

Issues Related to Upgrade of the Professional Staff Data System

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This paper was written as a heuristic device for the purpose of exploring issues related to the prospect of changes in the PSD data system. Its intent is to create thoughtful consideration of features of administrative procedures and data systems of KDE that influence the development of KDE data systems. It does not represent an official position of the Kentucky Department of Education or the Division of Integration Services.

The Professional Staff Data (PSD) system is an administrative records system developed in the late 1960's. It consists of a series of yearly files that summarize the assignments of persons who hold certified positions in Kentucky public school districts. Such persons include teachers; education professionals such as counselors and school psychologists; and persons holding district-wide positions such as superintendents, directors of pupil personnel, and curriculum supervisors. Each person's record summarizes demographic information, as well as information about the accounts from which he or she is paid. Teacher records also summarize information about their course assignments.

The PSD is the most heavily used of all the Department of Education's data systems. Most questions asked about education in Kentucky require information about teachers and the courses they teach, or information related to specific groups of staff, and the PSD is the only source of information KDE has about these matters.

Until a few years ago PSD data were collected using multipage paper forms which were distributed in September, completed by teachers, returned to KDE, keypunched, and then summarized in the appropriate yearly PSD file on the mainframe. This was a time-consuming and error-prone set of procedures; as a result of its complexity, the PSD file was typically not available for use until near the end of the school year. In 1994 this procedure was replaced with a computer program distributed on diskette, which made data collection easier and resulted in somewhat quicker preparation time for the yearly file. The program was written using Clipper; it produces .dbf files, which are processed to produce the PSD file on the mainframe. Questions about PSD data are answered both from the mainframe system and from these original .dbf files.

Beginning in 1995, PSD information began to be supplied to the SRIM system. Initially, only the roles of persons on the PSD were used by SRIM, but in 1996 SRIM began to summarize salary and teacher assignment information as well. At the present time, all valid information in the PSD system has been summarized in SRIM. Some of the PSD information has been superseded by transaction processing functions of SRIM: certain classes of local district staff, such as superintendents, are now kept up-to-date in SRIM by a transaction processing system that create more valid data than is available through the PSD.

Recent changes in technology at KDE and in districts generally, as well as changes in the Program of Studies, have created pressure for further evolution in the collection of PSD data. Numerous issues have arisen as we have explored the idea of creating a new data collection procedure to accommodate these recent changes. The purpose of this paper is to explore these issues and their implications for design of a new PSD data collection procedure.

1. The contents of the PSD

The PSD files consist of three types of information:

Identifying information about district certified staff, including:

- Social security number
- District
- Name
- Gender
- Ethnicity
- Role in the district that employs them
- Number of years of service

Salary information

- Number of days employed
- Extended service days
- Extra duty service assignments
- Source of funding for regular salary and extended/extra-duty service
- Salary amounts for regular and extended/extra-duty salary elements

Assignment information

- Course type (Program of Studies code)
- Grade range
- Number of hours taught per year
- Number of students enrolled
- School where the course is taught

2. Who uses the PSD

PSD information is widely used by both staff of the Department of Education and by persons from external organizations. Information usage occurs under a number of conditions, including the following:

Some requests are made directly against the PSD itself, either on the mainframe or against the .dbf files kept by the Division of Finance. Requests answered from the mainframe system may be answered either through the use of existing reporting programs written in COBOL, or by use of SAS to produce custom reports. Requests against the .dbf files are answered using Clipper programs or through the use of ad hoc programs written in other languages.

The availability of PSD data in SRIM has created heavy usage of the SRIM system to create mailing labels. Prior to the advent of SRIM, mailing label requests were fulfilled through reporting programs on the mainframe. The production of mailing labels has become the greatest single use of the SRIM system. In addition to mailing labels, SRIM makes it possible, either through the

SRIM applications or through ad hoc reporting, to answer any question that might be asked about teachers and the courses they teach.

SRIM data are summarized on a weekly basis into mailing label files and placed on the KDE web server for download to anyone on the Internet who wants them.

The usage of PSD data cannot be precisely quantified, but suggestive information about usage is available. Of the 86 information requests fulfilled by the Division of Integration Services over the past two years, 58, or 67% required PSD data. As mentioned above, mailing labels – which almost always require PSD data – are the single greatest use of the SRIM system. Label files on the web server are downloaded more than a hundred times each month. A number of requests about PSD data are fielded directly by the Division of Finance. It seems likely that PSD data are used more than a hundred times a month by someone, either within or external to the Department of Education.

