Review of Student Information System for Basic Education

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ABSTRACT

Student Information System (SIS) is a system to manage timely and accurate student data. It is an important tool for improving and driving a quality of education. SIS is utilized in all levels of educational managements for students, parents, teachers, schools, municipalities, states, and federal governments. This paper focuses on SIS for a basic education (i.e., primary and secondary schools). A good SIS should be able to support educational achievements in many ways such as: 1) enhancement of individual student performance; 2) assessment of teachers’ and schools’ efficiency; 3) tracking student information across school and grade registrations; 4) producing standard reports to states and federal governments for educational policy making; and 5) publishing school or state performance reports to public in order to promote improvement and competition. This paper reviews outstanding SISs from the United Kingdom (UK) and many states in the United States of America (USA) including Illinois, South Carolina, Massachusetts, Pennsylvania, and New York. Among these SISs, there are many common features. For example, they could organize a basic student information such as demographics, registrations and enrollments, attendances, grades, class schedules, etc. Also, there are many distinct features across these SISs. Some systems help in distributions of educational resources to students, while some systems provide ways to track individual student information over time from school to school or district to district. Varieties in these systems serve different purposes of educational management. Their dominant features are discussed and compared in this paper. Then, some recommendations are proposed to leverage the existing SIS in Thailand.

Keywords: student information system, sis, basic education, education system review

INTRODUCTION

School Information System (SIS) plays a key role in educational managements from many perspectives. For example, students can use SIS for their daily school activities such as managing class-timetables and checking tests’ results. Parents can access SIS to track school performances and behaviors of their children. Teachers use SIS for a course administration such as attendant checking, subject grading, and announcements for a class. School principals can retrieve collective student data from SIS to help in making their strategies and directions, and also to automatically generate standardized reports which are required by relevant educational agencies, states and/or federal government. Moreover, federal can use timely and accurate student information collected from SISs of all schools in the country to assist in making educational policies, improving educational strategies, and distribution of the right resources to the right students and schools.

In 2001, the president Barack Obama has launched the “No Child Left Behind Act of 2001” policy which leads to a large number of SIS developed in the US. These systems aim to
be capable for accountability and reporting of students’ performances to states and federal as compliant to such a policy. In this paper, we therefore begin with a review of SISs that are mostly developed in the US and a dominant system that is widely used in the UK. Then, a brief discussion of the existing SIS in Thailand is provided. Finally, the lessons learned from these SISs in the US and UK are used to provide recommendations for improving the SIS in Thailand.

1) Benefit of SIS

SIS typically are used to help achieving the following critical goals in education:

- Tracking individual student performances continuously over times.
- Evaluating teacher and school performances for the following purposes:
  - **Accountability**: SIS provides reliable, accurate, and up-to-date information which can be used to evaluate teacher and school performances, based on student achievements. This assessment information can also be used in decision making on resources distribution (e.g. financial supports, knowledge supports, learning tools, etc.) by state and federal. The accountability results can also be used to sustain supports from parents and local public.
  - **Incentives**: Schools may be rewarded when students’ performances are above the goal. In contrast, schools may receive penalties and/or extra supports when students (in average) achieve low performances in many consecutive school years. This process has been used to enhance an efficiency of school management and a quality of school performance in many states of USA such as Massachusetts, Nevada, New York, North Carolina, etc. [1].
- Education Policy Administration. Student information collected from SISs can be used to manage and administrate education policies in many aspects such as: (i) to improve resource allocations with an aim to raise student achievements based on the accountability results mentioned above, (ii) to evaluate the federal policy on education by tracking individual students over times and to provide improvement trends from year to year, (iii) to reduce costs of school administrative and routine school activities, and (iv) to coordinate student information from a basic education and a higher education for a better student planning in both levels of educations.
- The reporting feature basically generates document compliant to the state or federal reporting standard requirements.

2) Data Collection in SIS

Most SIS maintain a minimal data set to enable the aforementioned benefits. These information consists of: (i) class attendance: allows recording and reporting student attendances on each class daily or in selected time period, (ii) contact information: SIS collects contact information for parents, relatives and authorized individuals (e.g., legal guardian) relevant to students, (iii) student demographics: enables tracking numerous student demographic attributes in a permanent record and across enrollments, (iv) grading record: allows teachers to enter homework assignments, class tests and any other activity in classes, (v) school calendars: allows teachers to enter schools days, holidays, events targeted to a specific audience, and school scheduling, (vi) reports: generate student report including final grades, GPA and class rankings.

