store, Database, Data Warehouse, Data

Data Dictionary
Definition: A data dictionary is a centralized repository of information about data such as meaning, relationships to other data, origin, usage, and format.

What This Means:
To the educator, the data dictionary is the authoritative source for definitions, codes, and interpretations for all data elements and derived statistics for an education agency. At this level, the term metadata dictionary is appropriate. For the IT professional, the data dictionary is more technical, describing the tables, fields, and codes around which a database is designed and constructed.

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\# A B C D E F G H I J K L M N O P Q R S T U V W X Y Z

Terms
Data Source
Data Steward
Data Store, Database, Data Warehouse, Data Mart, Analysis Database
Data Type
Database
Database Software Title
Database Software Version
Database/Instance Name
DataSpecs
DBA (Database Administrator)
DBMS (Database Management System)
Decision Support System
Default Value
Detail Level
Dictionary Element
Directory Service

DataSpecs
Definition: DataSpecs is a metadata management application for an education agency. Data collections, repositories, outputs/reports, data elements, data stewards, calendars, gap analysis reports, and other key features are provided.

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What This Means:
ESP's DataSpecs is a metadata inventory application that compiles information about data resources and standardizes data definitions, codes, and formats to facilitate sharing of information across all applications without the need to reformat data time and time again. Reducing the burden of redundant data collection and reporting begins with understanding what is being collecting, by whom, when, for what purpose. Improving data quality begins with clear definitions and codes for what is being collected--and ensuring that those definitions are the same every time, for every report. This is simple to write, but difficult to do when an education agency has hundreds of collections, repositories, and reports to manage with thousands of data elements. To complicate the challenge, a single element like "name" can be labeled dozens of ways across hundreds of fields making linking records electronically virtually impossible. DataSpecs maps, aligns, and sorts this out to create a manageable database of metadata standards and rules for the education agency and can align them with national standards such as NCES handbooks, EDFacts, and SIF.

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Barbara's and Glynn's Conversation over Pizza

BC: Are there minimum competencies for data?

GL: You mean like for student academic skills? We measure minimum competencies—the basic level on NAEP?

BC: Yes, our minimally competent data would be the least we would demand.

GL: Then would we have higher order thinking skills for data? Gifted data? Advanced placement data? International baccalaureate data?

BC: Why not? We should recognize quality and complete data. The EDFacts folks honor the SEAs with the best data submitted. Don't North Carolina and Delaware get certificates?

GL: Let's ask Jack Grayson at APQC to do a Malcolm Baldrige National Quality Award for education data. We'd have two criteria—best rules and best compliance. The education agency with the clearest set of metadata standards and the highest level of compliance by their data providers get the awards.

BC: Think anyone would enter?

GL: Think anyone would win?

BC: Yes, and yes.

GL: Which states, which districts?

BC: I have a few in mind.

GL: So do I. What's surprising is how few are able to emphasize BOTH rules and compliance together.

BC: Yes, it seems it takes so much energy and time to do one or the other. Especially without help.

GL: That's where the IES LDS grants have been so important. Establishing the metadata standards up front, then building the LDS system with the rules enforcement and edit reports built in is the key.

BC: If there's one thing I would recommend our readers go back and review it would be our Data Tree.

GL: I agree. That's the foundation. Get your data standards established!

BC: Don't forget—make them sustainable!

See ESP's Data Tree online at www.d3mdatatree.com.

Attachment A: Standards and Guidelines Related to Education Data Systems

NCES Handbooks

Handbooks Online – Version 6.0. [NCES 2008805]. Handbooks Online - Version 6.0 is a searchable web tool that provides access to the NCES Data Handbooks for elementary, secondary, and early childhood education. These Handbooks offer guidance on consistency in data definitions and in maintaining data so that they can be accurately aggregated and analyzed. The online Handbook database provides the Nonfiscal Handbooks in a searchable web tool. This database includes data elements for students, staff, classrooms, and education institutions. Available online at: http://www.nces.ed.gov/pubsearch/pubsinfo.asp?pubid=2008805.

Student Data Handbook for Elementary, Secondary, and Early Childhood Education: 2000 Edition. [NCES 2000343REV] The Student Data Handbook was developed to provide guidance concerning the consistent maintenance of student information. This handbook defines data elements and definitions describing personal information, enrollment, school participation and activities, out of school experience, assessment, transportation, health, special program participation and discipline for pupils in early childhood, elementary, and secondary education. This handbook contains no data. This includes the original 2000 Handbook and the 2001 Update. Available online at:
http://www.nces.ed.gov/pubsearch/pubsinfo.asp?pubid=2000343rev.

