Palau Ministry of Education
Executive Summary

Student Consultants: Tom Lewkowitz, Yixin Liu
Community Partner, Edwel Ongrung

I. Background Information

Where still applicable, this background information is adapted from a prior consulting report by Zixuan Ma written in August 2007. [1] The Ministry of Education (MOE) is one of the nine ministries of the executive branch of government of the Republic of Palau. Its mandate is to provide public education to Palau's children from 6 to 18 years old. This mandate is carried out through the operation of 19 public elementary schools and one public high school.

Its mission statement is:

The mission of the Republic of Palau's Ministry of Education, in partnership with parents and community, is to ensure that our children and youth preserve Palauan culture and become contributing citizens and productive workers in a changing world. This will establish a high quality of life and security for future generations of Palauans.

The Ministry of Education is constantly improving its organization operations in order to serve generations of Palauan students and parents effectively. In particular, they are receptive to new technology and are looking for ways to incorporate technology to increase the effectiveness of management, administration and instruction.

II. Consulting Tasks

Currently one of the responsibilities of the MOE Central Office is to enter student responses of various standardized tests. These tests include the Palau English Reading Assessment which is administered three times a year for each grade, the Quarterly subject tests and the Palau Achievement Test (PAT) which are administered to students of grade 4, 6, 8, 10 and 12. They are particularly concerned about the time spent on processing data, including entering data for student responses and analyzing them using Microsoft Office Suite 2002. The student consultants are tasked to improve the time spent on data entry by designing an integrated test management system for MOE.

At the same time, the MOE is also interested in using the data entered when generating reports in order to do a variety of evaluations. In addition, the Ministry is interested in using data of student responses (item analysis) to evaluate their test design as well as tracking the performance of individual students. The student consultants were asked to integrate these features into their test management system for the management team at the MOE.

[1] Adapted from Zixuan Ma's report in 2007.

III. Outcomes Analysis and Recommendations

A new database design for managing student test responses was implemented and created on the current database servers. The design allowed for data collection to be centralized and data analysis to be done automatically. This meant they did not need to create new spreadsheets and write new scripts each time a new test was administered. Furthermore, it improved the integrity of all test response data.

An online test management system was also developed and successfully integrated into the MOE's intranet. It incorporated the new database design which allowed staff members to work with data in our new database tables. Features of the online test management system include:

Data entry of student responses

- Interface for manual entry of student responses into the database
- Automatic entry of scanned student responses into the database after the responses has been scanned

Data Analysis (Analysis could be done at the national level or at the school level)

- Analysis of where students needed help in (i.e. questions could be labeled as question type such as grammar, vocabulary etc.)
- Item analysis of how students fared and responded to each question
- Easy access to information on the number of students who took the tests and the statistics (i.e standard deviation, average, minimum and maximum score)
- Analysis of the passing rate and the percentage of students that fall within given skill levels (i.e Students who got above 90 are categorized as advanced)
- Easy access on how any individual student has scored for all tests that the student has taken

The test management system also communicates with the different tables that are used for students in elementary schools and for students in the Palau High School (PHS), allowing for a truly integrated system for students from grade 1 to grade 12.

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Palau Ministry of Education
Final Consulting Report

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I. About the Organization

Organization

The Republic of Palau's Ministry of Education (MOE)[2] 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, personnel changes, develops educational plans and budgets to submit to the national government. The school system consists of nineteen public elementary schools (grades 1-8) and one public high school (grades 9-12).

Its mission statement is:

The mission of the Republic of Palau's Ministry of Education, in partnership with parents and community, is to ensure that our children and youth preserve Palauan culture and become contributing citizens and productive workers in a changing world. This will establish a high quality of life and security for future generations of Palauans.

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.

[2] Adapted from Edmund's report in 2008.

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.

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 Computer Services department. There is secure, air-conditioned space for servers and networking equipment. Spare computers are stored in the server room as well, making it a warehouse for storage of IT equipment as well.

Within Koror, the public schools are connected to the ministry's network infrastructure mainly by dial-up (detailed later in the Technical Environment section). All of the schools have wired networks - LAN set up on site. The schools managed by the ministry spans across the 2 major islands: Koror, Babeldaob and various other remote islands such as Peleliu and Angaur.

Programs

The ministry maintains all of the 20 public schools in the country: 19 elementary schools and 1 high school. The public schools offer neither preschool nor kindergarten programs. However, preschool Head Start Programs are provided by a private Palau Community Action organization. These programs are supported by U.S. federal funds.

There are a total of about 3000 students in total in the public schools; School attendance is compulsory for children aged 6 through 14 where they attend elementary school from grade 1 through 8. Attendance for high school from grade 9 through 12 is not mandatory. The ministry also helps to administer standardized tests such as the SAT and TOEFL.

Besides the primary responsibilities of primary and secondary education, the ministry also oversees adult education where they administer the General Education Diploma (GED) and also programs for adults to attend high schools. In addition, the Ministry also oversees the special education program, especially in the area of early childhood.

The ministry handles transportation, facilities, supplies, staff, curriculum development, and instructional technology of all the public schools. All of the upper level staff principals and administrators have email and utilize it frequently as their primary means of communication. There is a plan to expand this email accesses to all students and staff. Teachers intend to use internet research to enrich existing curriculum in both high school and primary school.

Staff

The organization is overseen by a politically appointed minister and is run by a management team consisting of the top three levels (Minister, Director, Chiefs). The head of the ministry is the Minister of Education Masa-Aki N. Emesiochl who's appointed by the elected government. The ministry has one bureau and the Director of Education Emery Wenty runs the daily operations of the bureau. Alongside in the organization chart are four chiefs that form the management team responsible for making decisions that guide the ministries activities. The four core business processes are carried out by Divisions within the Bureau of Education.

- Division of School Management
- Division of Curriculum and Instruction
- Division of Research and Evaluation
- Division of Personnel Management

Most of the staff is proficient and comfortable with the use of computers for their daily work, especially Microsoft Office Suite and the use of web applications such as online time log sheets developed by the Computer Services Division. The Computer Services Division is headed by Edwel. He has a technical staff of 3 people who work with him and handle all the maintenance, management, setup of the computers.

Edwel has extensive experience with networking and scripting in languages such as MySQL and PHP. His support staffs have experience with hardware troubleshooting, network setup but not as much experience with programming and scripting.

Technical Environment

Within the Ministry, there is an even mix and distribution of Windows, Linux, and Mac OS X platforms being used. The Microsoft Office suite is commonly used within the MOE.

The network for the ministry is also diverse. A 320Kbps digital subscriber line (DSL) to the telecom and to the Internet is based out of the ministry office. Within the office there is both wired and wireless network access. Four of the public schools are connected via DSL to the ministry's network. Palau High School is connected to the ministry's network wirelessly. The rest of the schools use a 33.6kbps dial-up to connect to the MOE server and also to get access to the internet. All of the schools have wired networks (LAN) set up on site.

The ministry manages several servers providing remote dialup network access, file sharing, e-mail and a web server. These servers form the backbone for hosting content and applications that run on their intranet and on the Internet. These servers run on LINUX and are administered mainly by Edwel. The servers are connected to two TRIPP-LITE uninterrupted power supply systems in events of power outages. The network infrastructure is detailed as follows in Figure 1.

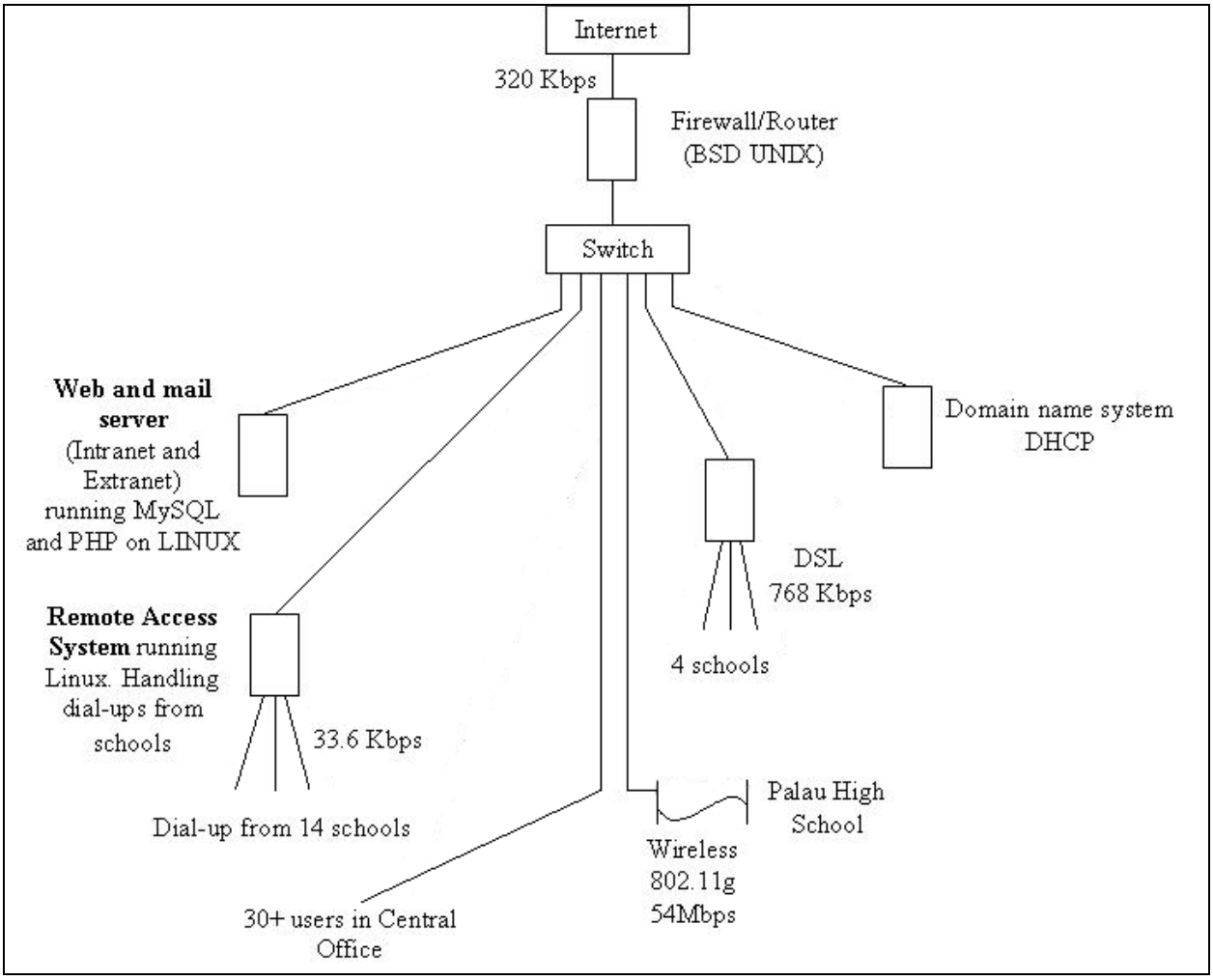


Figure 1: Internet Server system at MOE

Technical Management and Planning

The Computer Services division is responsible for the planning and management of technology. The management team (consisting of the Director and four Chiefs) recommends technical solutions to the problems facing the ministry and the Minister make the final decision and approval of all official changes in policy.

Troubleshooting of technical problems is handled by the staff of Computer Services Division; Backups of servers are also done periodically by the technical team. The Computer Services Division is headed by Edwel and he has a technical staff of 3 people who work with him and handle all the maintenance, management, setup of the computers.

Internal and External Communication

The organization communicates 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 in the same building, communication is not an issue. The MOE also keeps an open dialogue with schools throughout Palau. All school principals are provided with an Apple laptop and officials at each school have been assigned email addresses. The majority of principals are comfortable using email as a means of communication.

The ministry currently uses 2 different forms of web communication: intranet and extranet (internet) to communicate with their staff in Palau and to communicate with the outside world respectively. The intranet hosts more detailed information for the staff of the ministry to read and refer to; it also hosts web applications that were developed such as time log sheets. On the other hand, the extranet mainly hosts content and information for the public to learn more about the schools and MOE.

As information becomes more centrally located in MOE, new procedures and systems may have to be adopted to streamline the process of data collection and analysis.

Information Management

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

- **Paper and e-mail submission.** 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.
    - This takes time for the information to get delivered to the ministry physically.
    - Over e-mail, schools may send the information and data in their own (school's) format and the staff from the ministry has to spend time to reorganize the data to be consistent with the format that the ministry is using.
- **Use of Microsoft Excel.** Microsoft Excel is used for storing responses from the answer sheets (where the responses are made by shading the bubbles) after it has been scanned (using a normal scanner) and processed by Office Remark, a Windows based forms-processing software package for surveys and tests.
    - There is also an issue regarding data entry of grades as they are now being entered in Microsoft Excel and different versions are being held and handled by different staff.
- **Databases.** A SQL/PHP web based system is being used for tests that are not administered and marked using the scanned answer sheets (with the multiple choice bubbles).
    - These databases are only used for specific tests, are poorly designed, and are only being used for manual entry.
- **Databases and Excel together**. The Computer Services Team then combines the data (student responses) from their web database (non-scanned type) and from Microsoft Excel (scanned type) into a new sheet in Microsoft Excel.

- This creates confusion as there are many different versions and different copies of the Microsoft Excel files being circulated.
- This relies on the already heavily taxed Computer Services team to help to transfer and parse the data from Microsoft Excel and from the SQL database to combine and create a new Excel Spreadsheet for analysis and storage.

The responses of the students are required for the ministry's reference and also for them to review and analyze - for better design of future standardized tests (they have software that helps them do this). The test management is detailed further in Consulting Task I.

Currently the technical team is planning to move towards a web-based interface for all data entry and reporting. They have a preference for open-source software or to develop their own applications to meet the customized and specific needs of the Ministry. From the ministry's past working experience with past student consultants, they are familiar with the use and benefits of web-based solution.

Due to limitations in bandwidth and the technical infrastructure, the Moodle open source application for student management recommended and developed previously in past years is currently inactive or not being used. (The team will keep the limitations in mind when developing solutions and also possibly look at ways to upgrade the network.)

II. Scope of Work

Task 1: Designing a Test Management System

The consultants will design a test management system in order to track the progress of the MOE's students and also to help the MOE get funding from various outside organizations. The MOE must compile reports on how students are performing in their studies in order to get funding in many cases.