Evaluation of information requests by the Division of Integration Services reveals that approximately 75% of the requests made for KDE data come from sources outside of the Department of Education. These include:

- Federal agencies
- State of Kentucky agencies
- Local public districts and schools
- Private organizations such as the Girl Scouts and the Kentucky League of Cities
- The Legislative research Commission
- Colleges and universities both within and outside of Kentucky
- Corporations
- Private individuals
- Newspapers
- Researchers and students

Information requested by organizations both inside and outside of KDE typically requires a breakdown of data by teacher specialty or courses taught. This information is available only from the PSD system.

It seems clear from the available information that the PSD is the most heavily-used data resource owned by the Kentucky Department of Education.

3. The Program of Studies

Information about courses taught by teachers in Kentucky is available only from the PSD. Identification of course content on the PSD is summarized by the use of four-digit numeric “PSD codes” representing courses recognized by the Program of Studies. These codes describe non-teaching roles within public districts such as superintendents and principals, specific courses taught by teachers in public schools, and administrative duties fulfilled by teachers such as planning hours and supervision. A PSD entry is

made for each different assignment of a certified staff member, including the amount of time devoted to it, the enrollment and grade ranges if applicable.

The Program of Studies consisted, until this year, of a list of valid PSD codes agreed-upon by a committee of KDE staff. This list is used by external systems:

The Teacher Certification system uses the Program of Studies to create a table used to compare teachers' class assignments against their certificates, to determine whether teachers are teaching out of field.

SRIM uses the table to create coding information that enables teachers to be classified by the subject matter they teach.

At present there is no way other than use of the Program of Studies to determine whether a teacher is teaching in a field for which he or she is certified, or to determine what subject matter is being taught. Since information requests made to KDE very often require information about subject taught (e.g., mailing labels for foreign language teachers), this is critical information.

Changes instituted since the advent of KERA have radically altered the way courses are organized in Kentucky schools. In particular, the development of the Curriculum Framework represents a departure from the standardized course content model previously used by the Program of Studies. The Program of Studies assumed that courses would be organized by subject content on a semester or yearly basis; the Curriculum Framework describes courses according to learning goals and academic expectations, content/processes used, and does not assume that a single subject will be taught. The most recent proposed Program of Studies uses this new model, and largely dispenses with standardized course content (only certain courses required for high school graduation are specifically described). Thus the new Program of Studies radically alters the availability of information about subjects taught by teachers.

This change in the Program of Studies threatens to eliminate the Department of Education's capacity to answer information requests about the subjects taught by teachers. Given that this is the greatest use of KDE data by persons both within and outside of KDE, the likely result is to eliminate most of the Department's capacity to provide meaningful information.

It would be possible to operate the old "PSD code" system of describing courses parallel to the new approach of the Program of Studies. This would permit the external systems (Teacher Certification and SRIM) to function without major change. Unfortunately, this approach is not sustainable, for the following reasons:

New course content could not be accommodated at any time in the future, since the only body with authority to make changes in the official curriculum of Kentucky public schools (the Program of Studies Committee) has chosen to abandon PSD

codes. As time progresses, it would become increasingly difficult to capture information about new courses.

Implementation on a broad scale of the new Program of Studies would make it impossible for many teachers to adequately describe the courses they teach in terms of the old PSD codes. To the extent that courses involve more than one subject, a choice would have to be made whether to describe the course in terms of one PSD code or another, and much of the information about course content would be lost. When a course includes content from a single subject, it might well not match any available PSD code. Forced description in terms of PSD codes would in either case defeat the intent of both external systems.

It seems obvious that with the advent of the new Program of Studies, changes must be made in the PSD system. Fortunately, it is possible to model a new system that would maintain the functionality of the external systems. New applications to collect PSD data must take these new models into account. These issues will be discussed below.

4. MUNIS

MUNIS is a database application written to fulfill the KETS requirement for a District Administrative System. It consists of an Informix database and associated applications that collect information about the financial operations of Kentucky public districts. At present it has been implemented in all 176 districts in the state.

