

## **Republic of Palau Ministry of Education – Context Analysis**

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### **About the Organization**

The Republic of Palau's Ministry of Education (MOE) is responsible for maintaining a high level of education throughout the nation's public school system. To satisfy this responsibility the ministry reviews and recommends funding, curriculum and personnel changes and develops educational plans and budgets to submit to the national government. The school system consists of twenty-two public elementary schools (grades 1-8) and one public high school (grades 9-12). Overall, the school system comprises 2200 students at the elementary level and approximately 750 students at the high school level. Almost half of the students in grades 1-8 attend the two schools in the State of Koror, Koror Elementary and George B. Harris Elementary.

The ministry is a branch of the Republic of Palau's national government and is overseen by a politically appointed minister. The organizational structure consists of a Director of Education reporting to the Minister, followed by four Chiefs each responsible for a division plus an Administrative Services Manager.

Most of the funding for the MOE comes from the national government of Palau, however they also receive grant money from the US Department of Education and assistance from Pacific Resources for Education and Learning, a non-profit based in Hawaii dedicated to improving education in the region. Because of the diversity of sources providing funds, the MOE must follow guidelines required by the different bodies, including the U.S.'s No Child Left Behind Act.

The Administrative Services division is responsible for the technical environment. It consists of a manager, Edwel Ongrung, and a four person staff. This department works with the other divisions within the Ministry to provide the services necessary to support the mission of each division. These services include computer and network installation and support, software deployment and information services.

### **Facilities**

The MOE is housed in its own building in the center of Koror. There is ample space for the Administrative Services department. There is secure, air-conditioned space for servers and networking equipment.

There are also computer labs in each of the public schools in Palau. For the most part, there are individual labs to house these computers. Access is limited to teachers and students and security has not been an issue.

### **Technical Environment**

The MOE is currently supporting a wide array of systems. Within the Ministry, Mac OS X is the predominate platform, but there are also numerous Windows machines. At the schools, labs consist mostly of Mac OS 9 computers, but Linux labs are also being deployed. The Microsoft Office suite is commonly used within the MOE. At the schools, both Microsoft Office and Apple Works are common. MOE email accounts can be accessed through Squirrel Mail in a web browser.

The network for the ministry is also diverse. A 128 K leased satellite connection to the Internet is based out of the ministry office. Within the office there is both wired and wireless network access. Within

Koror, the public schools are connected by a wireless connection to the ministry. Three of the other schools are connected via DSL to the MOE and the rest are connected via a 33.6 kbps dialup. All of the schools have wired networks set up on site. The ministry manages several servers providing remote dialup network access, file sharing, email and a web server.

### **Technical Management and Planning**

The Administrative Services division is responsible for the planning and management of technology. The management team (consisting of the Minister, Director and four Chiefs) must approve all official changes in policy and while a technology plan has been developed, it has not yet been approved. Even without that approval however, many aspects of the plan are being implemented and the organization has a clear direction and focus for future technical development.

### **Internal and External Communications**

The organization must communicate on several different levels. Within the Ministry there is extensive use of the MOE email system. The management team meets frequently to discuss the direction of the organization and with everyone centrally located communication is not an issue. The MOE must also keep an open dialogue with schools throughout Palau. Officials at each school have been assigned email addresses and the majority of principals are comfortable using it as a means of communication. The elementary schools are regularly required to submit various forms with statistical information such as enrollment, attendance and grades. Most schools submit these forms electronically via email, but occasionally they are delivered on paper and the information must manually be typed. There is also an issue regarding file formats since many of the schools use AppleWorks while the MOE works with Microsoft Office. School staff regularly attends professional development courses at the MOE and these sessions serve as the primary means of communicating information to teachers in Palau.

There is currently little communication between the students and parents and the MOE. Grades and other information are sent to the parents directly by the schools. There is a realization within the MOE that as information becomes more centrally located, new procedures may have to be adopted.

### **Information Management**

Information management has consistently been one of the most significant challenges posed to the MOE. There is a remarkable amount of data and organizing it efficiently and generating accurate and appropriate reports from it has proven to be a difficult task. The MOE has resorted to numerous contrasting systems for different components of information management with mixed success.

The Ministry has had the most success with handling financial and staff data. In the last year, a successful transition has been made from a FileMaker database to a MySQL/PHP based system. Several databases store information such as the budget, current staff, salary data and timecard reports. Employees keep this information up to date through a PHP interface designed by Edwel Ongrung.