The MOE uses multiple standardized test scores to create these reports. The MOE management is very concerned with the system they have in place for managing the responses and scores of all of these students. There are currently 3 different types of standardized tests that the MOE administers: Palau English Reading Assessment (PERA), the Palau Achievement Test (PAT) and the Quarterly Assessment Test (QAT).

For grades 1 to 3, the responses and scores of the test are entered manually by the staff in Microsoft Excel question by question from the answer booklet. For grades 4 through 8, the responses of the students are scanned (from answer sheets using Office Remark) and imported into Excel and processed using VBA scripts. See Figure 2 for a visual representation of the previous workflow.

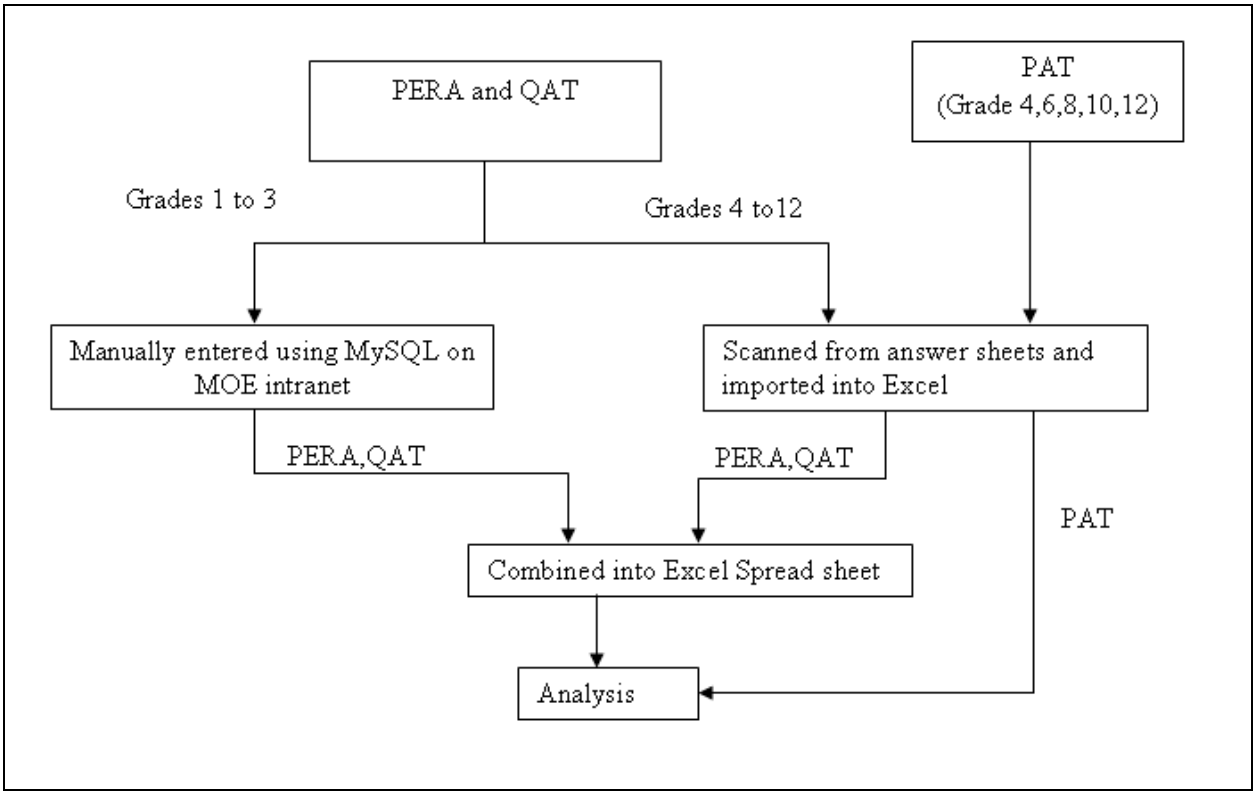


Figure 2: The previous workflow for test management at MOE

The Consultants found several issues with the previous workflow:

- **Time expended manually checking for errors.** A huge majority of the time spent on data entry is focused on fixing possible database errors that will occur. Many times the information on the test answer sheets do not match up with information in the MOE student databases. These database errors would have to be checked manually for each test response which costs lots of time.
- **Poor information management.** As Microsoft Excel is used by the staff as a primary form of updating and adding records, the grades and responses of the students are maintained by various staff and at different places/desktops. There are concerns of losing data since they are stored on the local machines of the staff and not on central MOE servers.
- **Poor database design and use.** The current MOE database using MySQL is only used for tests that have been administered from grades 1-3. Furthermore, each test uses separate tables from other test, which does not allow for general analysis.

The student consultants are tasked with coding a test management system for the MOE on their intranet to facilitate test analysis and improve the previous workflow. Due to the remote physical location, and the existence of networking to the various schools on other islands, this contributes to the justification of a web-based solution.

Expected Outcomes

The consultants intended to produce the following outcomes for task 1:

- **Create a new central test database.** We plan on designing a test database which stores information on tests administered and student's responses to these exams. This internal database is a necessity because the MOE needs to have the data secured in house. We intend to have a working test database to allow for any type of standardized test to be added so that if their overall curriculum changes, the database can accommodate this change.
- The technical staff at the MOE is very well informed on the basic SQL commands such as joining tables to extract data from the different tables based on different conditions, therefore we feel comfortable creating this database knowing that they can write SQL scripts to perform analysis on the data.
- **Create data entry forms on the intranet.** The staff tasked with inputting the data into the database is not highly technically trained, therefore we will also create an internal web application for staff to input the responses and scores of students as tests are received. The web application should be well designed to allow for easy and quick submission of answers into the database. Moreover, it will keep a consistency among all data entered.

Activity	Expected Outcome	How to Measure	Current Measure	Evidence of Change
Review all current databases and forms with Edwel	Understand what info to be captured; Know intended use of data	Consultants have good understanding of each form and associated database, especially how the table are related	Consultants have little understanding of each table and database; have some experience working with databases	Consultants completely understand forms and how they fit with each database
Design a new database or modify the existing database to remove redundancies with Edwel	A single database for all tests, responses and subjects	Edwel's understanding of good database design and how the various tables can be combined.	The staff currently uses their own local version of Excel to key in grades and responses. Report generation requires data from various sources.	The database is able to capture all changes and updates so that there is only one copy on the server which is backed up. Edwel is clear on how he can modify the table for future use/modification as when necessary.
Import the old data from the previous databases being used and merge them into our current database	A consistent and synchronized database that is able to handle and stores old data and takes in new data.	Consultants have good understanding of the data that they should import and 'clean up' so that it is consistent.	Consultants have little understanding on what are the data in the old database and tables that are meaningful to be imported as there are a lot of duplicate entries.	Database captures both old data and is able to take in new data being entered.
Design a web user interface for users and staff to key in the grades	Data entered is synced to the database on the server and updated dynamically.	Database front-end forms works with a single database Database is consistent for both scheduling and grading	Scores and responses are entered manually with no version control and no control of who makes which update.	Staff are comfortable with using the web interface to key in and update the grades.

Additional impacts

By adding a new test management system certain members of the MOE will need training. The technical staff will need to be informed of the new database structures and how they relate to all the current databases in place. The test specialists will need to be informed on new procedures that will be used in test data management. The staff involved with inputting the data through the web application will need training on how to use the interface we design. We plan on making the interface very simple and involving the user early in the design process so that minimal training is required.

Feasibility

This project is considered feasible through an analysis of requirements, risks, and sustainability.

Requirements:

Time. This project can be completed during the partnership, requiring around 5 to 7 weeks. There is a substantial amount of code already written for the MOE intranet so it will be simple for the consultants to figure out how to interact with the database.

Motivation. All the staff involved with inputting the student's data has spent days manually entering student data into excel sheets. They are very motivated to see a system that will lighten their workload allowing them to focus on other tasks in the MOE.

Skills. Tom has worked in web development and database design in the past; in addition Yixin has a strong coding experience. Edwel has a very strong SQL background which will help both consults through the coding phase of the project.

Risks:

Importing existing data into the new system. All the old data exists on many different formats so it will be very difficult for old data to be inserted into the system through easy means. We will try to find the simplest way for easy importation of old data. At the same time, the data that currently exists in the database being used have duplicate entries and some of the data is not consistent. It will be a challenge to write scripts to 'clean up' the existing data before importing them.

Sustainability:

The work is expected to be sustainable because we plan on creating a database system where new standardized tests may be added. By working with Keizy and Edwel on how the applications work they should be able to make any other modifications as needed. They both have a good background in databases and SQL and therefore should be able to fully understand the system in place. The consultants will also sit with the specialists, guiding them through the process of data entry in the initial stages when the system is first being tried out and used.

Task 2: Creating web application for entry of scanned Multiple Choice Question (MCQ) responses.

Currently, only the standardized English tests from grade level 4 to 8 are designed in the format of multiple choices where students shade in the bubbles and their responses are scanned in by using the scanner and using Office Remark OMR. Lyliza Madris is the name of the MOE employee tasked with scanning the test responses into the office remark software. Then these responses are transferred, stored and shared in Microsoft Excel.

The consultants found several issues with this approach:

- **Poor information management.** Again information will be stored locally on employee's computers. There is never a transfer to databases or a way to backup the information. It is difficult to assign and administer access rights to different sheets using Microsoft Excel.
- **Time expended manually checking for errors.** In addition to database errors mentioned in Task 1, there are many scanning errors that can occur. These errors also must be checked for manually which consumes a lot of time.

The consultants saw that a lot of time can be saved with scanned responses. Since the scanned responses are already digitized the consultants could write a web application to check for all errors and insert all data into the database automatically.

Expected Outcomes

The consultants intended to produce the following outcomes for task 2:

- **Web application to submit scanned responses.** Another web application will be developed so that users can fix errors and update the database as soon as responses are scanned.
- **Train Staff.** The consultants will also work with Lyliza Madris to provide training so that they can help relieve the workload of the technical services staff during peak periods.

Activity	Expected Outcome	How to Measure	Current Measure	Evidence of Change
Review the current process of how the grades are being digitized and stored for future reference and reporting.	Understand the gaps and processes that can be improved; areas where the process can be automated and made more efficient.	Consultants have good understanding of the various stages of how the data are being input to how they are being used to generate reports and for analysis by the Ministry.	Consultants have little understanding of the work processes within the MOE.	Consultants completely understand the processes and how the reports are being generated.
Design a web user interface for users and staff to update the responses made by the students.	Responses made by the students are scanned and the database is updated with a simple upload.	Web application forms works with a single database Database is consistent for both tracking and grading	Scores and responses are saved in Microsoft Excel and depends on the administrative manager to update the data into the database.	Staff is comfortable with using the new procedure and the web interface to update the database after the responses have been scanned.
Recommend that other subjects that are being covered in the school's quarterly test to adopt the multiple choice approach.	Responses made by students can be scanned in automatically without having a need for teachers/administrators to enter them manually.	Responses made by students are being entered or scanned as they come in. There is no accumulation of test responses that has to be entered.	Responses made by students are being entered into the computer and stored digitally by the staff laboriously.	Workload of curriculum staff is reduced as they can now spend more time revising and planning the curriculum rather than keying in the data.

Additional impacts

Expected impacts to the overall organization are as follows:

Improved work process flow – With the use of the web application to automate the process, the delay between scanning of the responses and updating the database is reduced significantly. This will help ease the bottleneck especially during times when the technical services staff is away or preoccupied with other tasks.

Technology adoption – If the use of the web application encourages teachers to use technology, it would have a broader impact on the Ministry's central office as a whole. By involving the staff the in the development process, this will expose them web application and will make it for feasible and possible for them to self-learn and develop additional applications in the future.

Feasibility

This project is considered feasible through an analysis of requirements, risks, and sustainability.

Requirements:

Time. The web application will be rolled out simultaneously with that of the database entry specified in task one. Users will be involved early in the design process so that rectifications and customizations can be made early in the process. The project is expected to be completed within 5-6 weeks before it is being deployed and tested out to see how the users respond to the web interface and the change in workflow. The consultants will provide technical and user help and these information will be documented together with the users in schools and at the MOE.

Motivation. MOE is keen in implementing a web application to solve their problems and needs from using the scanner for multiple choice responses.

Skills. The web application will be programmed in PHP and uses a MySQL database. The technical staff in MOE has a good understanding of PHP and SQL and they can provide some help if needed.

Risks:

No additional hardware resources required. The web application will not require additional hardware resources as they can be hosted on the existing server.

Training required is minimal. Training required to use the new web application is minimal as it is relatively straightforward and will be easy to pick up.

Sustainability:

The work is expected to be sustainable as Edwel, and the rest of the staff in the Computer Services division are familiar with PHP and MySQL and will be able to write more scripts for future needs and customizations if required. A manual will be created if the process proves to be too confusing for the users to accept initially. The consultants will also sit with the staff, guiding them through the process of inserting the data into the database when the system is first being tried out and used.

Task 3: Creating web application for the analysis of student tests responses and results

The MOE currently uses Microsoft Excel to analyze data to obtain performance of students nationwide and in various schools. There are several problems associated with the use of Microsoft Excel in MOE:

- **Inconsistencies in format of data entry.** As the student responses and test scores may have been keyed in different formats by different staff (Some in horizontal format, some in vertical format, different headings in different columns etc), this creates a challenge for Edwel if he has to write a macro to do the analysis of test results and responses. The process is inefficient as he needs to write a new macro each time the format is different.

- **Long and cumbersome process to parse data.** The staff at MOE has to extract the data manually using Microsoft Excel (Copy and pasting into various different sheets). This makes the process prone to human error.

- **Time wasted creating new Excel formulas.** Whenever a new excel sheet is created the staff must write up new Excel formulas to do the analysis they want. This proves to be a long and tedious process as the staff has to do this for each new test where data has been entered. Moreover, they have to go back and do the data parsing all over again if an error in some of the data was found only in the later stages.

- **Item and Label analysis is a very long process.** The MOE often labels each question as a topic so they can see how student's are fairing on certain topics, for example if the Ministry is interested in how their students have fared in grammar, they have to look at all questions labeled as grammar questions. They are also interested in the frequency of responses for each answer (how many students answered 'a' for number 1). They found this to be a time consuming process as well.