**SIS IN THE US AND UK**

In this section, we provide a comprehensive review on the SISs developed in the US and the UK. The selected systems are chosen based on their outstanding features, the population sizes and the K-12 education ranks of the states adopting them. We discuss in this section only extra features these system provide in addition to those mentioned in the introduction. Table 1 compares the selected SISs reviewed in this paper.
Table 1: Comparison of SISs and their main functional features.

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1) **School Information Management System (SIMS) in the UK** [2] is used to manage school and student information by more than 22,000 schools in 120 districts, which is about 80% of the whole SIS market in the UK. In addition to the main functions discussed in the introduction, SIMS can help increasing students’ learning outcomes. This is because SIMS has comprehensive student information which can be used by teachers to make a difference in a classroom as follows.

- SIMS supports the collection of student performance, personalized learning, exam organization, timetable construction, and a range of other school activities. These information allows teachers to gain insight into individual student situation, thus enables teachers to provide suitable educations and supports for each students.
- SIMS helps school leaders to make informed decisions by providing detailed information about what actually happens in the school as well as promoting achievements and sharing good practices to other schools and public.

2) **OpenSIS** [6] is used in South Carolina and provides the following main components.

- Core SIS features: OpenSIS is used to manage basic student information as described in the introduction as well as the following: (i) scheduling – students can create single student schedulers or group schedulers, (ii) health records - capture student's immunization, allergies, special medical conditions, physician contact information and nurse visits, and (iii) special education functionality - track goals and progresses for students with special needs or attention.
- Extensions: OpenSIS extends functionalities in the core features in order to enable teachers to create their own website to communicate with students and parents. It can also document and track disciplinary incidents, and notify parents of infractions. In addition, OpenSIS allows the integration of its SIS with other applications, e.g., WordPress, Moodle LMS and Google Checkout, to support customization.
- Data integrations: OpenSIS enables its integration with state information system through the state reporting feature, which is based on the Extract-Transform-Load (ETL) concepts which consists of four data processing steps, i.e., collection, extraction, transformation, and load and submission.
3) **iPass** [4] is a web-based SIS that has been developed by a company named “Information Marketing Group” and has been widely adopted in the state of Massachusetts, USA. In addition to the basic SIS information, iPass enables the management of individual student success plan. It also enables connecting student and staff information to the nurse’s office through iHealth module. It separates accesses to student information to teachers and parents via iTeacher and iParent. In addition, it supports the synchronization of student biographical and scheduling data to the hand held device through iPass ToGo module.

The Information Marketing Group has developed other three systems to manage other types of information relevant to school management. These systems include: (i) iStaff - is used to manage human resources including employee demographics, attendance and leave, emergency and health, certification and re-certificate, contractual and compensation, professional development, and payroll system, (ii) iFips - is used to manage financial information such as requisition and purchase order system, payment processing system, budgetary fund accounting, and budget development system, and (iii) iAutoAlert - is embedded into iPass to inform/alert students, parents, teachers, and staffs about important school information such as school closings, delays, special events, attendance notifications and other important communications. The notification are sent via automated voice calls, emails, and/or SMS (text messages) directly from iPass.

4) **Illinois State Board of Education Student Information System (ISBE-SIS)** [5] is developed by the Illinois State Board of Education. In addition to the management of basic student information and school activities as discussed in the introduction above, ISBE-SIS allows the assignment of a unique Student Identifier (SID) for every student in the state of Illinois. This SID is very important in the SIS development and system integration in the US since students in grade K-12 don’t have a unique identifier across schools, US students actually would have unique identifier when they are 14 years old. Hence, the students cannot be tracked when they move from school to school or location to location. With the SID generated by the ISBE-SIS, the state of Illinois can track their students across schooling systems within the state. For the data integration, the ISBE-SIS enables data import and export into their systems through: (i) batch process: users can upload student information into the system via CSV, Text, or XML files in which SID is used in the data integration process, (ii) online process: users can view and update student information as well as making a standardized report via ISBE Web Application Security (IWAS), (iii) request file: users can retrieve student information as a file.