Staff Data Handbook for Elementary, Secondary, and Early Childhood Education: 2001 Edition. [NCES 2001305]. The Staff Data Handbook was developed to provide guidance concerning the consistent maintenance of staff information. This handbook defines data elements and definitions describing personal information, educational experiences, qualification information, current employment, assignments, and evaluation and career development for personnel in early childhood, elementary, and secondary education. This handbook contains no data. Available online at: http://nces.ed.gov/pubsearch/pubsinfo.asp?pubid=2001305.

NCES Financial Accounting for Local and State School Systems: 2003 Edition. [NCES 2004318]. This NCES Handbook has been designed as the national standard for state and local education agencies to use in tracking and reporting financial data and for school districts to use in preparing their comprehensive annual financial reports (CAFRs). The purpose of the handbook is to ensure that education fiscal data can be reported in a comprehensive manner.

The *2009 Edition* contains guidance conforming to Governmental Accounting Standards Board Statements up to Statement 47. There are chapters on budgeting, governmental accounting, and financial reporting. Account codes have been updated to reflect changes in the new reporting requirements and developments in technology and security. There are also special chapters on accounting student activity funds and a model for school level program cost accounting. Available online at: http://www.nces.ed.gov/pubsearch/pubsinfo.asp?pubid=2009325. Secondary School Course Classification System: School Codes for the Exchange of Data (SCED). [NCES 2007341]. This NCES data handbook provides taxonomy for assigning standard codes to secondary school courses in 22 major subject areas. It

also includes a content description for each course, and instructions on how to use the taxonomy in coding courses. Available online at: http://nces.ed.gov/pubsearch/pubsinfo.asp?pubid=2007341.

Handbook on Human Resources. [NCES 98302] This handbook is intended as a basic guide that can assist postsecondary institutions in developing an analytically useful database on their faculty and staff. It reflects the perspectives and judgment of a broad-based group of professionals with expertise in postsecondary institutional analysis and a deep understanding of the issues concerning postsecondary education faculty and staff. Available online at: http://nces.ed.gov/pubsearch/pubsinfo.asp?pubid=98302.

Postsecondary Education Facilities Inventory and Classification Manual. [NCES 92165] This document contains a major update of types of postsecondary institutions' physical facilities and re-established current and consistent definition and classification codes to collect, report, and exchange comparable data on institutional facilities. Available online at: http://nces.ed.gov/pubs92/92165.pdf.

Standards for Education Data Collection and Reporting. [NCES 92022] Initiated to produce data collection and reporting standards through the combined efforts of data providers, producers, and users at the local, state, and federal levels. The standards do not attempt to describe the types of data that should be collected. Rather, they are intended to serve as a guide to the key phases of data collection and reporting. The standards identify the qualities that characterize good measures and describe the process of selecting and evaluating appropriate measures that will result in data of the highest quality—data that provide useful, timely, accurate, and comparable data. Available online at: http://www.nces.ed.gov/pubsearch/pubsinfo.asp?pubid=92022.

Elementary/Secondary and Postsecondary Data Exchange Standards

SPEEDE/ExPRESS (SPEEDE stands for Standardization of Postsecondary Education Electronic Data Exchange, and ExPRESS stands for Exchange of Permanent Records Electronically for Students and Schools.) is an ANSI X12 (Electronic Data Interchange) format. For information on SPEEDE/ExPRESS go to the website of the Postsecondary Electronic Standards Council at: http://www.pesc.org/interior.php?page_id=146.

Postsecondary Electronic Standards Council (PESC) standards for data exchange have been developed to assist in the movement of data from high schools to postsecondary institutions, between postsecondary institutions, and between postsecondary institutions and the U.S. Department of Education and other organizations. Participants include representatives from postsecondary institutions, local and state education agency personnel, and vendors of data software used by the community. Among the standards included are standards for electronic high school and college transcripts, student aid applications, IPEDS reporting and education test score reporting. Available standards can be found at: http://www.pesc.org/interior.php?page_id=147.

Schools Interoperability Framework (SIF) standards have been developed to facilitate the sharing of data among software used at the elementary/secondary levels. The

Schools Interoperability Framework Association consists of both vendors and education practitioners, including representatives of the U.S. Department of Education. The SIF specification provides rules for data movement between numerous types of applications-efficiently, accurately, and automatically. The SIF Implementation Specification is available online at: http://www.sifinfo.org/us/sif-specification.asp.