- **Difficulty in sharing data.** As the processed data resides locally in Microsoft Excel on the local machines of staff members, they often have to share the data as attachments via email. It is difficult to share data and this also adds to the already heavy burdened bandwidth of the MOE network.

- **Lack of Student Records.** Since each excel file is separate, there is no way to track a student's progress throughout their time in the Palau Educational system.

The consultants will work to create a separate web application to do test analysis from the data that was entered into the database. The data will be available for all relevant and interested parties to view. This will also provide an incentive for the staff to switch over to use the online test management system as they will be able to see the analysis instantaneously once the data is entered.

Expected Outcomes

The overall outcome of our test report system will be an easily accessed web application to extract data on all tests administered. This will improve time and communication among all staff working on creating reports for the MOE. By improving time, reports can be made quickly and sent out to organizations that require them to provide funding to the MOE. Also, it will be easy to track the performance of an individual student, schools and the nation overall.

The final reporting software will work for all grades. One of the difficulties in analyzing the test results and tracking student performance is that different tables within the MySQL database are used in management of students in elementary schools and in Palau High School. We plan on designing the test report system such that it is able to extract and make sense of data from both tables – the different tables used would not be visible to the user.

Activity	Expected Outcome	How to Measure	Current Measure	Evidence of Change
Review how the reports are being generated currently and to look at some of the past reports.	Understand the different information and data required for report generation and the format/layout in which the information is presented.	Consultants have good understanding of how to parse and extract the data, categorizing them as required to be used to generate reports and for analysis by the Ministry.	Consultant have little clue on the type of data that the Ministry needs in generating reports.	Consultants completely understand the data required for generating the reports and how to parse/process the data.
To interview and discuss some other features that the staff in charge of generating reports may need in our web application.	The application will be able to generate reports and process data that is required not just for current and past reports but also for potential future reports that the management team will be looking at for long term strategic planning..	Users and staff will have a better turnaround time generating reports and obtaining trending results for analysis to make recommendation in policy making and also in spending resources in subjects where they are needed most in schools.	Report generation can take up to 3-4 months to generate after the student responses and answer sheets are received physically by the MOE Central Office.	Report generation will take a much shorter time, allowing for remedial action to be taken early if necessary.
Introduce the report analysis feature of our online test management system to data entry personnel and all staff if possible in the Ministry of Education.	Staff will be motivated in adopting and using our test management system as they will see the benefits of doing so such as being able to obtain information such as student performance, national performance and school performance instantly.	Staff starts using the online test management system after we have deployed it.	There is no test report application or software that the staffs are using to generate reports. They do it all manually using Microsoft Excel.	MOE staff starts to use our online test management system and move away from using Microsoft Excel as the main tool for data tracking and analysis.
Introduce the test management system to remote schools in Palau.	Schools will be able to do data entry on their end without having to send the student responses to the Central Office to be entered.	Schools start doing their own data entry of student responses into the MOE database.	Student responses and answers are sent physically to the MOE main office to be entered.	The workload on the staff at the MOE Central office is reduced and they can focus on issues such as policy planning etc.

Additional impacts

Expected impacts to the overall organization are as follows:

Ability to create school performance reports – With the use of the web application, the MOE management team will be able to compare the performance of different schools – school principals will also be able to compare and benchmark their school's results to the national's and to focus on the subject areas that need improvements.

Adoption of the use of the web application– The MOE staff and users will be able to see the benefits of having a centralized database – quick response time and ease to generate reports. This will encourage them to switch over from their current practice of using Microsoft Excel to using our web application so that the data is captured centrally in the MOE database.

Ability to follow a student's progress – We can create a web application to get all the standardized test scores for each student. This can help the Palau High School properly place each student in the right skill level for each subject.

Information Management improved - One of the main goals of having a central database is to increase data integrity and reduce redundancy problems. The MOE staff is concerned about the accuracy of the data entered as it affects the test scores and performance reflected. The new database design and the instant accessibility of the analysis will enable accurate data cross checking and reporting. It also allows for consistent data storage for each student throughout their education in Palau

Report generation time decreased – The management team at MOE is concerned of the time it takes for them to gather the data and to review the reports as it takes months after an exam before the report is generated. With the use of the online test management system and the test report analysis functionality, the time and delay will be reduced significantly.

Feasibility

This project is considered feasible through an analysis of requirements, risks, and sustainability.

Requirements:

Time. The test reporting software will be worked on as soon as the web application from task 1 and 2 are completed. It will be relatively simpler to code since the consultants will have experience with PHP and SQL from the first two tasks and the problem itself is less complex thus the time spent on this task will be significantly less.

Motivation. MOE is keen in being able to access parsed results such as standard deviation etc immediately without having to do it manually on Microsoft Excel.

Skills. The web application will be programmed in PHP and uses the same MySQL database as the test management system in task 1 and task 2. The technical staff in MOE has a good understanding of PHP and SQL and they can provide some help if needed.

Risks:

No additional hardware resources required. The web application will not require additional hardware resources as they can be hosted on the existing server.

Training required is minimal. Training required to use the application to view test reports is minimal as it is relatively straightforward and will be easy to pick up.

Sustainability:

The work is expected to be sustainable as Edwel, and the rest of the staff in the Computer Services division are familiar with PHP and MySQL and will be able to write more functions and customizations if required. The consultants will also sit with the staff, guiding them through the process of how to make sense of the parsed data that the application presents.

Task 4: Configuring the UPS for the servers in the server room

The MOE currently has all its physical servers (web server, mail server, remote access server and DNS server) and UPS housed in the server room in the MOE central office. The UPS system that is currently being used is the Tripplite SMART2200RMXL2U model. The UPS system that was used previously was APC and Edwel had been using the apcupsd which is a daemon designed for communicating with UPSes made by APC. However, the administrative team tried using the same daemon to communicate with the current Tripplite Ups but to no success.

When there is a power outage, when the UPS runs out of battery power, the servers just turn off due to lack of power. The proper procedure should be to turn off the server machines when the UPS runs low on battery power.

The consultants will work with Edwel to find a way to have the servers communicate with the UPS so that they can be turned off in the event of a power outage and the server runs low on battery power. This helps to maintain data integrity and lifespan of the servers.

Expected Outcomes

Activity	Expected Outcome	How to Measure	Current Measure	Evidence of Change
Explore different available UPS tools that can be used to communicate with the Tripplite UPS.	Finding different available UPS tools online that can be used to communicate with the UPS.	UPS tools can indeed communicate between the server and the UPS.	No known tools are known on how to communicate with the Tripplite UPS.	Edwel and the rest of the technical team will have some resources to use for communication between the server and UPS.
Selecting and evaluating the different available online tools, choosing one to be deployed on the servers.	Having a UPS tool or utility that Edwel and the technical team can use to configure on how they want the servers to communicate with the UPS.	The tool is easy to install on the different servers and configure. Documentation on the tool should be widely available.	No known tools are known on how to communicate with the Tripplite UPS.	Since resources on the tool is widely available, Edwel and the technical team will be able to refer to the information available online easily if they need to troubleshoot.
Test and deploy the UPS monitoring tools on the existing MOE servers.	UPS monitoring correctly configured for the needs of MOE.	Servers shut down when UPS runs low on battery during power outage and will power on again when power comes back up.	No known tools are known on how to communicate with the Tripplite UPS.	No need for Edwel to manually change the system time and configurations each time there is a power outage and the servers are not shut down during a power outage (UPS runs out of battery power).

Additional impacts

Expected impacts to the overall organization are as follows:

Technical Management:

The proper shutting down and booting up of the servers will prolong the lifespan of the servers, ensuring the sustainability of the network infrastructure of MOE and reduce the need to buy new hardware. It will also save the technical team time and trouble from having to restart the servers manually after a power outage.

Information Management:

Since the servers are shut down properly when the UPS runs low on battery, this ensures the data integrity on the hard disk. The system time is not reset each time the power goes out as the system is shut down properly when the power goes down and is powered back on when the power comes back.

Feasibility

This project is feasible assuming that there are tools available online and sufficient time left after the web application has been completed.

Requirements:

Time. The web application package detailed in Task 1 to 3 is of higher priority than the current task. Ideally, there should be at least 2 weeks left after the application has been completed so that there is sufficient time to work on the current task.

Motivation. Edwel is keen on having the UPS communicate with the servers as this will enable them to be shut down appropriately during power outages.

Skills. Both student consultants have not much experience dealing with network and server management. Hopefully, there will be sufficient documentation found online that comes with the configuration tool.

Risks:

Dependency on online resources. The progress and success of the task depends largely on the availability of configuration tool and documentation found online as the student consultants do not foresee enough time and resources to write their own programs to have the servers communicate with the UPS.

Sustainability:

The work is expected to be sustainable, assuming that there is documentation found online since Edwel already has experience working and configuring APC UPS in the past.

III. Outcomes and Recommendations

Task 1. Designing a Test Management System

Designed new database

Through the consulting process, Edwel and the student consultants discussed and identified what are the needs of MOE in terms of a test management system. Edwel is extremely busy with administrative work such as budgeting etc during the school year. As a result, he may look for immediate solutions for his problems rather than looking at redesigning the entire databases.

We found that the databases used for test management prior to our work were not well designed. For example the PERA exams would have their own tables and the quarterly tests would also have their own tables. We decided to design a database that could be used for all the exams they give out and did not require new tables whenever a new type of exam would be given out. By doing this Edwel would not need to write a new grading script each time a new type of test was given out.

The new database is the first step of consolidating all the information from the different tests such that Edwel and the MOE staff can easily produce useful statistics and automated report generation for students and for the whole nation. The MOE can now easily track a student's progress and performance by creating a report of their exam scores, something that was not doable before. This would help the ministry better understand the performance of different schools and needs of the schools and serve the student body more efficiently.

The design and relationships of the database were kept very simple to allow Edwel to easily manage the tables in the future. See Figure 3 for the relational design of the new database.

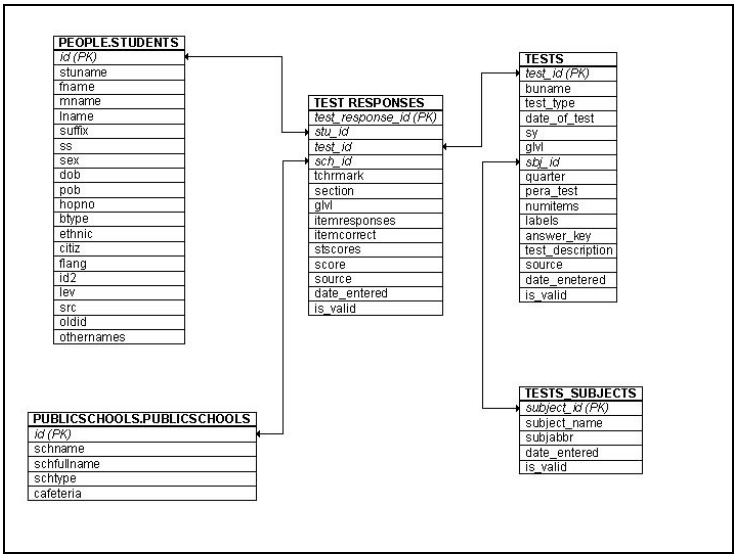
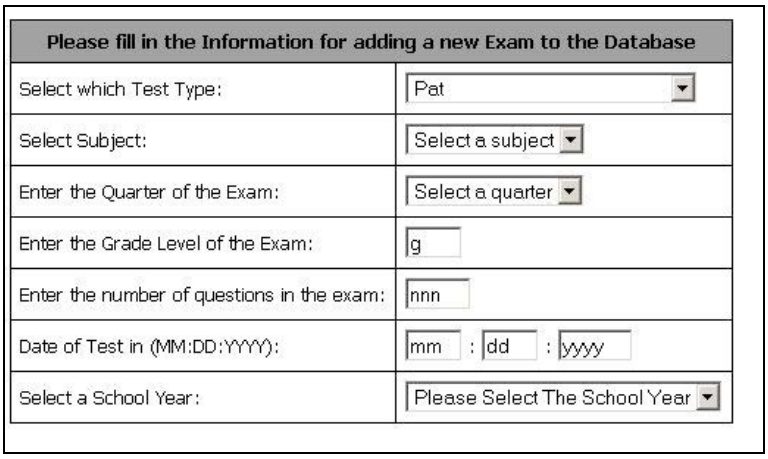


Figure 3: The consultant's final database design

Built user interface(UI) to create and manage exams

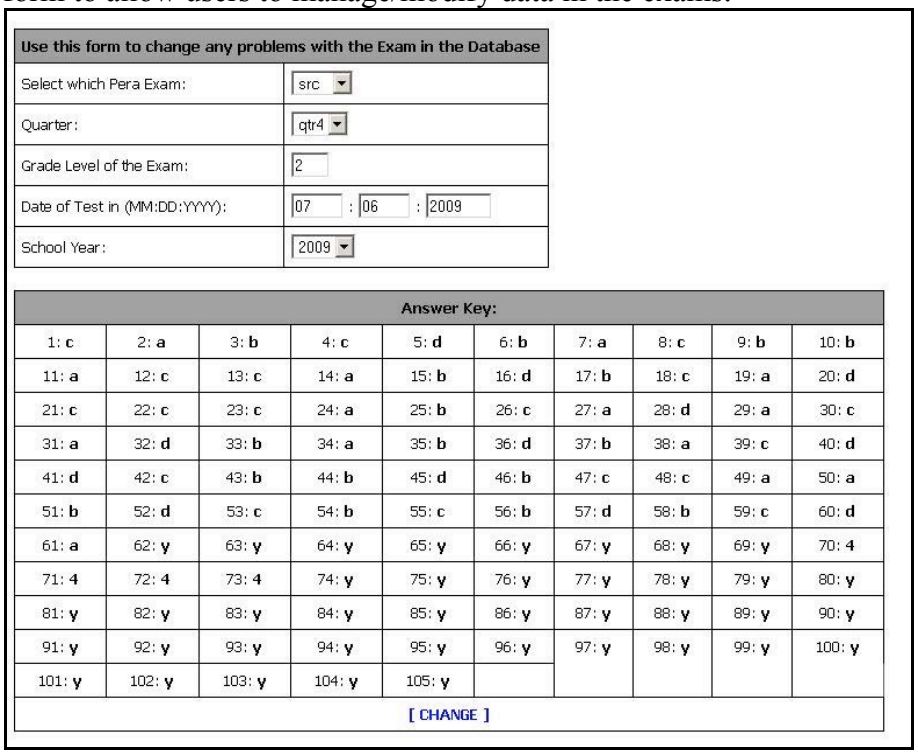
The first UI we built on the MOE intranet site was to allow users to add to the TESTS database. Whoever created the exam would fill out the online test entry form to enter their data into the database. This also included fields to enter the answer key for the exam and labels for each question for item analysis (i.e to find out how students fared in questions classified as Grammar or Vocabulary).



