FUJITSU Education Solution K-12 School Business Support Services for Elementary and Junior High Schools

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Under the measures and policies of the Ministry of Education, Culture, Sports, Science and Technology (MEXT) and the Ministry of Internal Affairs and Communications (MIC), the education boards of local governments and elementary and junior high schools in Japan have started making full-scale use of information and communications technology (ICT) in their educational programs. According to the Results of a Survey on Educational Informatization in Schools released by the MEXT, the objective of having one information terminal per member of teaching staff has almost been achieved in all parts of the country. In addition, more than 60% of elementary and junior high schools have already computerized their documents related to school business. A project to have one information terminal per student is now underway, and further promotion of ICT use for education is expected. To support these informatization efforts, in the spring of 2013, Fujitsu launched "software as a service" type "FUJITSU Education Solution K-12 School Business Support" services, which integrate the school business know-how it has accumulated over many years. Whereas current support systems use packages, application service providers, private clouds, etc., these services are aimed at reinventing school business support systems. In this paper, we consider the computerization of elementary and junior high school business and introduce the operation of "FUJITSU Education Solution K-12 School Business Support" services and their expected effects.

1. Introduction

In a mission statement published in April 2011, the Ministry of Education, Culture, Sports, Science and Technology (MEXT) announced its intention to complete the introduction of information and communications technology (ICT) in education throughout Japan by 2020–21. This includes introducing school business support systems (along with cloud computing technology) into all schools. In the spring of 2013, Fujitsu released the "FUJITSU Education Solution K-12 School Business Support" services[note 1)] (K-12 services) in response to this mission statement.

Fujitsu started making a concerted effort to gather information related to school business in 2002 with the release of our groupware system for school administrators. As part of our support work, we made repeated visits to school classrooms to learn about the business of school administration and to analyze the flow of data such as attendance records, report cards, and other student records. We also worked with several customers to consider and ascertain the degree to which the introduction of ICT can improve the efficiency of school administration. We combined this knowledge to create our school business system solution, which became available starting in 2006.

The K-12 services are optimized for operation as software-as-a-service (SaaS) solutions and have been developed over several years on the basis of business analysis studies.

2. Current state of school business systems

School business refers to business carried out within schools. It includes work related to school

note 1) K-12 ("K through 12") refers to the entire period of education from kindergarten through elementary and junior high school to the final year of high school (i.e., year 12).

administration, such as processing exam results and creating timetables, work related to student records, such as updating cumulative guidance records,[note 2)] and work related to the health of students, such as performing health examinations. For many years, school administrators performed these tasks using pen and paper, which has consequently involved a lot of effort. In particular, there was felt to be a heavy workload associated with the creation of report cards and materials related to school records.[1)] However, in the last few years, the policy of providing every school administrator with a terminal device has been almost fully implemented, and work normally done with pen and paper is undergoing a complete transformation.

The results of a MEXT fact-finding survey of school business systems published in 2013[2)] indicate that almost every school administrator in elementary and junior high schools now has a terminal device but that only about 64% of those schools use computerized business systems for school business documents[**Figure 1 (a)**]. This means that, even though computers have been introduced, there are still many schools that have not incorporated them into their business systems.

Another question in the same survey focused on the type of system management used. Here, "system" refers to a system that performs work related to administrative documents and encompasses all systems that may be present within a school. The system supports sharing information between school administrators, issuing notices to homes and communities, managing services and facilities, and the like. The results showed that non-cloud networks[note 3)] are used in 15 342 schools, private clouds[note 4)] are used in 6439 schools, and public clouds[note 5)] are used in 812 schools. Expressed as percentages of all elementary and junior high schools, these numbers are equivalent to 50%, 21%, and 3%, respectively [**Figure 1 (b)**].

The K-12 services introduced in this paper are provided in the form of SaaS that functions like a public cloud. As the survey results show, only 3% of schools have implemented such advanced measures.

The Ministry of Internal Affairs and Communications (MIC) envisages that school business services will mostly be operated using publicly licensed application service provider (ASP)/SaaS type services (i.e., private cloud and public cloud services) due to their cost-effectiveness, literacy, and security measures.[3)]

3. Description of K-12 services

3.1 Objectives

Given the current state of school business systems discussed in the previous section, Fujitsu identified three key objectives for its K-12 services.

1) Enable easy start-up

Enable customers to set up school business systems without difficulty.