The MOE has had significantly less success managing student data. A variety of solutions have been attempted, but none has provided the up to date information and reporting that the organization requires. A Microsoft Access database was designed to record student enrollment data and generate reports, but there was difficulty in its implementation as there was no efficient way to input data into the system. Only one MOE employee could perform data entry and data did not arrive from the schools in a consistent or useful format. This method has been abandoned in favor of Microsoft Excel spreadsheets, but many of the same problems remain concerning data entry. Often by the time information is entered into the spreadsheets, it is already obsolete. A HTML web form system was designed two years ago to

retrieve data from the schools in a consistent format, but policy did not dictate its use, and although training was provided for the teachers, the system never gained acceptance or overall use.

### **Consulting Task: Implement a Web Based Student Information System**

A well-implemented student information database can provide numerous benefits to the teachers, schools, ministry and the students themselves. By giving the teachers and school administrators a interface to enter data directly into a system that can be accessed both at schools and at the MOE, several layers of complication and redundancy are immediately removed. The most obvious example of this is the elimination of the replication of enrollment data at both the Ministry of Education and the individual schools. Another benefit to this system is the speed and accuracy with which the MOE is able to access vital student information. With previous systems, the most up to date data was at times six months old where as with a web based information system, real time information will be immediately available for the ministry's use. One of most important uses of the new system will be the reporting of standardized testing results that all elementary school students must take in five subjects each quarter.

A web based student information system can also provide numerous other features that will benefit the school system. It can provide easy methods for teachers to keep grade books and report attendance. It can also provide individual schools flexibility in creating class schedules and generating custom reports. The ease in creating and accessing this information will reduce time-consuming tasks for teachers and administrators enabling them to spend more of their time in the classroom educating students. Finally, the information available through this software will enable the MOE to provide more timely and accurate reports on its progress in reaching it's goal of high quality education as an argument for increased funding both within Palau and from international organizations.

### **Approach**

To build a system with the capabilities described above in a ten week time frame was not a reasonable objective. Instead, several open source student information systems were examined and one demonstrated the functionality and ease of use required for the Ministry of Education's. The Centre Student Information System is open source software developed in PHP with a backend PostgreSQL database. The software provides the functionality to manage numerous schools, each with independent marking periods and the capability to store multiple years of information. Information managed includes student enrollment (including class schedules), attendance, grades and report cards. It is built with a module approach so additional functionality can easily be added as required by the MOE and individual schools. It also includes an advanced user management system with which one can manage access for teachers and administrators.

Centre stores extensive biographical data for each student including multiple addresses, medical information and past and current enrollment data. Administrators can also easily add additional fields to be stored through the web interface.

At each school, classes are created and each one is assigned to a teacher. It is easy to enroll students in classes either on an individual basis or by group (for instance, all first grade students can be placed in a specific class). The teacher who is assigned to the class is automatically given access to assign grades and take attendance for the individual class. If they choose, they may also create a grade book for the class and use it to keep track of grades for assignments, papers and tests (which can be weighted to determine a final grade).

To implement Centre for the Ministry of Education, few changes to the software itself are required. The more challenging aspects concern importing data appropriately and then taking the necessary steps to

ensure sustainability. To import data, there is a significant amount of work required to parse the “current” student data in the ministry’s Excel spreadsheets. It will be important to initialize the system with accurate information to ensure usability in its initial stages. To accomplish this, several elementary schools will be set up on a trial basis at the beginning of the project and employees at those schools will test the system to find any problems that arise and any other possible kinks in the system.

Another challenge will be determining the steps required to ensure that all teachers in Palau are required to use the system so that complete and accurate information reaches the MOE. In order to set these policies, detailed proposals and recommendations will be designed to present to the management team. Of course training in the use of the new system will be required for teachers and administrators once it is in place and the Administrative Services division will ultimately be responsible. To ease the load on its employees, it will be important to develop instructional guides that can be given to teachers for reference.

One other important aspect of the system is report generation. Built into the standard version of Centre is the ability to create reports with information such as schedules, grades, class rank and attendance. It will be necessary to meet with the Division of Research and Evaluation to determine what other types of reports are required and work to make that these can be generated. It will also be important to ensure that employees at the MOE are knowledgeable in both how Centre operates and the PHP language to create new reports in the future.

One last challenge will be to keep the MySQL database that manages staffing in the MOE synchronized with the Centre teacher database. A resolution for this problem has not been found yet, but it is most likely that scripts will be created to manage both systems simultaneously. There is little redundant data in the two different databases and this should not be a major issue.

## **Outcomes**

Over the course of the given work period, a complete student information system was implemented for the sixteen elementary schools in Palau. This system includes the ability to track information such as student’s personal information, enrollment data, quarterly grades, assessment exam grades and daily attendance. Other features of the software, which is based on the open source student information system *Centre*, include the following:

- Data is archived so that data from previous years remains intact for reporting purposes.
- Access privileges restrict teachers and administrators to viewing and modifying only their students’ information.
- All system data is stored in a PostgreSQL database and can be accessed for reporting purposes through standard means.
- A new student registration form has been created to match the previous paper registration form. This webpage provides a convenient method of entering a new student into the system from a single screen.
- Simple reporting features are built into the software to generate information about grades and attendance (such as total absences for a student, class or school).