Please fill in the Information for adding a new Exam to the Database	
Select which Test Type:	Pat
Select Subject:	Select a subject
Enter the Quarter of the Exam:	Select a quarter
Enter the Grade Level of the Exam:	g
Enter the number of questions in the exam:	nnn
Date of Test in (MM:DD:YYYY):	mm : dd : yyyy
Select a School Year:	Please Select The School Year

Figure 4: Form to enter an exam

Since mistakes could have arisen when entering data on the original form when defining the test, we created a form to allow users to manage/modify data in the exams.



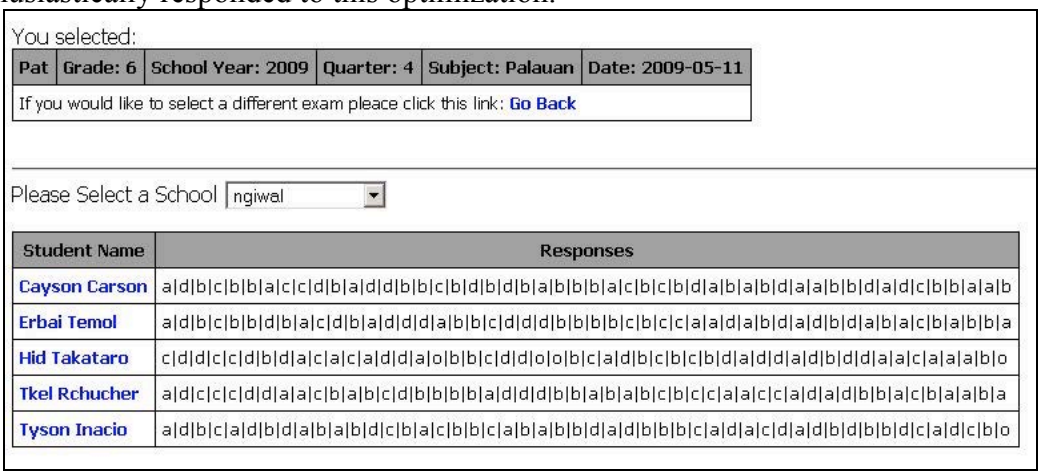
Use this form to change any problems with the Exam in the Database	
Select which Pera Exam:	src
Quarter:	qtr4
Grade Level of the Exam:	2
Date of Test in (MM:DD:YYYY):	07 : 06 : 2009
School Year:	2009

Answer Key:									
1: **c**	2: **a**	3: **b**	4: **c**	5: **d**	6: **b**	7: **a**	8: **c**	9: **b**	10: **b**
11: **a**	12: **c**	13: **c**	14: **a**	15: **b**	16: **d**	17: **b**	18: **c**	19: **a**	20: **d**
21: **c**	22: **c**	23: **c**	24: **a**	25: **b**	26: **c**	27: **a**	28: **d**	29: **a**	30: **c**
31: **a**	32: **d**	33: **b**	34: **a**	35: **b**	36: **d**	37: **b**	38: **a**	39: **c**	40: **d**
41: **d**	42: **c**	43: **b**	44: **b**	45: **d**	46: **b**	47: **c**	48: **c**	49: **a**	50: **a**
51: **b**	52: **d**	53: **c**	54: **b**	55: **c**	56: **b**	57: **d**	58: **b**	59: **c**	60: **d**
61: **a**	62: **y**	63: **y**	64: **y**	65: **y**	66: **y**	67: **y**	68: **y**	69: **y**	70: **4**
71: **4**	72: **4**	73: **4**	74: **y**	75: **y**	76: **y**	77: **y**	78: **y**	79: **y**	80: **y**
81: **y**	82: **y**	83: **y**	84: **y**	85: **y**	86: **y**	87: **y**	88: **y**	89: **y**	90: **y**
91: **y**	92: **y**	93: **y**	94: **y**	95: **y**	96: **y**	97: **y**	98: **y**	99: **y**	100: **y**
101: **y**	102: **y**	103: **y**	104: **y**	105: **y**					
[CHANGE]									

Figure 5: Form to manage exams

Built UI to insert student responses manually

When we arrived at the MOE, we saw that not all of the exams were filled out with scanned sheets. For example all Math test answers and exam answers for grades 1-3 were always manually entered into excel sheets by an employee named Loretta. We created a form to allow her to manually enter the test responses directly into the database. By using JavaScript we also improved efficiency by automatically moving onto the next question when she enters an answer. She enthusiastically responded to this optimization.



You selected:

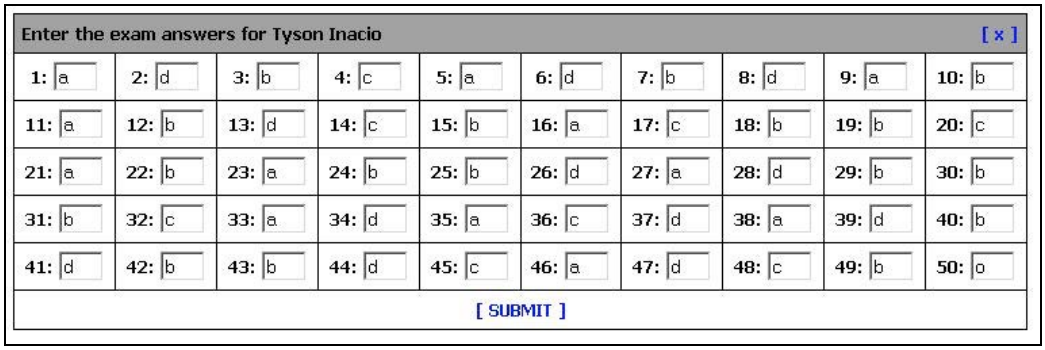
Pat	Grade: 6	School Year: 2009	Quarter: 4	Subject: Palauan	Date: 2009-05-11

If you would like to select a different exam pleace click this link: Go Back

Please Select a School ngiwal

Student Name	Responses
Cayson Carson	a|d|b|c|b|b|a|c|c|d|b|a|d|d|b|b|c|b|d|b|d|b|a|b|b|b|a|c|b|c|b|d|a|b|a|b|d|a|a|b|b|d|a|d|c|b|b|a|a|b
Erbai Temol	a|d|b|c|b|b|d|b|a|c|d|b|a|d|d|d|a|b|b|c|d|d|d|b|b|b|b|c|b|c|c|a|a|d|a|b|d|a|d|b|d|a|b|a|c|b|a|b|b|a
Hid Takataro	c|d|d|c|c|d|b|d|a|c|a|c|a|d|d|a|o|b|b|c|d|d|o|o|b|c|a|d|b|c|b|c|b|d|a|d|d|a|d|b|d|d|a|a|c|a|a|a|b|o
Tkel Rchucher	a|d|c|c|c|d|d|a|a|c|b|a|b|c|d|b|b|b|b|a|d|d|d|b|b|a|b|a|b|c|b|c|c|a|a|c|c|a|d|a|d|b|b|a|c|b|a|a|b|a
Tyson Inacio	a|d|b|c|a|d|b|d|a|b|a|b|d|c|b|a|c|b|b|c|a|b|a|b|b|d|a|d|b|b|b|c|a|d|a|c|d|a|d|b|d|b|b|d|c|a|d|c|b|o

Figure 6: Form to select which student to enter answers for



Enter the exam answers for Tyson Inacio [x]

1: a	2: d	3: b	4: c	5: a	6: d	7: b	8: d	9: a	10: b
11: a	12: b	13: d	14: c	15: b	16: a	17: c	18: b	19: b	20: c
21: a	22: b	23: a	24: b	25: b	26: d	27: a	28: d	29: b	30: b
31: b	32: c	33: a	34: d	35: a	36: c	37: d	38: a	39: d	40: b
41: d	42: b	43: b	44: d	45: c	46: a	47: d	48: c	49: b	50: o

[SUBMIT]

Figure 7: Form to enter answers

Proposed new work flow for test data management

We found that there was a lot of database management that needed to occur to make sure our software was properly sustained. To help with this we created a work flow for all exams to make sure the databases are well maintained by the staff members using them. Our work flow assigns specialists to entering and managing tests. This will help avoid multiple entries within tables. Also, with a central database used on the MOE intranet, Microsoft Excel is no longer being depended on to maintain data integrity.

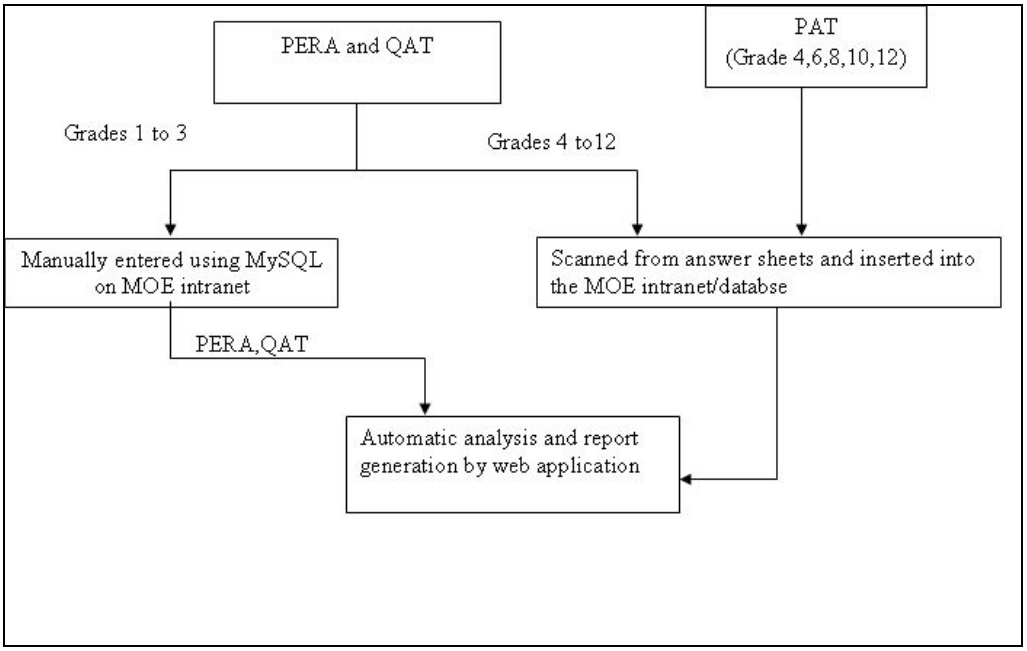


Figure 8: Our new proposed test management workflow

Trained staff on new software

We gave several presentations to all staff involved with test management on our proposed workflow and how each form is filled out. In the first few meetings, they gave us feedback and we made changes to several forms in response to their feedback. We then presented a workshop on how to use the test management system where they also had a chance to get their questions answered.

Task 2. Creating web application for the scanned Multiple Choice Question (MCQ) responses

Created a work flow for submitted scanned responses without manual entry

In our workflow from task 1 we added a branch to allow for uploading scanned forms. In this workflow we proposed using their current scanning program: Remark Office. From this, saving the scanned file responses as a ".txt" file and then uploading the file to a web based user interface that we built on their intranet.

Built intranet user interface to upload scanned responses

In our application, the user will upload the file from Remark Office to our interface and send the file to the server. We then analyze the file and create a workable spreadsheet for the user to correct for errors detected by the application. Errors will be displayed and the user can change information and save at any point. Common errors include a different grade reflected in the data or entry when the test is defined for a particular grade. Other error-checking include checking for the school of the student, if there was an error in reading the answer sheet using the scanner from Remark Office and if there were duplicate entries.

In the past, these errors would have been checked for manually. By detecting errors automatically, the time that the MOE staff spends on cleaning data and removing the errors was cut down immensely.

We also gave the option to save the user's work. Once they save their work they can continue editing errors from the same file by selecting the option to "Continue editing this file" so they can come back and work on the same file at a later time.