2) Improve efficiency of current business as much as possible

Achieve efficient operation by reducing the data input workload as much as possible and by automating routine tasks such as data transcription and numerical aggregation.

3) Provide new educational perspectives

Store data in a centralized database so that data can be displayed in a cross-sectional manner, which is not currently possible. That is, provide a platform enabling data to be analyzed from various new perspectives.

3.2 Functions

The K-12 services provide functions that support a number of areas.

1) Attendance information

Functions are provided for inputting student attendance information and for outputting attendance reports and other related reports.

2) Educational programs

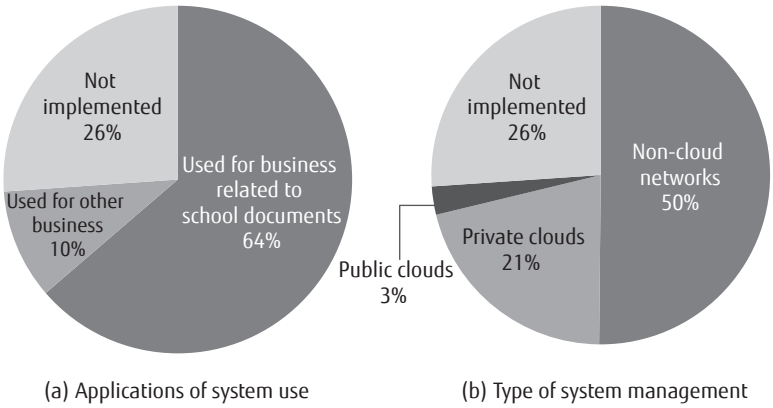
Functions are provided for inputting teaching plans and for outputting teaching progress reports and future teaching plans.

note 2) A document containing school register information and evaluation information about the students. This is an official document that schools are obliged to maintain.

note 3) A conventional network implemented and operated within the school facilities that is based on a server at that location, including the nodes where software, data, and the like are stored and/or accessed.

note 4) A cloud computing environment built and operated by a school, board of education, or the like and used by a limited group of people.

note 5) A cloud computing environment built and operated by a commercial vendor that provides a wide range of services to the vendor's customers.



(a) Applications of system use (b) Type of system management

Figure 1
Applications of system use and types of system management in elementary and junior high schools.

3) Test records

Functions are provided for inputting student test results and for outputting aggregated data.

4) Report cards

Functions are provided for inputting student evaluation information and for outputting a variety of report forms and report cards.

5) Cumulative guidance records

Functions are provided for inputting student evaluation information and for outputting cumulative guidance records.

6) Forwarding and approval status

Functions are provided for forwarding and approving the various official records output from each function and for checking the status of these records.

7) Useful features

Functions are provided for retrieving the data input for each function, for using that data to generate reports, and for outputting that data in comma separated values (CSV) format.

8) Personal records

Functions are provided for accumulating information from day-to-day observations of each student and for enabling the data input for the various functions to be referenced on a per-student basis.

9) School health

Functions are provided for managing medical examination records and information from health office visits and physical fitness checks.

10) Operations management

Functions are provided for managing information about school administrators and students, implementing various types of master data, setting system access privileges, etc.

The following sections introduce the specific measures of the K-12 services corresponding to the three objectives mentioned above.

4. Enable easy start-up

The measures relating to the first objective (enable easy start-up) are as follows.

4.1 Demonstrate services' effectiveness to customers

By introducing the K-12 services as SaaS, we make it easy for customers to see what sort of effects they can expect.

For example, implementation is cost effective because it does not require any initial investment in hardware or software. The server management and service operations necessary for service maintenance and administration are performed by Fujitsu ICT specialists, thereby reducing the need for customers to have specialist knowledge for the maintenance and administration of the services. Data is maintained at Fujitsu's data center, where security is ensured.

4.2 Consider MIC guidelines

The content of the K-12 services have been carefully examined to ensure that they follow the guidelines for ASP/SaaS providers in educational fields, which were published in 2010 by MIC.

These guidelines have been comprehensively set forth for items that should be considered by service providers such as Fujitsu and their customers. By checking the content of services from a third-party viewpoint, we ensure that services are introduced smoothly.

4.3 Enable customers to customize mechanisms

The mechanisms provided by the K-12 services can be customized by the customer.

Most of the customization work related to school business involves the creation of report cards. While report cards are not official records that schools are obliged by law to issue and maintain, they are widely used as a means of achieving smooth communications. Consequently, there has been a history of changes being independently made at the discretion of the school principal.