National Center for Education Statistics and National Forum on Education Statistics Guides

Forum Guide to Metadata: The Meaning Behind Education Data. [NFES 2009805]. The Forum Guide to Metadata empowers people to more effectively use data as information. This guide includes definition of metadata; why metadata are critical to the development of sound education systems; what components comprise a metadata system; what value metadata bring to data management and use; and how to implement and use a metadata system in an education organization. Available online at:
http://www.nces.ed.gov/pubsearch/pubsinfo.asp?pubid=2009805.

Every School Day Counts. The Forum Guide to Collecting and Using Attendance Data. [NFES 2009804]. This Forum guide offers best practice suggestions on collecting and using student attendance data to improve performance. It includes a standard set of codes to make attendance data comparable across districts and states. There are real-life examples of how attendance information has been used by school districts. Available online at:
http://www.nces.ed.gov/pubsearch/pubsinfo.asp?pubid=2009804.

Managing an Identity Crisis: Forum Guide to Implementing New Federal Race and Ethnicity Categories. [NFES 2008802]. This Guide provides information about the 1997 standards and suggestions about how to implement them at the state and school district level. It covers developing policies and procedures, communicating with staff and the public, re-identification, and coding, storing, reporting, and bridging data. Available online at:
http://www.nces.ed.gov/pubsearch/pubsinfo.asp?pubid=2008802.

Forum Curriculum for Improving Education Data: A Resource for Local Education Agencies. [NFES 2007808]. This curriculum supports efforts to improve the quality of education data by serving as training materials for K-12 school and district staff. It provides lesson plans, instructional handouts, and related resources, and presents concepts necessary to help schools develop a culture for improving data quality. Available online at:
http://www.nces.ed.gov/pubsearch/pubsinfo.asp?pubid=2007808.

Forum Guide to Core Finance Data Elements. [NFES 2007801]. This document provides an overview of key finance data terms. It also covers the 2 NCES public school finance surveys: the state-level National Public Education Financial Survey and the School District Finance Survey (or F-33). Differences and similarities between the two surveys are described. Chapter 3 contains definitions for key finance data elements. Chapter 4 contains a listing and definitions of key finance indicators and economic adjustment indexes. Available online at:
http://www.nces.ed.gov/pubsearch/pubsinfo.asp?pubid=2007801.

Forum Guide to Decision Support Systems: A Resource for Educators. [NCES 2006807]. Forum Guide to Decision Support Systems: A Resource for Educators was developed to help educators better understand decision support systems and determine how they might be used most effectively in education organizations. Available online at:
http://www.nces.ed.gov/pubsearch/pubsinfo.asp?pubid=2006807

Forum Guide to the Privacy of Student Information: A Resource for Schools. [NCES 2006805]. This guide was written to help school and local education agency staff to better understand and apply FERPA, a federal law that protects privacy interests of parents and students in student education records. Available online at:
http://www.nces.ed.gov/pubsearch/pubsinfo.asp?pubid=2006805.

Accounting for Every Student: A Taxonomy for Standard Student Exit Codes. [NFES 2006804]. Today's public education agencies are being held accountable for student achievement to an unprecedented extent. The current focus on student outcomes—particularly the attention given to graduation and dropout rates—has highlighted the importance of collecting accurate data at the student level. Comprehensive information systems need standard codes to place students who enroll in a specific school within a given district, and to subsequently track any changes in those students' enrollment status. This guidebook presents "best practice" advice, from members of the National Forum on Education Statistics, for maintaining such information. It was developed to help education agencies develop effective information systems for tracking the enrollment status of students. It is primarily for data managers and accountability directors at state and local education agencies, as well as school administrators responsible for collecting student enrollment and exit data. In addition, researchers and policymakers will find the guidebook useful in making fair comparisons among schools and agencies on issues related to student enrollment, retention, and completion. Available online at:
http://www.nces.ed.gov/pubsearch/pubsinfo.asp?pubid=2006804.

Forum Guide to Elementary/Secondary Virtual Education. [NCES 2006803]. This guide provides recommendations for collecting accurate, comparable, and useful data about virtual education in an elementary/secondary education setting. Available online at:
http://www.nces.ed.gov/pubsearch/pubsinfo.asp?pubid=2006803.

Forum Guide to Education Indicators. [NFES 2005802]. This Forum Guide to Education Indicators provides encyclopedia-type entries for 44 commonly used education indicators. Each indicator entry contains a definition, recommended uses, usage caveats and cautions, related policy questions, data element components, a formula, commonly reported subgroups, and display suggestions. The document will help readers better understand how to appropriately develop, apply, and interpret commonly used education indicators. Available online at:
http://www.nces.ed.gov/pubsearch/pubsinfo.asp?pubid=2005802.