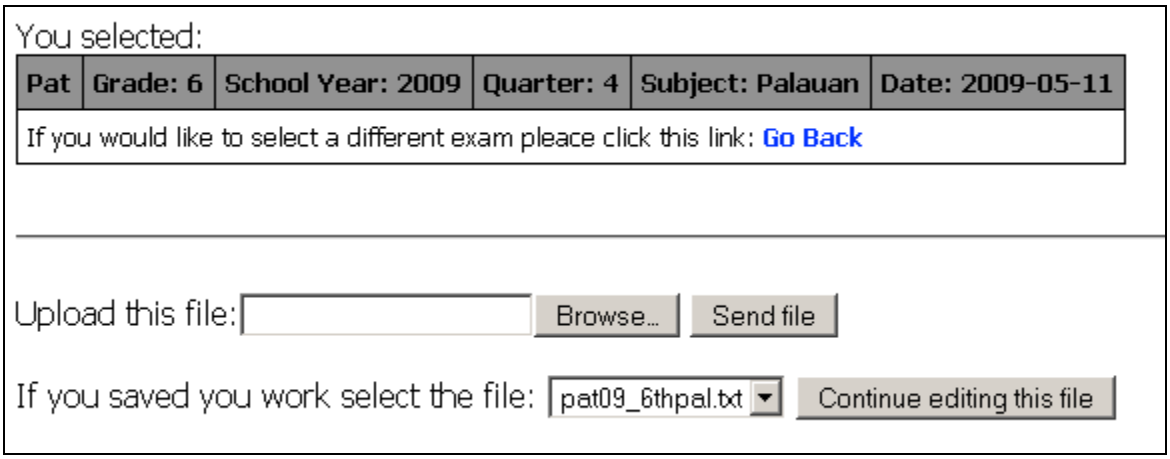


Figure 9: Form to upload the file

Save

Line	Errors		Student Info			School info		Grade	Responses
	Symbols	Sync	Id	Student Name	Change	Id	School Name		
1		[sync]	1917	Whitney Ruluked	[C]	1	jfk	6	a|d|d|d|a|a|a|c|a|c|a|b|b|d|c|b|d|c|c|d|d|d|d|b|a|b|b|c|b|c|d|c|c|
2		[sync]	1916	Skiwo Johnson	[C]	1	jfk	6	a|c|b|d|d|b|b|a|b|d|c|a|c|a|c|d|b|b|d|d|d|d|b|c|a|c|c|b|a|c|d|d|b|
3		[sync]	1040	Angelica Towai	[C]	13	koror	6	c|d|b|c|a|d|c|b|a|c|c|b|c|d|d|c|d|b|c|a|d|d|a|b|b|b|a|c|b|c|d|c|a|
4		[sync]	1048	Jacques Thing	[C]	13	koror	6	a|d|b|c|a|d|b|b|d|d|b|b|b|a|d|c|b|d|a|a|b|c|a|b|c|b|d|b|c|c|c|c|b|
5		[sync]	1021	Bieb Tellei	[C]	13	koror	6	a|d|b|a|a|c|d|b|a|b|a|b|d|c|c|d|b|c|b|b|d|d|c|c|b|b|a|c|b|d|a|c|c|
6		[sync]	1057	Shenna Sengebau	[C]	13	koror	6	a|d|d|c|a|b|d|b|a|d|d|b|c|d|d|c|b|c|b|c|d|d|d|b|b|c|b|c|b|c|b|c|c|

Figure 10: Example of the table that is built when file is uploaded

More details on our software can be found in Appendix A.

Task 3. Online Test Reporting

For the online test reporting we created 5 different ways of generating reports for everyone's use at the MOE. In the past Edwel would need to write a script to create reports each time an exam is given. We wrote the sequel and PHP code so that test analysis can be done as soon as test responses are entered.

All of the test analysis pages are under the "Test Reports" tab right below "Test Management". The user clicks on which report they would like to generate, then selects which exam and the test report data is generated.

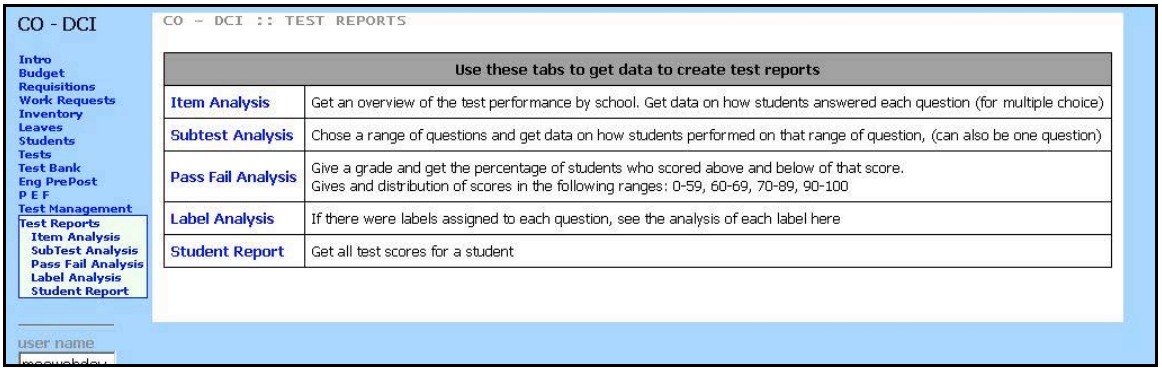


Figure 11: The reporting options

Item analysis report

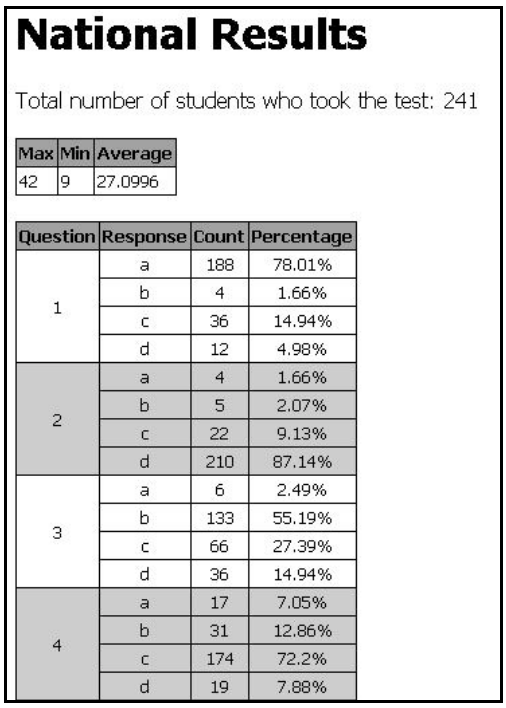
The Item analysis link will first generate an overview of scores for the exam. It will give the maximum, minimum, and average raw scores and percent scores as well as the standard deviation. It will also then give these values broken down by school.

Overview

School	Number Tested	Max	Min	Average	Max Score	Min Score	Average Score	Standard Deviation
National	241	42	9	27.0996	84%	18%	54.199%	13.909%
aimeliik	8	34	24	30.6250	68%	48%	61.25%	6.24%
airai	30	37	11	26.7000	74%	22%	53.4%	11.811%
angaur	2	39	36	37.5000	78%	72%	75%	3%
gbh	45	37	9	26.3333	74%	18%	52.667%	12.501%
ibobang	4	28	12	17.5000	56%	24%	35%	12.45%
jfk	2	23	17	20.0000	46%	34%	40%	6%
koror	76	40	12	26.5921	80%	24%	53.184%	13.168%
melekeok	6	42	17	31.5000	84%	34%	63%	14.731%
meyuns	24	38	11	26.0000	76%	22%	52%	14.911%
ngaraard	4	40	26	32.7500	80%	52%	65.5%	11.079%
ngarchelong	7	34	21	28.2857	68%	42%	56.571%	7.613%
ngardmau	6	32	10	24.6667	64%	20%	49.333%	14.907%
ngchesar	4	37	27	30.2500	74%	54%	60.5%	7.921%
ngeremlengui	10	39	11	25.3000	78%	22%	50.6%	19.82%
ngiwal	5	37	25	29.8000	74%	50%	59.6%	8.523%
peleliu	8	41	27	35.1250	82%	54%	70.25%	9.243%

Figure 12: Example of an overview table

We then generate an item analysis of each question. For multiple choice questions we give the frequency of responses for each multiple choice. For free value questions (a 4 point question) we generate how many students scored each possible question value.



National Results

Total number of students who took the test: 241

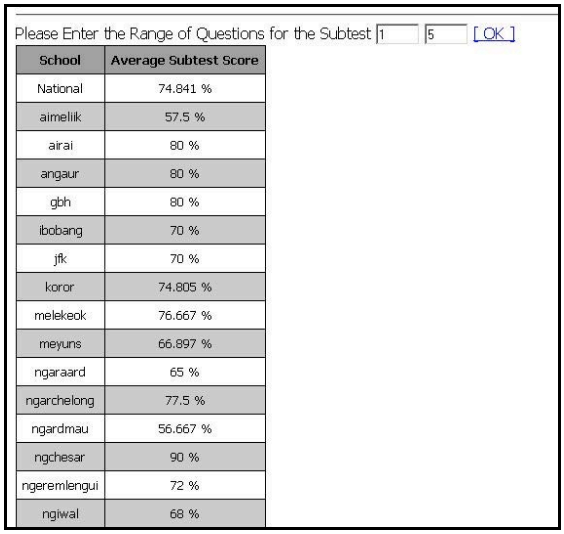
Max	Min	Average
42	9	27.0996

Question	Response	Count	Percentage
1	a	188	78.01%
	b	4	1.66%
	c	36	14.94%
	d	12	4.98%
2	a	4	1.66%
	b	5	2.07%
	c	22	9.13%
	d	210	87.14%
3	a	6	2.49%
	b	133	55.19%
	c	66	27.39%
	d	36	14.94%
4	a	17	7.05%
	b	31	12.86%
	c	174	72.2%
	d	19	7.88%

Figure 13: Example of an item analysis

Subtest analysis report

The subtest analysis report asks the user to enter in a range of questions. The software generates data assuming the range of questions was a subtest.



Please Enter the Range of Questions for the Subtest 1 5 [OK]

School	Average Subtest Score
National	74.841 %
aimelik	57.5 %
airai	80 %
angaur	80 %
gbh	80 %
ibobang	70 %
jfk	70 %
koror	74.805 %
melekeok	76.667 %
meyuns	66.897 %
ngaraard	65 %
ngarchelong	77.5 %
ngardmau	56.667 %
ngchesar	90 %
ngeremlengui	72 %
ngiwal	68 %

Figure 14: Example of a subtest analysis

Pass fail analysis report

The user inputs the passing grade and then we generate the percent of students who passed/failed nationally and by school. We also breakdown the amount of students by the MOE skill levels.

Please Enter the Passing Grade for the Exam (out of 100): 65 [OK]

School	# Tested	% Pass (65 - 100)	% Fail (< 65)	Percent Advance (90-100)	Percent Proficient (70-89)	Percent Developing (60-69)	Percent Beggining (0-59)
National	252	54.762 %	45.238 %	1.587 %	36.905 %	26.984 %	34.524 %
aimeliik	8	50 %	50 %	0 %	25 %	37.5 %	37.5 %
airai	31	64.516 %	35.484 %	0 %	58.065 %	12.903 %	29.032 %
angaur	2	100 %	0 %	50 %	50 %	0 %	0 %
gbh	47	48.936 %	51.064 %	2.128 %	23.404 %	36.17 %	38.298 %
ibobang	4	0 %	100 %	0 %	0 %	25 %	75 %
jfk	2	50 %	50 %	0 %	0 %	50 %	50 %
koror	77	61.039 %	38.961 %	1.299 %	41.558 %	27.273 %	29.87 %
melekeok	6	66.667 %	33.333 %	16.667 %	33.333 %	33.333 %	16.667 %
meyuns	29	44.828 %	55.172 %	0 %	24.138 %	31.034 %	44.828 %
ngaraard	4	75 %	25 %	0 %	50 %	50 %	0 %
ngarchelong	8	50 %	50 %	0 %	50 %	12.5 %	37.5 %
ngardmau	6	16.667 %	83.333 %	0 %	16.667 %	0 %	83.333 %
ngchesar	4	50 %	50 %	0 %	50 %	25 %	25 %
ngeremlengui	10	60 %	40 %	0 %	40 %	20 %	40 %
ngiwal	5	40 %	60 %	0 %	20 %	60 %	20 %
peleliu	9	66.667 %	33.333 %	0 %	66.667 %	11.111 %	22.222 %

Figure 15: Example of a pass/fail analysis

Label analysis report

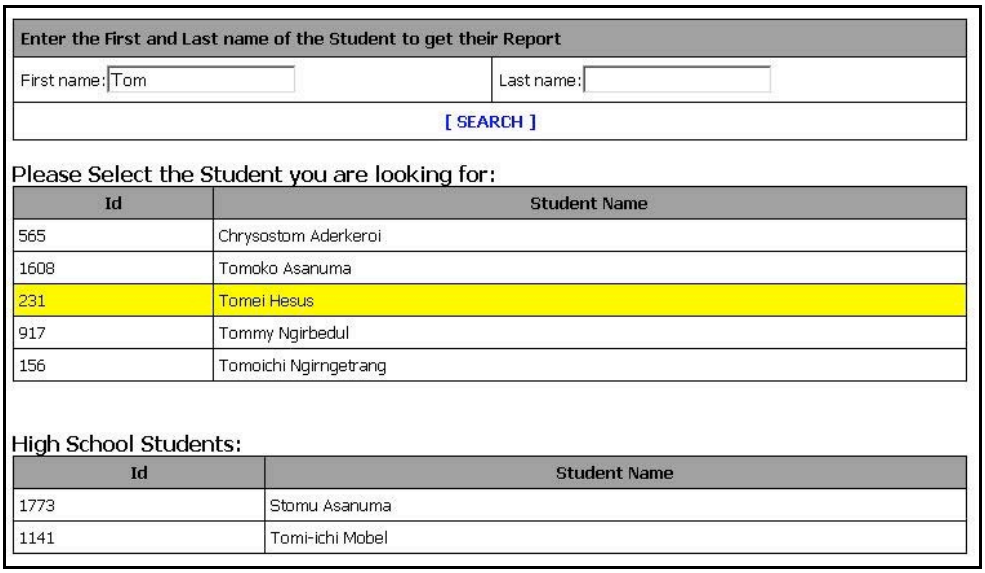
If there are labels assigned to each question this will generate a report for each label. In Figure 16 the label P represents all questions marked as “Phonics” and the average score nationally was a 69.616%. It also breaks down the skill levels of all students based on their scores on “Phonics” labeled questions.

School	Label	Average Score	Percent Advance (90-100)	Percent Proficient (70-89)	Percent Developing (60-69)	Percent Beggining (0-59)
National	P	69.616 %	10 %	37.5 %	30 %	22.5 %
	V	66.625 %	22.5 %	32.5 %	15 %	30 %
	RC	70.251 %	15 %	50 %	10 %	25 %
	F	53.02 %	2.5 %	35 %	5 %	57.5 %
	PA	81.75 %	40 %	40 %	10 %	10 %
aimeliik	P	53.85 %	0 %	0 %	0 %	100 %
	V	60 %	0 %	0 %	100 %	0 %
	RC	63.33 %	0 %	0 %	100 %	0 %
	F	20.83 %	0 %	0 %	0 %	100 %
	PA	50 %	0 %	0 %	0 %	100 %
airai	P	69.23 %	0 %	33.333 %	66.667 %	0 %
	V	38.333 %	0 %	0 %	0 %	100 %
	RC	37.78 %	0 %	0 %	0 %	100 %
	F	54.167 %	0 %	33.333 %	33.333 %	33.333 %
	PA	86.667 %	66.667 %	33.333 %	0 %	0 %

Figure 16: Example of a label analysis

Student Reports

Since we created one database for all tests it was possible to follow a student's progress. The user enters a student's name and then can get all test scores for that student.