For report cards and other forms that are updated particularly frequently, the K-12 services provide a mechanism that enables changes to be made easily with image editing software. A mechanism is also provided that enables detailed editing to be performed using dedicated software when adding or deleting data items or performing large-scale modifications to the format (**Figure 2**).

5. Improve efficiency of current business as much as possible

The measures relating to the second objective (improve efficiency of current business as much as possible) are introduced below with reference to the attendance information data flow shown in **Figure 3**.

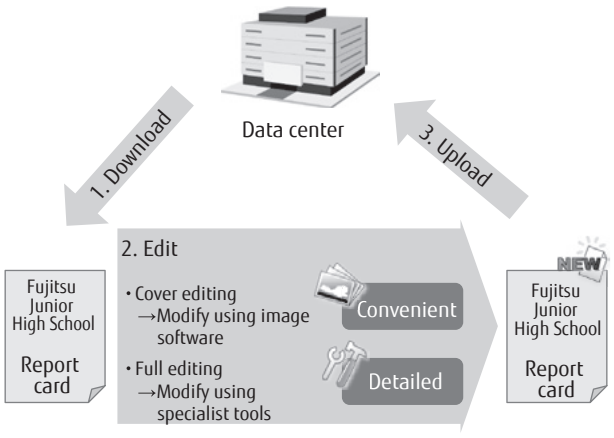


Figure 2
Customizing report cards.

5.1 Automate and streamline transcription work

In the morning, the teacher takes attendance by checking the names on the class list [1) in Figure 3]. The data is aggregated for each class on a daily basis [2) in Figure 3], the aggregate figures for each student are calculated on a monthly basis [3) in Figure 3], and a monthly attendance report is prepared. Information is transcribed for report cards at the end of each term [4) in Figure 3] and for cumulative guidance records at the end of each school year [5) in Figure 3]. In short, a number of aggregate value checks and data transcription tasks are done as part of the school's business.

With the K-12 services, the processing within the area indicated by the dashed line in Figure 3 can be automated. Moreover, the processing covering tasks 2–4 can be performed at the touch of a button.

The handling of test data and rest results is performed using similar business analysis methods. Simply by inputting the test results, it is possible to automate the process of deriving an evaluation of results in accordance with particular judgment criteria.

This automation reduces the workload on school administrators and the number of administrative errors. Moreover, the unification of the document preparation criteria should improve the quality of school business.

5.2 Simplify input

The K-12 services minimize the amount of work needed to input data into the system. In general, the accumulation of more data in the system increases the possible variety of secondary processes, facilitating subsequent expansion to a wide variety of services. As a first step, we made it as easy as possible to input data.

Specifically, a mechanism is provided for copying data using mouse clicks or from office automation (OA) software or the like and pasting it into the system. It was implemented to improve the operating efficiency compared to the current state of affairs in which school administrators mostly use their own OA software to prepare data and then copy that data into the system.

A tool is also provided for reading grade scores—it converts the grade scores on written paper tests into

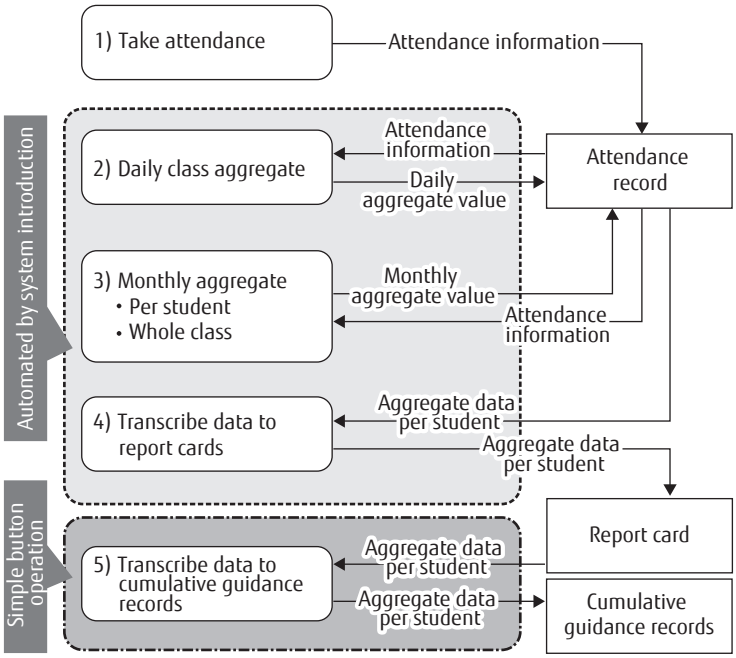


Figure 3
Data flow of attendance information and scope of automation.

electronic data. Conventionally, tests are marked with a red pen, and the scores are then either written into a log or entered into a computer to derive the grade each student receives for each subject by performing aggregate calculations. With this tool, scores can be converted into electronic data that can be stored in a centralized database. The stored data can be used as source data for the derivation of subject grades.