The most positive feature about MUNIS is that it provides a standardized data source for all districts in the state. Unfortunately for PSD purposes, it lacks information about teacher assignments. Thus, while it can easily provide information about two of the three PSD elements (demographic and salary information), it lacks the capacity to provide information about courses and enrollments. It represents a partial source of data.

This problem has been dealt with in recent years by providing each district with the capacity to create a file extract from the MUNIS system that serves as a source of input to the PSD application. This is a good use of the available data, but the specific implementation is problematic: the file extract must be carried on diskette from one computer system to another. MUNIS is installed in each district on an RS/6000 server using an AIX operating system, and the PSD application is written in Clipper for a Windows operating system. It would be desirable if upgrade of the PSD system made improvements to this approach. Some suggestions for these improvements are made in the final section of this paper.

5. SRIM

SRIM (Statewide Reporting and Information Management) is a client-server system contained in an Oracle database and applications owned by the Division of Integration Service in the Office of education Technology. This system was developed beginning in 1994, and continues to evolve.

Originally, SRIM was conceived as a “data warehouse”, i.e., a system that summarizes information collected periodically from other data systems. While it continues to fulfill this role with respect to many data elements, recent evolution of the system has caused substantial changes in this model. Some of the older legacy mainframe systems have been wholly or largely subsumed within SRIM, which now collects and reports this data within a transaction-oriented framework. Increasingly, SRIM has become the Department of Education’s “official” source of data for some uses.

Some PSD information has been subsumed within the transaction-oriented SRIM framework. Local district superintendents are now kept up-to-date through this system, as are also public school principals and Migrant services staff. These staff are also summarized on the PSD, but because SRIM transactions are more timely than PSD records, updates to this information are not accepted from PSD.

Within its continuing data warehouse functionality, SRIM continues to be a heavy user of PSD data. Yearly PSD files are used to update SRIM tables that summarize information about most staff employed by public districts. These data represent SRIM’s only capacity to classify teachers and others by subject matter.

6. Modeling options

Adoption of the new Program of Studies requires substantial changes in the way that PSD data are collected and reported. Because PSD codes can no longer be used to report teacher assignments, a new model that captures the same information in terms of the new Program of Studies model must be used. This will require substantial differences in the way that PSD reporting programs are written.

Two models are presented herein. The first model assumes that all information about each course offered in public schools will be collected by the system; the second assumes that only information of relevance to external data systems will be collected. Both systems are predicated on the assumption that “PSD codes” are a substitute for the information that is really needed by external systems.

What is needed, both by Teacher Certification and by SRIM is a description of the subject matter taught by teachers, the grade levels at which it is taught, and the population to which it is taught. PSD codes summarized this information in a readily accessible format that was easy to enter into a paper system; with the advent of modern client-server systems, such summarization is no longer necessary. The two models given below capture this information rather than PSD codes; where specific PSD codes are needed, the model makes it possible to generate them.