Enter the First and Last name of the Student to get their Report

First name: Tom Last name:

[SEARCH]

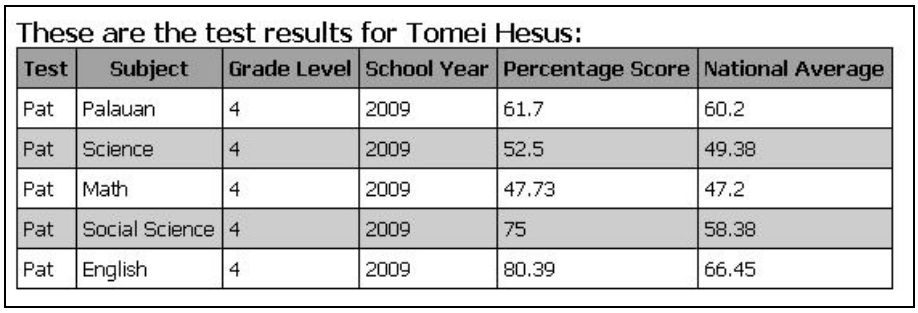
Please Select the Student you are looking for:

Id	Student Name
565	Chrysostom Aderkeroi
1608	Tomoko Asanuma
231	Tomei Hesus
917	Tommy Ngirbedul
156	Tomoichi Ngirngetrang

High School Students:

Id	Student Name
1773	Stomu Asanuma
1141	Tomi-ichi Mobel

Figure 17: Form after you search for a student



These are the test results for Tomei Hesus:

Test	Subject	Grade Level	School Year	Percentage Score	National Average
Pat	Palauan	4	2009	61.7	60.2
Pat	Science	4	2009	52.5	49.38
Pat	Math	4	2009	47.73	47.2
Pat	Social Science	4	2009	75	58.38
Pat	English	4	2009	80.39	66.45

Figure 18: Example of a student report

Task 4. Configuring the UPS for servers in server room

Here are some of the outcomes of the consulting process:

Introduction of The Network UPS Tools project.

From the research done online, there are only 2 different tools available online that allow for configuration of UPS systems. One of them is apcupsd which Edwel has been using in the past but the tool only worked with UPSs made by APC, The American Power Corporation. The Network UPS Tools (NUT) project is a generic UPS monitor daemon that aims to communicate intelligently with all current UPS designs. The tool was introduced to Edwel and the technical team after a trial installation and testing when it was found to be able to communicate with the Tripplite UPS that are being used for the servers.

Through the consulting process, Edwel was involved in the process of installation and configuring the tool. A list of available online resources and documentation was compiled and shared with Edwel and the technical team so that they can refer to them for future upgrades and installations.

The next step after achieving communication between the servers and the UPS is to do a live test by simulating a power outage to observe that the servers shut down and power back on as expected in a real event. The simulation was done together with Edwel and proved to be successful; with the use of the NUT daemon, the servers are now able to shut down when the UPS runs low on battery power in the event of a power outage and power back on when power resumes.

Recommendation 1. Improve network connection and server hardware

For the full benefits of the applications hosted on the MOE server to be realized, a good network infrastructure is needed to ensure teachers and students can access the required material when needed. Currently, both the extranet and intranet are hosted on the same physical machine.

As more applications are developed and hosted on the MOE intranet, the workload on the server will get heavier and it may take time for applications on the server to load and process data.

As such, the server machine needs to be upgraded or the MOE can also consider hosting the intranet and extranet on two separate physical machines. This will help to separate the intranet from the extranet and preserve the integrity of data hosted on the intranet. This will also improve the security of the intranet in cases of malicious attacks by hackers using theextranet.

Recommendation 2. Change workflow of test management

As can be seen in the following workflow diagram, the success and use of the online test management systems depends critically on the test being defined in the database before data and student responses can be entered. We recommend that the subject specialists who designed the exams be the ones responsible for defining the exam in the database with the correct number of questions, the correct answers and the question type(if applicable).

The defined responsibility of the specialists will make the process of using the test management system clear and visible to everyone involved and allow the organization to have better control over the website and the content management.

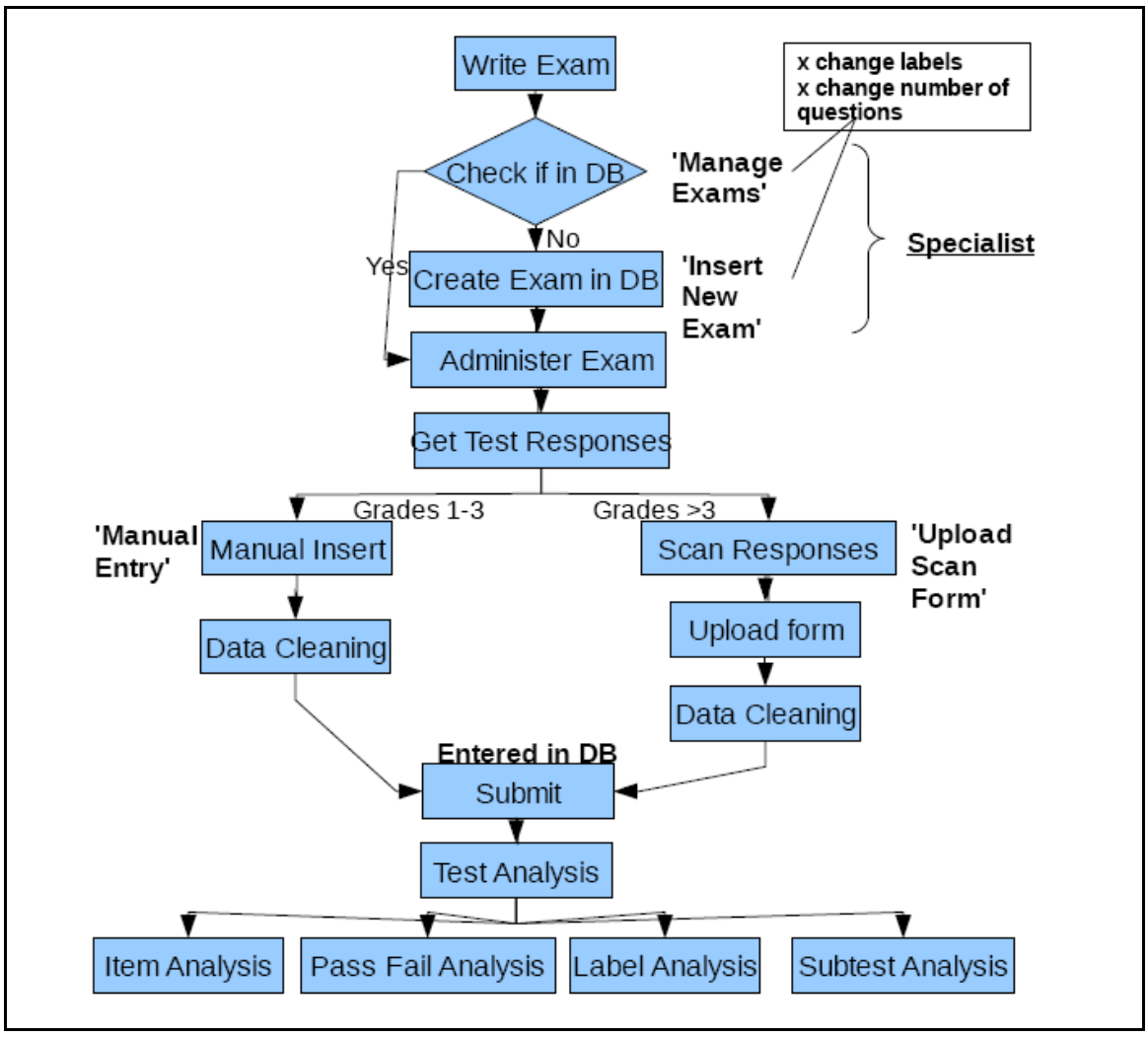


Figure 19: The proposed work flow

Recommendation 3. Sustenance of technical capability

With the past few collaborations and partnerships between Carnegie Mellon University and Ministry of Education of Palau, Edwel has been instrumental and the main person in direct contact with the student consultants. As such, Edwel is very familiar with the technical infrastructure and has the most experience in setting up the network and supporting the daily operations of the Ministry of Education (MOE). It has been observed that the Ministry relies mainly on Edwel to resolve technical issues since Edwel is the staff in MOE who is the most knowledgeable in terms of scripting and network management. When the mail server goes down, the staff at MOE will be waiting for Edwel to fix and solve the problem. This poses to be an issue, especially when Edwel is away on other duties or away on leave.

Also, Edwel will be reaching retirement age soon and there is a strong need to ensure that there will be someone who succeeds Edwel's position will be able to take over comfortably with the relevant and required knowledge and technical know-how. The consultants recommend finding an employee to shadow Edwel's work so he can pass on his knowledge to the employee.

<u>Resources for Recommendation 3:</u>

• Guide to Human Resource Management by Civil Service Branch, Hong Kong
can be found online at
http://www.csb.gov.hk/english/publication/files/e-hrmguide.pdf
The guide mentions and discusses about succession planning, staff induction and many other aspects of human resource management practices.

• A research study on workforce planning conducted by the International Public Management Association for Human Resources.
http://www.ipma-hr.org/pdf/research/Planningresults.pdf

About the Consultants

Tom Lewkowitz is a senior in Computer Science with a minor in Engineering Studies at Carnegie Mellon University. He is expected to graduate in May 2010.

Yixin Liu is a senior in Electrical and computer engineering with a double major in Engineering and Public Policy at Carnegie Mellon University. He plans to pursue a master's degree in Management Science and Engineering and a career in consulting after graduation.

Appendix A – Manual on using the online test management system

The manual for using our test management system was developed as a reference material for the staff at MOE Central Office to refer to on how to use the applications developed. This helped to teach users how to use the test management system when the consultants were busy or after training sessions. Specific manuals were similarly extracted and adopted from the main copy for users who just need to know how to use the specific parts or functions of the test management system.

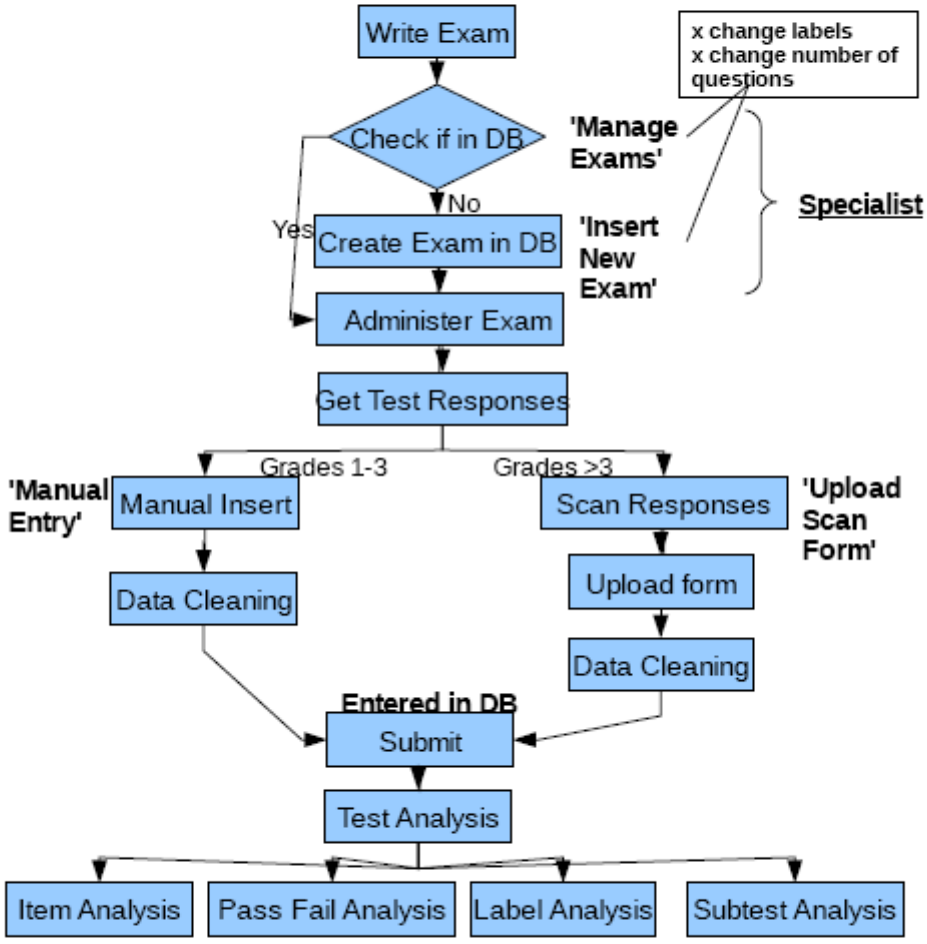
Manual for Online Test Management System

Table of Contents

Introduction

About the Online Test Management System

The online test management system is designed using Javascript, PHP and mySQL. It coordinates the test entry, grading and report analysis used by the Ministry of Education, Republic of Palau. With the newly designed system, the workflow for the MOE in terms of test grading, data collection and analysis is depicted in the diagram as follows:



The online test management system is designed by Tom Lewkowitz and Yixin Liu from Carnegie Mellon University. For more information, they can be contacted at the following by e-mail:

Tom Lewkowitz	:	tlewkowi@gmail.com
Yixin Liu	:	yixin@ceek.biz

Using the Manual

The manual is designed and arranged in chronological order of the workflow process (depicted earlier in the Introduction section). Each section covers instructions on how to use the web application to collect the data, parse the data, and finally to analyze the data. Within each section, the relevant staff is also listed so that it is clear on the responsibility of different staff in the use of the system. This manual covers Test management which is more complex. Data analysis which is under Test Reports is not covered here but will be covered in the training sessions.

1) To get to the applications listed on the manual, go to **PROGS** from the menu on the top of the intranet website.

2) Then Select **CO-DCI**

3) The **Test Management** and **Test Reports** applications can be found on the menu on the left.

Defining an exam (Staff of interest: Specialists)

After an exam has been designed and written, it needs to be defined and inserted into the database. The recommendation is that the subject specialist who designed the test/exam insert the information into the database.