The effects of this process on work efficiency are illustrated by the following rough calculations. As shown in **Figure 4**, it takes about 15 seconds to enter the test results for one student,[note 6)] so the time taken to enter the test results for a whole semester would be 15 seconds × 40 students × 30 tests = 5 hours. Using this tool to perform the work reduces the time taken to 2 minutes per class × 30 tests = 1 hour. As the number of tests increases, this difference becomes even larger, and the efficiency increases even further.

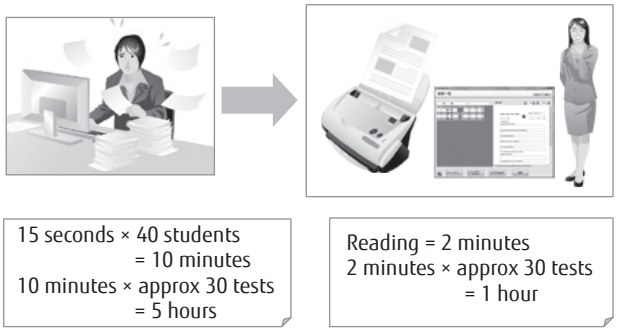


Figure 4
Trial calculations of reduction in time taken to input test results for each semester when using test result reading tool.

6. Provide new educational perspectives

The measures relating to the third objective (provide new educational perspectives) are introduced below.

6.1 Store data consistently

If school business is all done using pen and paper, it is difficult to pass on information from one school year to the next, including the large numbers of test results, the report cards for each semester, and the daily observations of students. Even if the information is stored using OA software, it is split between multiple files with inconsistent input formats, making

note 6) 15 seconds is needed because evaluation scores have to be entered for each student from multiple viewpoints.

it impossible to pass on information to the next school year on the basis of clear standard methods.

Since the K-12 services store information in a centralized database, it is easy to pass on all information from one school year to the next. In particular, the personal record functions provide a consistent way of accessing diverse types of information, such as notes on individual students.

This mechanism enables school administrators to review the progress of students from diverse viewpoints and provides the basis for individual guidance.

6.2 Retrieve data flexibly

The K-12 services provide functions that enable the data in the centralized database to be searched in various ways. The data can be downloaded and freely processed using data aggregation and other tools running on the terminal equipment.

In recent years, there have also been many social issues involving students, and a greater burden of responsibility is being placed on schools and boards of education. Using the K-12 services enables the data collected every day to be output in real time, making it possible to perform data analysis in a timely fashion.

7. Future challenges

To enable the K-12 services to spread to elementary and junior high schools throughout Japan, Fujitsu is addressing the following issues:

In the near future, every schoolchild in Japan will be provided with his or her own terminal device. Of course, terminals will also be used by teachers for collecting and storing data relating to student assessments, such as materials created by students, and the contents of lessons checked by teachers. These data and contents can be made available as services in the form of a teaching portfolio. Since the K-12 services provide a mechanism for viewing information about individual students, their use makes it possible to support students from an even broader perspective. Thus, one issue being addressed is that of collaborating with external systems such as digitized teaching portfolios.

It may also be necessary to provide potential users with a clearer description of the security policy for the K-12 services. School administrators, boards of education, and parents have expressed reservations about the storage of school information off-site using ASP and SaaS technologies.[3] To address these concerns, it will be necessary to explain in simple terms how the security measures offer adequate security.

8. Conclusion

Fujitsu's efforts in developing the FUJITSU Education Solution K-12 School Business Support services and the potential benefits of these services have been discussed. It is expected that school business support systems including ones based on SaaS will be actively introduced and will spread to schools and boards of education throughout Japan. Although the K-12 services have a simple functional configuration, careful consideration has been given to the benefits and value they offer to customers. Customers that have already introduced separate systems will understand the benefits that can be obtained by storing data in a centralized database. We will continue to work on improving these systems so that their benefits can be enjoyed by school administrators at elementary and junior high schools throughout the country.

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