a. Modeling including the Program of Studies

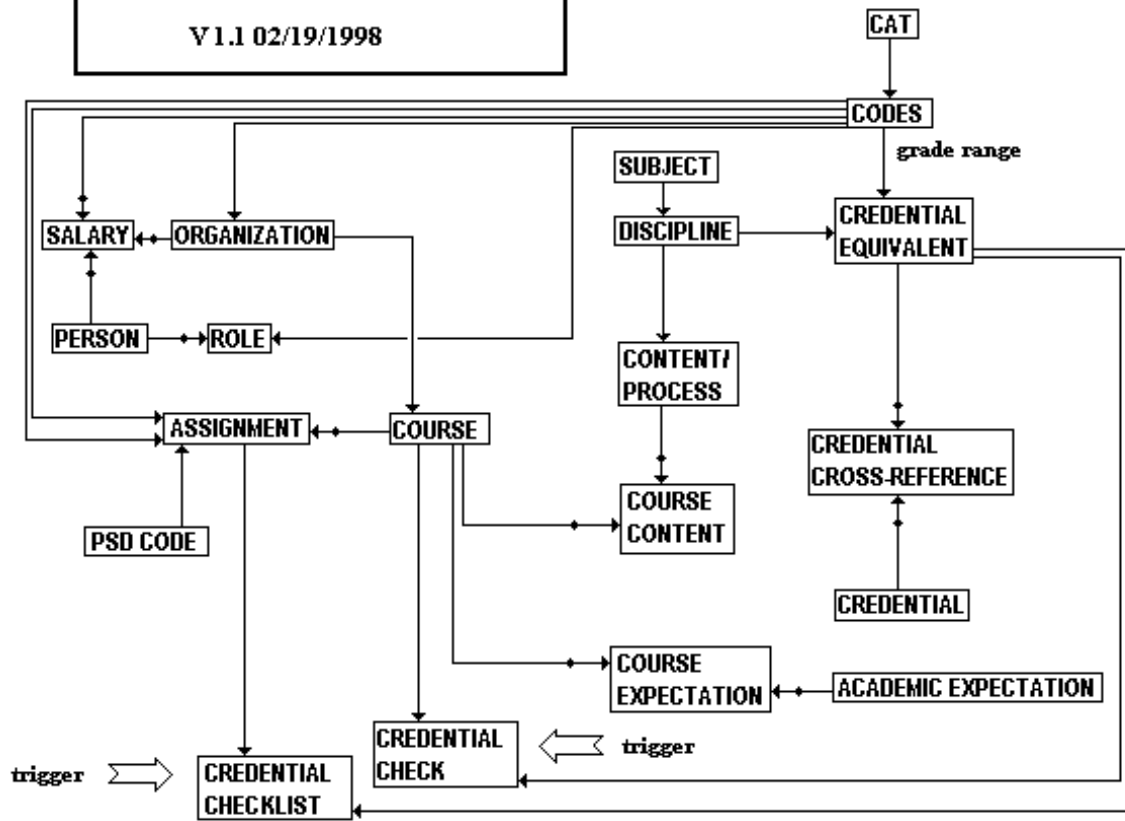
This model fully implements the new Program of Studies, including a detailed description of all the required elements of each course taught in public schools in Kentucky. It enables the translation of course elements as required in the Program of Studies into PSD codes for use by external systems.

An understanding of this model requires the assumption made above, that it is the subject matter, grade levels, and population instructed, that is of real interest to external systems. This information is collected for each course, and in addition tables are maintained creating relationships between specific types of certification and this information. When teacher assignments are associated with courses described in this model, it is possible to generate "PSD equivalent" codes for transmission to external systems. These equivalents are not the same as PSD codes. They represent what subject is being taught at what level to what population. Use of this model requires corresponding changes in the relevant code tables of the Teacher Certification and SRIM systems.

Each labeled box in the diagram represents a table that would have to be created and populated in a database, on a server as yet unspecified.

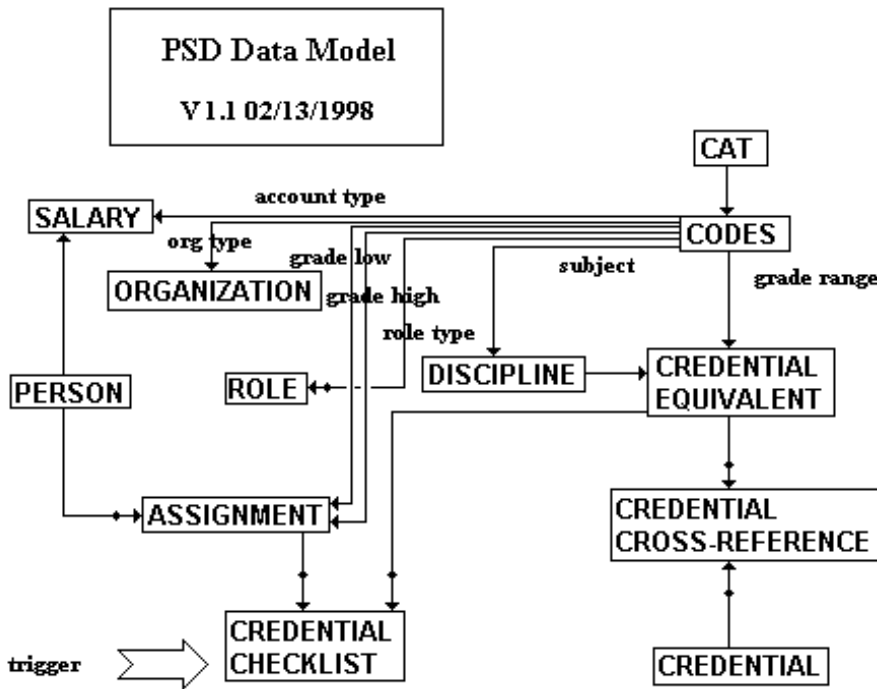
Program of Studies Data Model

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b. PSD modeling without the Program of Studies

This model is identical to the first, except that it does not provide for the detailed description of each course. Instead, districts would describe each course only in terms of the subject matter and grade levels taught. As with the first model, however, this model would make it possible to generate PSD equivalents for each teacher.