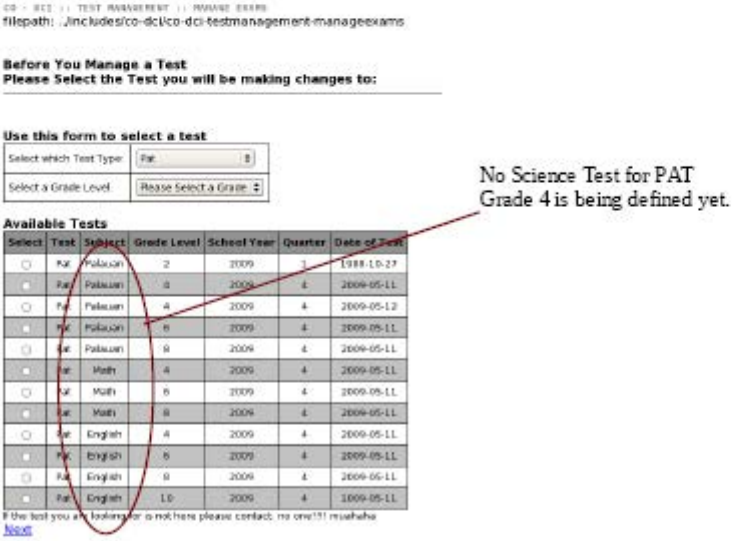
I. Creating a new exam in the database

1) Check that exam is not defined in database

Before creating a new exam in the database, it is a good practice to check if the test has already not been defined in the database. To do this, go to **Manage Exams** under Test Management.

2) Select the Test Type and (optionally) the grade level and school year from the drop down menu to see a list of tests that have already been defined. **Suppose** we want to define a PAT **Science** test for Grade level **4**. This will indicate that the test does not exist in the database and we can go ahead to create one.

(Tip: When the list gets long and hard to filter through, it may be easier to select the grade level and school year to see a shorter lists of tests already defined.)



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3) Now that we have ensured that the test is not defined yet to avoid duplicates, we can go ahead to insert a new test into the database. Click **Insert New Exam** in the menu on the left.

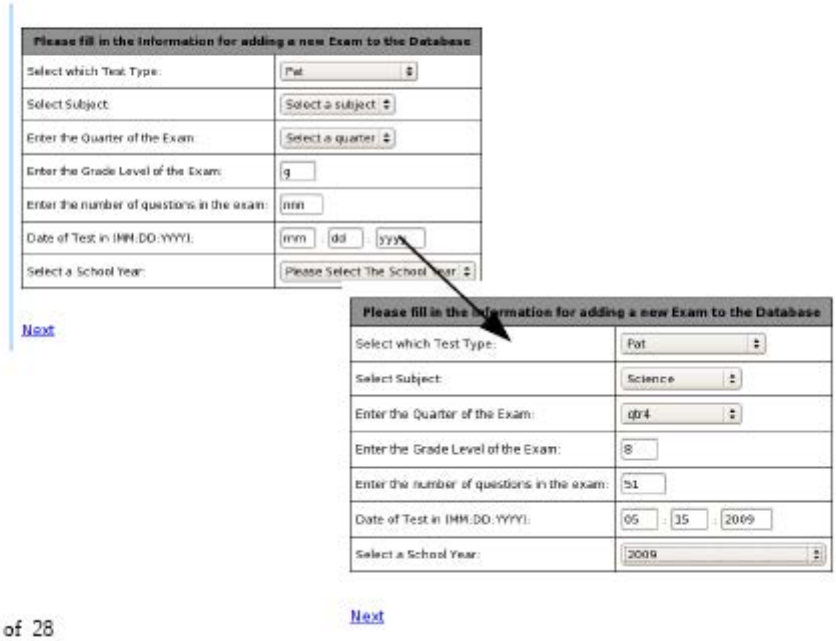
4) Select the test that we want to insert and the following information will be required to be filled out (We are using PAT here for demonstration purposes):

The following information will be required:

- The Test Type: PAT/Quarterly/PERA
- Test subject or type of PERA(pre, mid post)
- Quarter the exam was administered
- Grade level of exam
- Number of questions in the exam
- Date of test (An estimate will do if this is administered on different dates in different schools)
- School Year

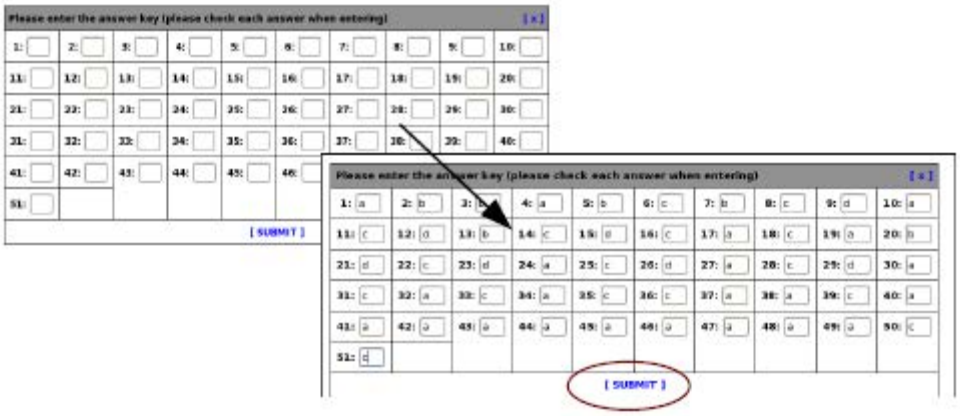
At the same time, get ready with the answers for the test which will be keyed in.

Note that once the number of questions is entered, it cant be changed. To change it after it has been keyed in, refer to section on Manage Exams (section on modifying exam - step 5)



After all the information has been filled out, click on **NEXT.**

5) There will be a pop-up to key in the **answers**. They can be keyed in **without** pressing the tab key. Then click on **SUBMIT**.

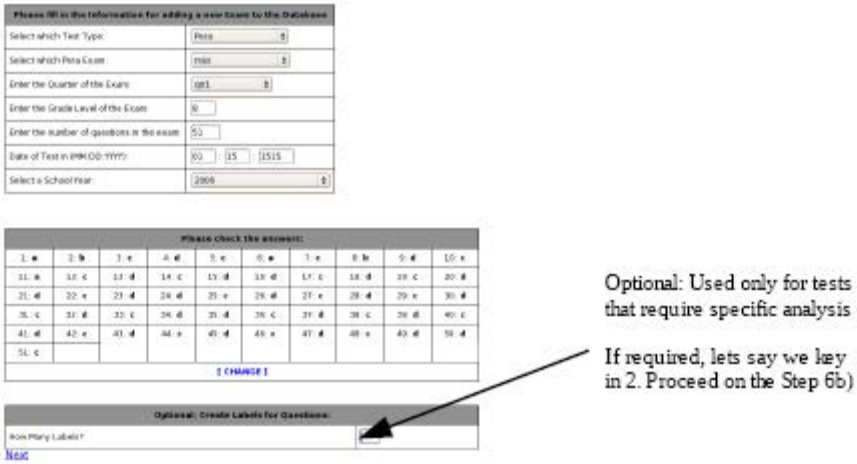


NOTE: For **open response questions in tests like **MATH**, the answer key should be the **total number of points allocated** for that question i.e 4.

6a) Review and verify the answer key. They can be changed if necessary by the **CHANGE** link.

** For tests such as PERA where specific analysis needs to be done based on how well students did in sections of the test like Vocab, grammar etc, fill in the Labels column lets say we fill in 2.(proceed on to **step 6b**) If specific analysis is not required for the test, **skip to step** 7.

**Note that once the number of labels is keyed, it cant be changed. To change it after it has been keyed in, refer to section on Manage Exams (section on modifying exam – step 5.)



Optional: Used only for tests that require specific analysis

If required, lets say we key in 2. Proceed on the Step 6b)

Page Next

6b) Fill in the labels that we need i.e Vocab, Grammar and click **Assign Label to Questions**:

6c) Assign the label type to the questions and then click **Submit Labels.**

7) Click on **NEXT.** The test is now defined in the database.

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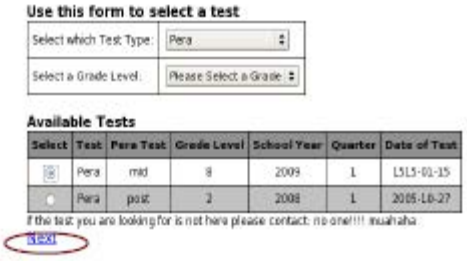
II. Modifying an exam in the database

1) Click on Manage Exams under Test Management on the left menu

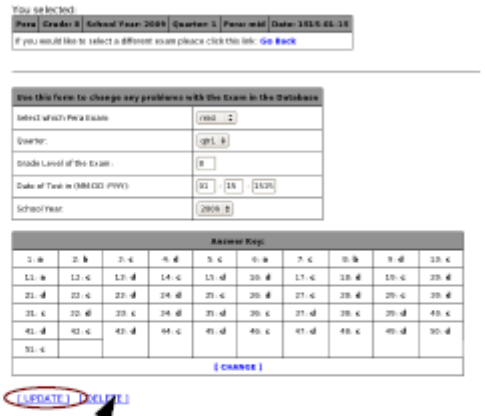
2) Select the test and (optionally) the grade level and school year from the drop down menu to see a list of tests that have already been defined. Next, click on the test that you want to modify and click **Next**.

(Tip: When the list gets long and hard to filter through, it may be easier to select the grade level and school year to see a shorter lists of tests already defined.)



3) The following information can be modified:

-The type of test, quarter, grade level of exam, date of test, school year and answer key.
-If the information you want to modify is not listed, skip to step 5 on deleting.



4) Once the modifications have been done, click on **UPDATE**. (You are done! Skip step 5.)
5) If for some reasons that you want to change the number of questions and labels, the current Manage Exams does not support this. So **please make sure that these are defined properly right at the start.** If changing them is absolutely necessary, the only workaround is to (Please read the warning!) click on **DELETE** and then go to **Insert New Exam**.

   Warning: Before you go ahead and delete the exam and insert a new one to have the exam reflect the correct number of questions or labels, it is important that you check that there has been no data/responses already entered into the database by the data entry staff - this can be checked with Edwel OR going to the **Item Analysis of the **Test Report section** and making sure that there there are no responses as yet in the database belonging to the test type being deleted. If there has already been data being entered, contact Edwel for help with changing the labels or number of questions.)

Uploading Scan Responses

This section concerns the staff who collects the responses from the multiple choice questions in the bubbles format and scans them.

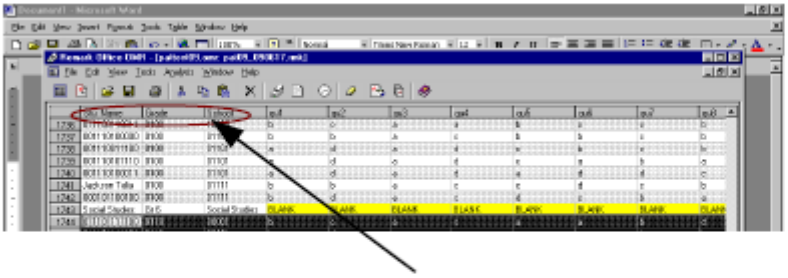
I. Requirements : Column format, file format

There are some requirements that the data has to be scanned so that the web application can handle the data correctly. Please make sure you read through this section before doing any scanning to save you trouble later on.

1) Column format

The column format has to be in the following order (We recommend defining this early on in Remark Office so that less time and effort is needed in post processing using Microsoft Excel.):

Student ID	School ID	Grade ID	Responses...



Make sure that the column format is as follows:
Student ID, School ID, Grade Level, Responses

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2a) Unique Files

Please note that each individual test for each different grade is treated differently. i.e for PAT English **Grade 4** is treated differently from PAT English **Grade 5.** As such, it may be easier to scan the answer sheets separately and save them in individual file names instead of scanning all responses for various different tests together at one time and saving them using a filename.

i.e

Different file for each individual test

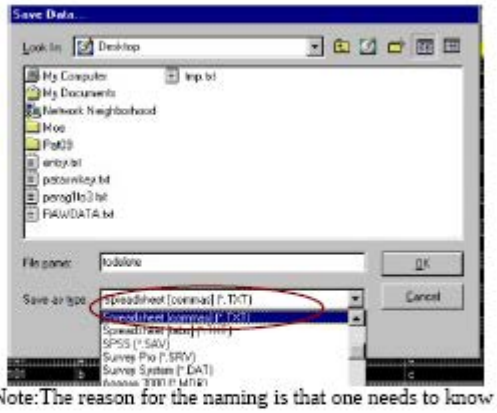
**Tip: It is also a good idea to organize the different files into different folders for ease of management.

2b) File Format

The file format has to be in the extension '.txt' before it is uploaded using the web application. This can be done by using Remark Office and under **Save Data As**, select the file type to be '**Spreadsheet(commas)(*.TXT)**'.