The MOE is fully prepared to maintain the system from an administrative point of view. It resides on a Ministry of Education server that provides several other services and is backed up regularly. I also worked with several MOE employees to go over installation of the software from scratch. They are able to progress from a formatted hard drive to installing Linux and *Centre* with all other necessary software. In terms of long-term sustainability from an administrative perspective, the software does not provide any specific challenges and regular backups will be the only ongoing task.

Maintaining the integrity and completeness of the data is the more challenging aspect of the software. Many steps were taken to achieve these goals with varying success. Bernice Elechuus, who is responsible for student data at the Ministry, has taken the lead role in providing continued support for the software and maintaining the data. To provide for several of the schools with more limited Internet access and no school secretary, scripts were created to import data into the system from comma-separated files. Bernice has used the enrollment and grades scripts several times to practice importing student data.

Several school secretaries have also been trained in the software's use. Each attended a three-day training course led by Bernice and I. During the class, each secretary repeatedly demonstrated a number of skills using the software. These including registering new students, modifying student biographical information, transferring a student from one school to another, creating new subjects and classes, changing student schedules and submitting student grades and attendance. Bernice was involved in each step of the training process and is planning on continuing training MOE employees as necessary.

Another major outcome that Bernice was heavily involved in was cleaning data, importing it and preparing for the coming school year. The data from the 2003-2004 and 2004-2005 school years was carefully examined and many duplicate students and misspelled names were fixed. This task was completed entirely by MOE employees. When the data was deemed to be accurate, we worked together to use scripts and import the data into the new student information system. Bernice primarily handled importing the 04-05 data on her own. Not only will this allow the MOE to have two additional years of data in the system for reporting, but it will also make it considerably easier to set the system up for the coming school year using the software's rollover features.

The MOE's ability to upgrade and further customize the system is unproven and is one possible issue in terms of sustainability. The depth of knowledge required to update the system certainly exists within the Ministry of Education, but the time that it would take might simply not be available. While the current software will certainly meet the needs of the organization for some time to come, it may take further outside assistance to upgrade the software in the future. One of the primary challenges in adopting this system, cleaning and importing data, should not be an issue with future updates or modifications to the software.

### **Recommendation 1: Encourage Teacher Involvement**

While the current student information system takes many steps in the right direction in terms of diversifying the job of data entry, it would be even more effective if taken to the next level. By training and encouraging teacher involvement in the system, it would ease the load on the administration at the MOE and on school secretaries allowing them to spend more time with other tasks. Further, it would increase teacher involvement with their students, allowing them to see reports of grades and attendance and give access to biographical information such as guardian's telephone numbers as needed.

By removing a degree of separation between the source of the data and its entry into the system, it is more likely that the data will be accurate as well. One possible risk is a teacher begins to enter data without proper training. While the possible damage is limited (because of access controls), it is still important to train and guide teachers as they begin to use the software. A possible method to increase excitement and adoption of the software among teachers is to hold a workshop on the integrated grade book and show how it can be to keep track of their student's grades online. This would present the teachers with a time saving element of the software for their individual benefit while also encouraging the software's use, which would benefit the Ministry of Education. From a long term perspective, as teachers become more comfortable with computers and the use of the software, it is advisable to set policy such that teachers are required to enter their own grades and attendance data into the system.

## **Recommendation 2: Integrate Palau High School**

To take full advantage of many of the possible features of the Student Information System, it should be implemented system wide, including Palau High School. By deploying the software at the high school, there are several immediate benefits for both the central Ministry of Education office and the high school. For the central office, there is a single system that can be used to look up information for any student in the public school system and a single database that can be used to generate reports on these students. For the high school, by using the software, the freshman students would be easily transferred into the school at the beginning of each year complete with student biographical data and transcripts.

The software also has many features that would be especially useful at the high school level. In addition the teaching grade book previously mentioned, the built-in scheduling capabilities are extensive. It is easy to generate complex customized schedules for individual students as needed.

The Ministry of Education is capable of completing the transition for Palau High School into the system without additional outside help. The current high school registrar has been trained in the use of the software and with Bernice's assistance could import the data and take the necessary steps to begin using the software. The scripts set up to import the elementary student information would easily work for the high school data. It is an appropriate time to include the high school as the school is looking for a new information management system.

There are few risks involved in further deploying the software into the high school. Rather than developing and deploying new software specifically for the high school, using the *Centre* software provides the added benefit of having several people already trained in its use within the Ministry of Education. It would take time to import data from the current access database, but this would be a one-time challenge in return for many long-term benefits.