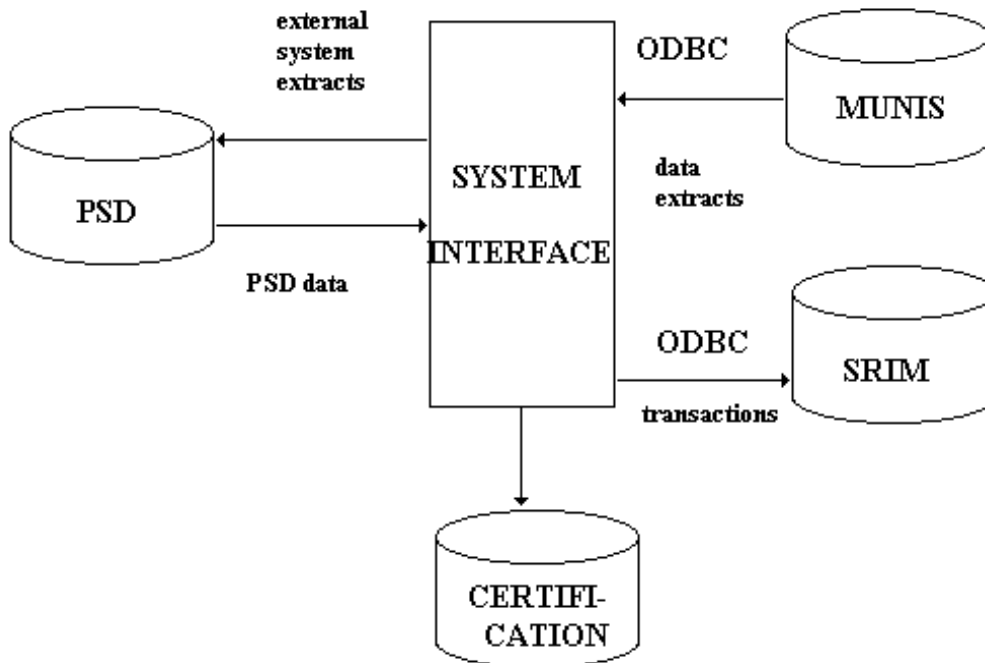


7. Replacing the PSD

As noted above, changes in the Program of Studies require a substantial change in the way that PSD data is collected. The nature of changes in the Program of Studies in fact requires that the PSD system be replaced with a more modern system, since PSD coding cannot support the requirements of the new curriculum model. This new system must preserve the Department of Education's ability to provide information to both internal and external requesters about the subjects and enrollments of courses taught by teachers.

It would be highly desirable to make other changes that account for the availability of modern technology in all public districts. All districts are now connected to the Statewide Network; this gives them access to the Internet. Such access makes it possible to create levels of system integration among data systems that have not been available in the past.

A general model of PSD system connectivity is given by the following diagram:



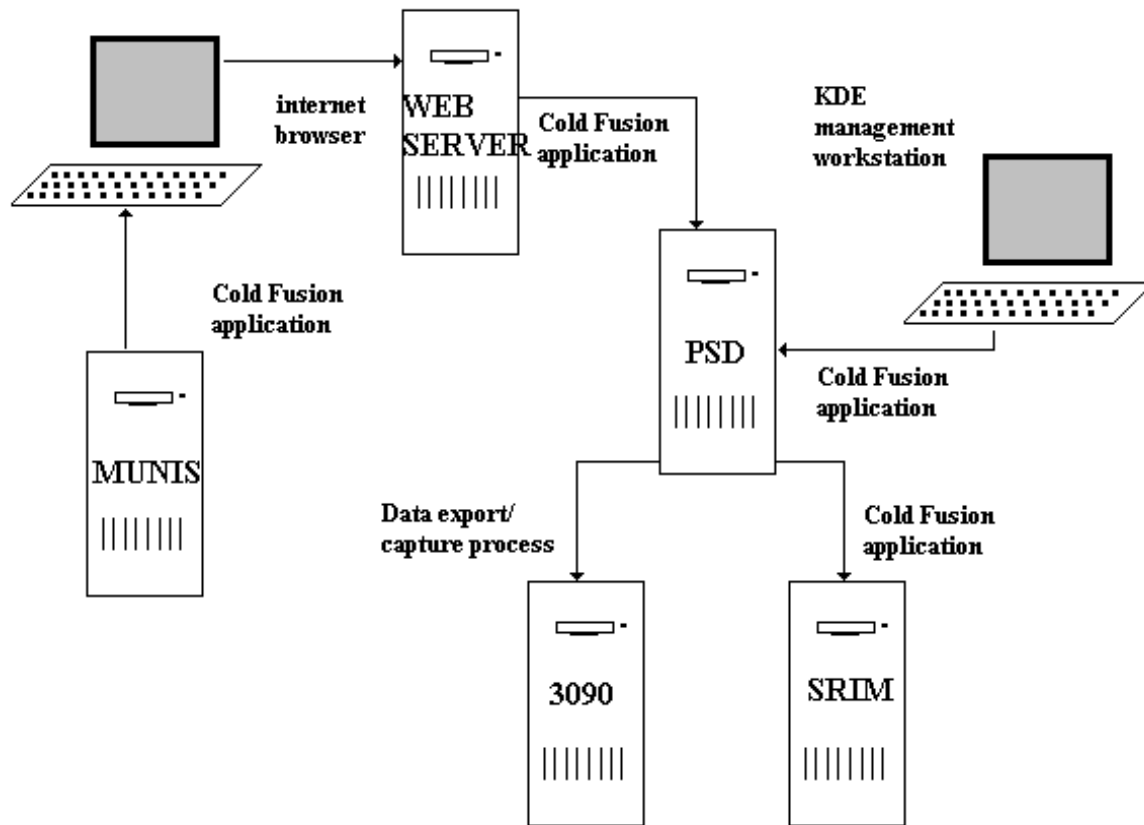
The “System Interface” is actually a group of tables within the PSD database that contains system crosswalk data for the various data systems, together with programs that translate information from one set of system codes to another. “ODBC” is a software product called an ODBC Driver (Open DataBase Connectivity) that makes it possible for an application to connect to and use an external database.

The significance of this model is that when implemented it makes it possible for a PSD program to obtain information from external systems where needed, combine it with information supplied by users, reformat it for use by other external systems, and transmit it where it is needed. An especially attractive feature of this model is that from the user’s view, no knowledge of the external systems is needed. Thus, the person who enters PSD data at the local district level need not create a file extract from the MUNIS system; this is done automatically by the PSD entry program. To the user, the application looks like a single database, even though it uses several.

The way to accomplish this model is by use of modern application development systems that allow for data transmission via the Internet. Such systems are currently in use by the Department of education, and the fact that all relevant systems are connected to the Statewide Network means that they are accessible via the Internet.

The integration of these various data systems would be accomplished using a modern Internet application development system. The system currently used by and recommended by Integration Services is Cold Fusion. This is a development systems that makes it possible to create applications that run on the user’s Internet browser, using transactions to and from remote databases. A group of applications residing on a

web server at KDE would enable all of the connections to the necessary databases, without requiring that the user be aware of the location of any of them. A graphical representation of this system is as follows:



One real advantage to this approach is that the application, once written, needs only to be maintained at one location, the web server; most support for the user's installation would be provided by the web browser vendor, or by the KETS help desk. This would greatly reduce the support requirements for system development staff.

One additional feature that would be required by the system would be a security interface. Because the application would be available over the Internet, it is necessary to assure that unauthorized users could not access the system. A security mechanism currently exists for KDE Internet applications, and should prove sufficient to prevent unauthorized access. It would require management, and this could be labor-intensive. To minimize the amount of support required at KDE, it would be advisable to have a security tree, which would require that KDE staff only fulfill security functions for district-level staff. District-level security staff would then manage access for district and school-level staff. This approach is graphically represented in the following diagram:

PSD system security management model