5) **SME** [7] has been developed by a company named “Harris School Solutions” and used in Pennsylvania. It enables the management of special education, case management, discipline, health, state reporting, textbook management, fee administration, gifted and talented education, counseling, career technical education, family portal, teacher portal, etc. The most outstanding feature of SME is the rule-based warning system, in which users can set rules to perform some tasks automatically, e.g., (i) to withdraw students automatically from their enrolled subjects based on a number of days of consecutive absences, (ii) to automatically scan for gifted and talented students, (iii) to send alerts in order to manage system wide messages, school messages or just to a particular user role.

6) **New York State Student Identification System (NYS-SIS)** [8] is a key component of New York State Student Information Repository System (SIRS). It has been developed by the New York State Education Department (NYSED). Due to the problem of lacking unique identifier of US students mentioned earlier, the NYS-SIS hence assigns a unique student identifier to every pre-kindergarten student in New York State. This unique
identifier is used to track individual students through grade 12 and also when he/she transfers between local educational agencies. NYS-SIS manages student information in four levels:

- Level 0 – the aforementioned basic student information is collected, verified and maintained by using a web-based application.
- Level 1 - the collected data from level 0 is loaded into repositories by using data templates and load procedures provided within the web application. Data in this level is used for analysis and reporting.
- Level 2 - all K-12 statewide school data from level 1 is aggregated here and is used in making education policies and improving curriculums and instructions.
- Level 3 - this level is the data warehouse for generating state and federal reports. At level 3, student names are removed and SIDs are encrypted to protect students’ privacy. Data at this level is used to: generate report cards, determine accountability of public schools and districts, generate federal reports, inform policy decision, and announce to public to gain attention for sustain local supports.

**SIS IN THAILAND**

In general, schools in Thailand have to use paper works or local SIS to manage student information and school activities. However, the Office of the Basic Education Commission (OBEC) provides a Management Information System (MIS) [9] to collect statistical data of students, teachers, and schools. The Data Management Center (DMC) is a key system of MIS which is used to collect student information from each school once in each fiscal year. With the administrative distribution of education from OBEC to municipalities, many SISs have been developed locally. The Department of Local Administration therefore develops a desktop-based SIS, called Local School [10], to support their schools in the student information and school administration management activities. The student information in the Local School system however is not reported to the Department of Local Administration. Instead, the student information of local schools are submitted through SIS [11] and CSIS [12] systems once in each fiscal year to claim for subsidies based on the number of enrolments.

**LESSON LEARNED AND RECOMMENDATIONS FOR SIS IN THAILAND**

Considering the basic requirement in terms of unique student identifier for information system development and data integration, Thailand is beneficial from the fact that most babies are now born in hospitals and are immediately registered to obtain a citizen identifier (CID). This CID is important for developing SIS and tracking students across schooling systems. While in the US, the SID generated for statewide students in many states can tracks students within the state, they are limited when students move across states in the US.

![Figure 1: Comparison between SIS in USA and SIS in Thailand.](image-url)
However, in terms of SIS, Thailand is still lack behind the US and UK. As shown in Figure 1, in the US, teachers can use SIS to manage student information and routine class/school activities as well as generate standardized reports to submit to state and federal. In Thailand, on the other hand, teachers have to manage school activities by using paper works and/or local SIS. Annually, teachers have to enter required student information again for federal or educational agencies. It is a duplicated work which would waste a lot of time.

Moreover, the information in SIS should be regularly updated and analyzed. SIS should be able to perform an automatic and immediate data filtering in order to early detect outstanding students including: 1) gifted and talented students; 2) poor performance students; 3) students with poverty and/or disability. The SIS should be able to exchange (e.g. import and export) data automatically across platforms, systems, applications, and/or external organizations (e.g. tax office, public health service, etc.), by sharing the same standard among them. Also, SIS should enable parents to access their children information via various types of channels e.g. web application, mobile application, online/offline access, SMS, automated call center, letter, etc. This will increase choices of accesses in order to reach more parents with diverse backgrounds, especially in Thailand. Last but not least, SIS should be able to track individual students over times, at least for the whole study cycle throughout a basic education. This will gain true data for accountability (of teachers, schools, and policies on education) and individual students’ success planning.

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REFERENCES