Forum Guide to Building a Culture of Quality Data: A School and District Resource. [NCES 2005801] Quality data, like quality students, come from schools. Recently, there has been a growing awareness that effective teaching, efficient schools, and quality data are related. The quality of information used to develop an instruction plan, run a school, plan budget, or place a student in a class depends upon the school clerk, teacher, counselor, and/or school secretary who enter data into a

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computer. This document offers recommendations to staff in schools and school districts about best practices for data entry – getting it right at the source. Available online at: http://www.nces.ed.gov/pubsearch/pubsinfo.asp?pubid=2005801.

Forum Guide to Protecting the Privacy of Student Information. [NCES 2004330]. The Forum Guide to Protecting the Privacy of Student Information gives a general overview of privacy laws and professional practices that apply to the information collected for, and kept in, student records. The book is not intended to give an authoritative interpretation of any law or policy Instead, it provides background on the key principles and concepts in student privacy, summarizes Federal privacy laws and any recent changes to them, and suggests good data management practices for schools, districts, and state education agencies. Available online at: http://www.nces.ed.gov/pubsearch/pubsinfo.asp?pubid=2004330.

Facilities Information Management: A Guide for State and Local Education Agencies. [NCES 2003400]. This publication is a guide to designing and maintaining an information system about the condition, design, use, management, and financing of elementary/secondary education facilities. It includes commonly used measures, data elements, and a list of additional resources for the practitioner. Available online at:
http://www.nces.ed.gov/pubsearch/pubsinfo.asp?pubid=2003400.

Weaving a Secure Web Around Education: A Guide to Technology Standards and Security. [NCES 2003381] This *Guide* is a publication of the National Forum on Education Statistics. It provides recommendations for development, maintenance, and standardization for effective web sites. Available online at: http://www.nces.ed.gov/pubsearch/pubsinfo.asp?pubid=2003381.

Planning Guide for Maintaining School Facilities. [NCES 2003347]. This *Guide* was prepared by members of the National Forum on Education Statistics to help school facilities managers plan for efficient and effective operations. It provides practical advice on a range of topics, including how to do a facilities audit to know what you have, planning for maintenance that will ensure smooth operations and avoid costly surprises, managing staff and contractors, and evaluating maintenance efforts. Available online at:
http://www.nces.ed.gov/pubsearch/pubsinfo.asp?pubid=2003347.

Technology in Schools: Suggestions, Tools and Guidelines for Assessing Technology in Elementary and Secondary Education. [NCES 2003313]. This guide was written by the National Forum on Education Statistics under NCES's Cooperative Education Statistics System. Directed toward state and local education agencies, it describes how to measure technology use by examining planning and policies; finance; equipment and infrastructure; technology applications; maintenance and support; professional development; and technology integration. Available online at: http://www.nces.ed.gov/pubsearch/pubsinfo.asp?pubid=2003313.

Safety in Numbers: Collecting and Using Crime, Violence, and Discipline Incident Data to Make a Difference in Schools. [NCES 2002312] This document is designed for use by school, district, and state staff to improve the effectiveness of their efforts to collect and use disciplinary incident data. It provides recommendations on what types of data to collect, why it is critical to collect such data, and how the data can

be used to improve school safety and answer policy questions relating to school improvement and the safety of students. This is a National Forum on Education Statistics publication and contains no data. Available online at: http://www.nces.ed.gov/pubsearch/pubsinfo.asp?pubid=2002312.

Building an Automated Student Record System. [NCES 2000324]. The purpose of this document, developed by the National Forum on Education Statistics (NFES), is to provide a guide for local and state education agencies faced with the task of designing a new or upgrading an existing automated student information system. While based on a chapter from the Student Handbook for Elementary, Secondary, and Early Childhood Education, this guide contains additional information from a variety of resources, most of which are cited in the text. Included in the contents are guidelines, checklists and real life examples. Available online at: http://www.nces.ed.gov/pubsearch/pubsinfo.asp?pubid=2000324.

Privacy Issues in Staff Records. [NCES 2000363]. This report discusses key concepts in protecting and managing information in staff records. This handbook does not provide legal guidelines, but does address the federal Freedom of Information and Privacy Acts and offers principles of best practice. Available online at: http://www.nces.ed.gov/pubsearch/pubsinfo.asp?pubid=2000363.

Safeguarding Your Technology: Practical Guidelines for Electronic Education Information Security. [NCES 98297]. These guidelines are written to help education administrators and staff at the buildings, campus, district, and state levels better understand why and how to effectively secure their organization's sensitive information, critical systems, computer equipment, and network access. Available online at: http://www.nces.ed.gov/pubsearch/pubsinfo.asp?pubid=98297.

NCES Technology @ Your Fingertips: A Guide to Implementing Technology Solutions for Education Agencies and Institutions. [NCES 98293]. These guidelines describe a process for getting the best possible technology solution for your organization. It also describes the steps necessary to identify technology needs, acquire the technology, and implement a technology solution that provides a foundation for an organization's future technology well being. Available online at: http://nces.ed.gov/pubs98/tech/.

Basic Data Elements for Elementary and Secondary Education Information Systems. [NCES 97531]. This document contains a set of basic student and staff data elements recommended by the Core Data Task Force of the National Forum on Education Statistics. The purpose of these basic data elements is to provide a common language to promote the collection and reporting of comparable education data to guide policy and assist in the administration of state and local education systems. The report also contains a recommended process for identifying and periodically updating the set of data elements to be maintained by a school, school district, state education agency, or other education unit with a need for student and staff information. Available online at: http://www.nces.ed.gov/pubsearch/pubsinfo.asp?pubid=97531.

About the Authors

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Dr. Ligon is a nationally recognized expert on issues relating to student record collection and exchange, data quality and reporting, growth models, and large-scale system design.

The National Center for Education Statistics, the U. S. Department of Education and over 25 state education agencies have consulted with Dr. Ligon on various areas of his expertise. He has a Ph.D. in Educational Psychology, Quantitative Methods from The University of Texas at Austin and is licensed to teach in the State of Texas.

Prior to starting ESP in 1993, Dr. Ligon directed the Austin (TX) Independent School District's information and technology organization. As the executive director of management information, he led the district's efforts in developing and reporting on district-wide program evaluations, many of which won national awards from the American Educational Research Association. Dr. Ligon was also a leader in the advent of SPEEDE/ExPRESS, the EDI standard for the exchange of electronic student transcripts.

From 1992 to 2000, he served as a member of the U.S. Department of Education's Planning and Evaluation Services Review Panel. Dr. Ligon's whitepapers; *A Technology Framework for NCLB Success* and *Steps for Ensuring Data Quality* are prominently featured within the U.S. Department of Education's 2005 National Education Technology Plan, meant to help motivate and incite technology-driven transformation in education. He has authored over 25 ESP Optimal Reference Guides for the education community dealing with data-driven decision making.

At the beginning of his career, Dr. Ligon taught in predominantly Spanish-speaking schools near the Texas-Mexico border. He is an experienced evaluator of Title I, Migrant, compensatory education, and bilingual education programs.

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Vice President for Education Services
As the vice president for Education Services, Dr. Clements leads ESP's Federal Practice Group in Washington, DC. She is widely recognized as the leading expert on federal K-12 education data collection programs, policies, and content. In recognition of that knowledge, she serves as a key advisor to the U.S. Department of Education's senior staff on the national collection of data from state education agencies, particularly through the Performance Based Data Management Initiative (PBDMI) and its successor, the Education Data Exchange Network (EDEN). She graduated from The University of Texas at Austin with a Ph.D. in Educational Psychology, Quantitative Methods and is a licensed Spanish teacher.

In addition to her current role, Dr. Clements helps propel the development of automated data collection and reporting systems, unique student identifier systems, and electronic transcript/record exchange systems for state education agencies. She also advises state and federal education agencies on confidentiality, reliability, FERPA compliance, and privacy matters.

Earlier in her career as project director for the Council of Chief State School Officers (CCSSO), Dr. Clements drove the strategic direction of a series of projects promoting better collections and management of education information. Prior to that, Dr. Clements worked as the education program director at the Texas Education Agency on projects such as educator assessment, teacher training, and professional development.

Dr. Clements was a founding committee member on SPEEDE/ExPRESS, the EDI standard for the exchange of electronic student transcripts. She served on the National Education Goal Two Advisory Committee and led a resource group to analyze and make recommendations for information systems development.
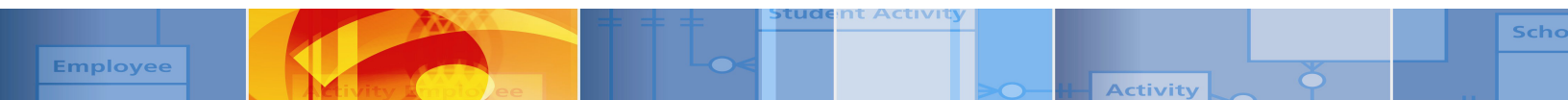
About ESP Solutions Group

ESP Solutions Group provides its clients with *Extraordinary Insight™* into PK-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/EDFacts**), National Education Data Model (**NEDM**) 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.

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