For easy tracking purposes, it may be easy to save the file according to the filename format but feel free to use other format that you are comfortable with:
(Test)(School Year)(Subject/Test type)(Grade)

i.e PAT09_Eng4 for Palau Achievement Test English Grade 4 for School Year 09
i.e PERA09_post6 for **Post** Palau English Reading Assessment Grade 6 for School year 09



**Note:The reason for the naming is that one needs to know which text file to choose from when uploading.

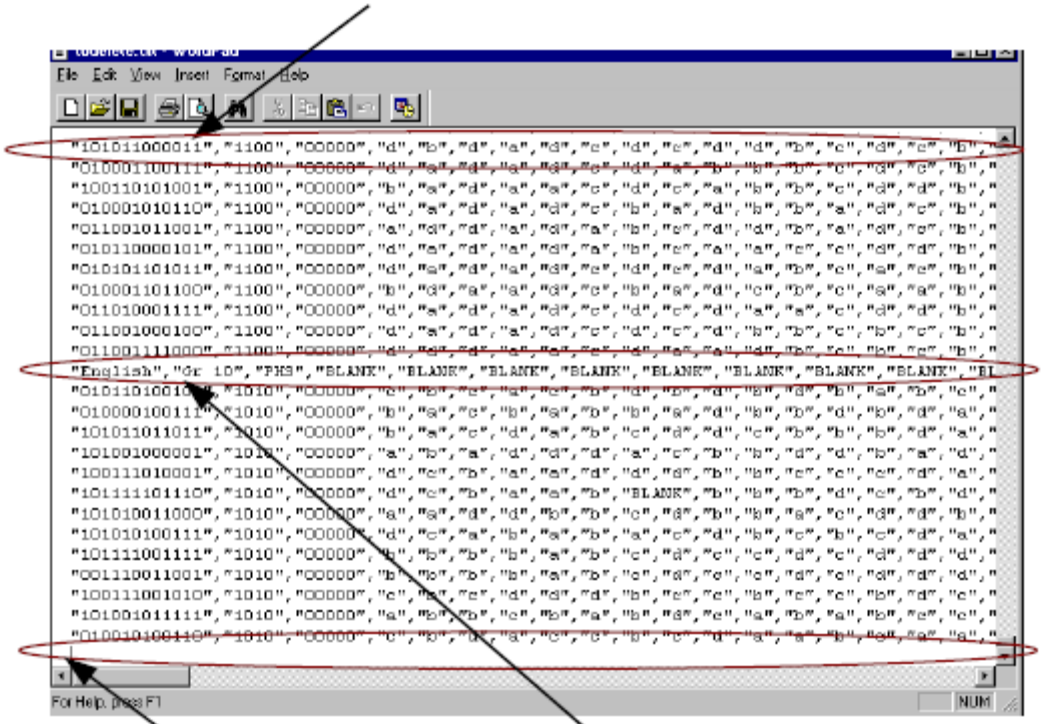
II. Changes that cannot be made using Remark Office and must be made using other software like Ms Excel before exporting to txt :

If there are some changes that cant be made using Remark Office before saving as .txt, please refer to Appendix A on page 27.

III. Requirement within text file

To ensure that the text file uploaded is readable by the application, do one final check by opening the text file and doing a visual check on the contents.

1) Ensuring that there are no other dummy data in the file and that there is a n empty line at the end of the file.



Empty line at the end of the file

This line contains irrelevant data for the application. It should be removed before being uploaded.

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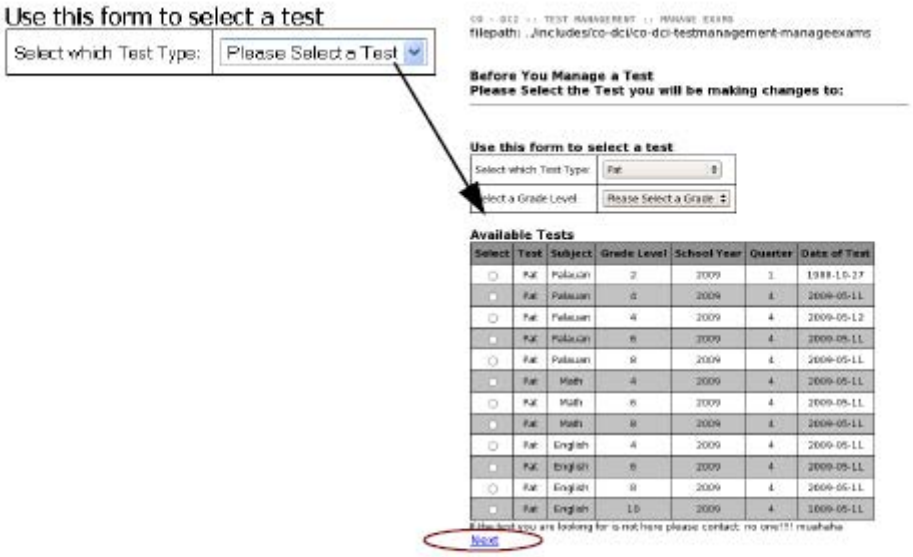
IV. Uploading

After all the work to format the data etc, it is time to upload the text file into the web server!

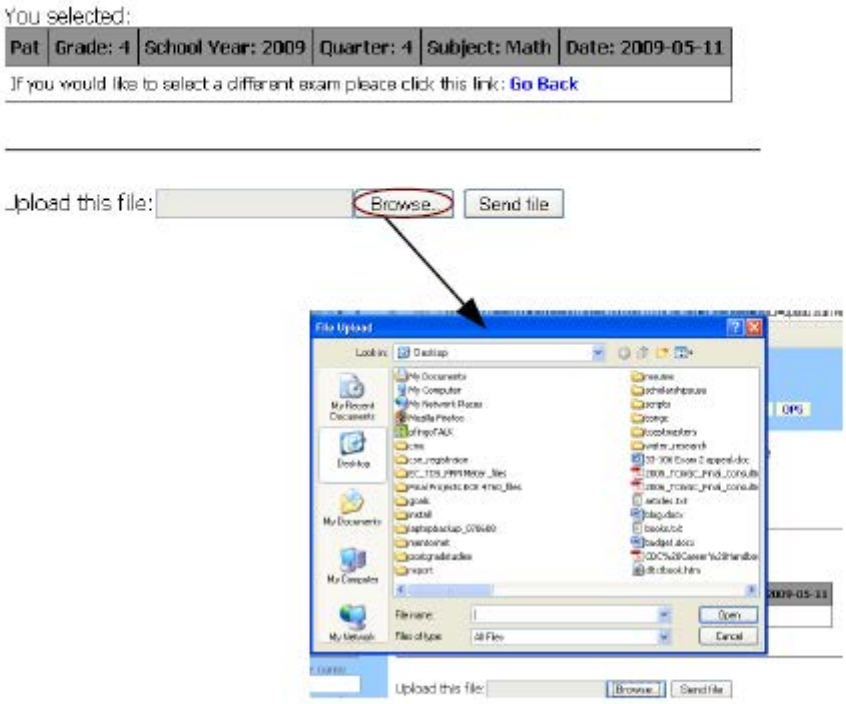
1) To upload, click on **Upload Scan File**

2) Select the Test Type and (optionally) the grade level and school year from the drop down menu that we want to upload for and click **NEXT**.

(Tip: When the list gets long and hard to filter through, it may be easier to select the grade level and school year to see a shorter lists of tests already defined.)

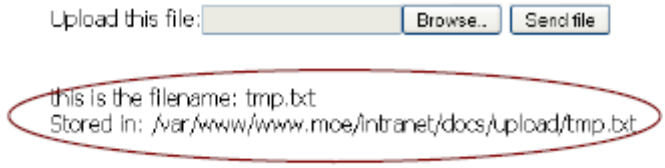


3) Then, we need to select the **text file** from our local machine with the scanned data that we want to upload and click **Browse**



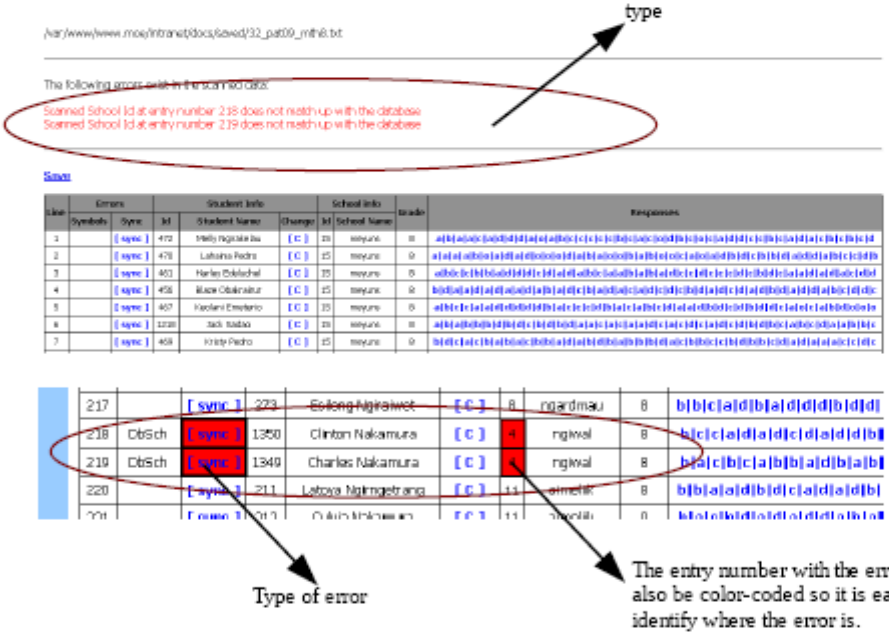
4) Once we have selected the file we want, we click on the button **Send file**.

5) If the upload is successful, we'll see the following message of what the filename is and where it has been uploaded.



6) The data read in will also be displayed as follows:

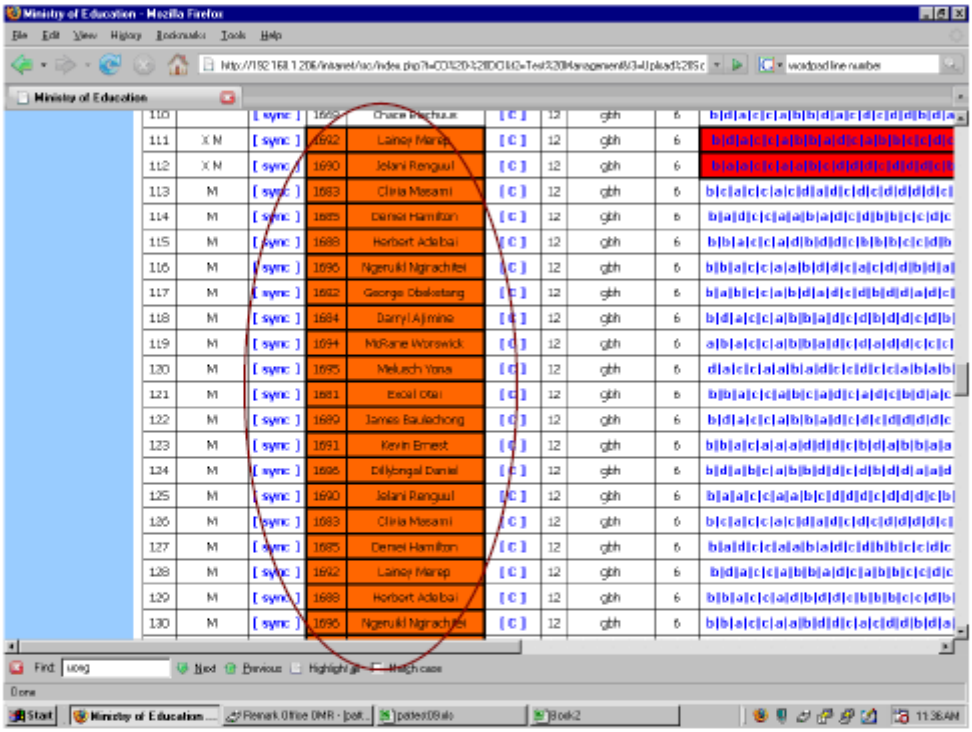
The types of error are stated at the top: with the entry number and the error type



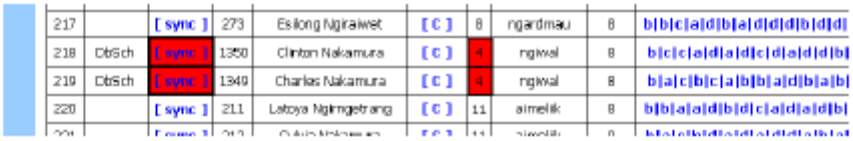
V. Error Handling

Before making any changes, be sure to remember the entry number we are changing so that we can go back to the entry number to check the change after it has been done.

1) One of the earliest errors to check for is if there is a duplicate answer sheet that has been scanned twice. (i.e 2 or more entries of same name, school, grade and answer key).In such cases, the duplicate entries have to be deleted either in Remark or using Excel.

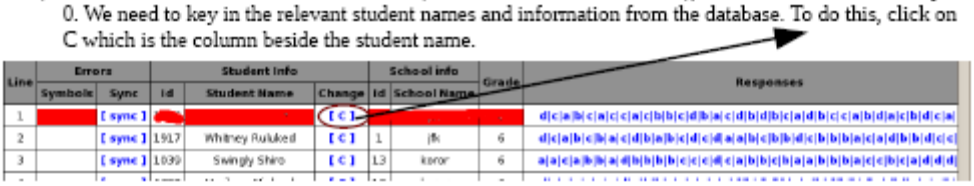


2) Another possible error is that the database information is inconsistent with what is reflect on the answer sheet. In such cases, **contact Keizy** and verify the school and grade that the student is in. Sometimes, the student may have transferred which the database may not have captured. If this is the case, save the file, let Keizy update the database before loading the file to continue working on it.(Instructions to how to save comes later.) If we are sure that the information on the database is right, then we click on *sync*.



217		[sync]	273	Esilong Ngiraiwet	[C]	8	ngardmau	8	b|b|c|a|d|b|a|d|d|d|b|d|d|
218	ObiSch	[sync]	1350	Clinton Nakamura	[C]	4	ngiwal	8	b|c|c|a|d|a|d|c|d|a|d|d|b|
219	ObiSch	[sync]	1349	Charles Nakamura	[C]	4	ngiwal	8	b|a|c|b|c|a|b|b|a|d|b|a|b|
220		[sync]	211	Latoya Ngirngetrang	[C]	11	aimelik	8	b|b|a|a|d|b|d|c|a|d|a|d|b|

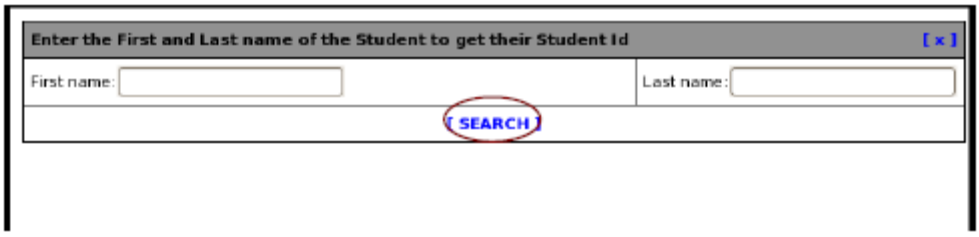
3) In the case where there was no student id(Recall that is was Error#3100), the student ID will show up as 0. We need to key in the relevant student names and information from the database. To do this, click on C which is the column beside the student name.



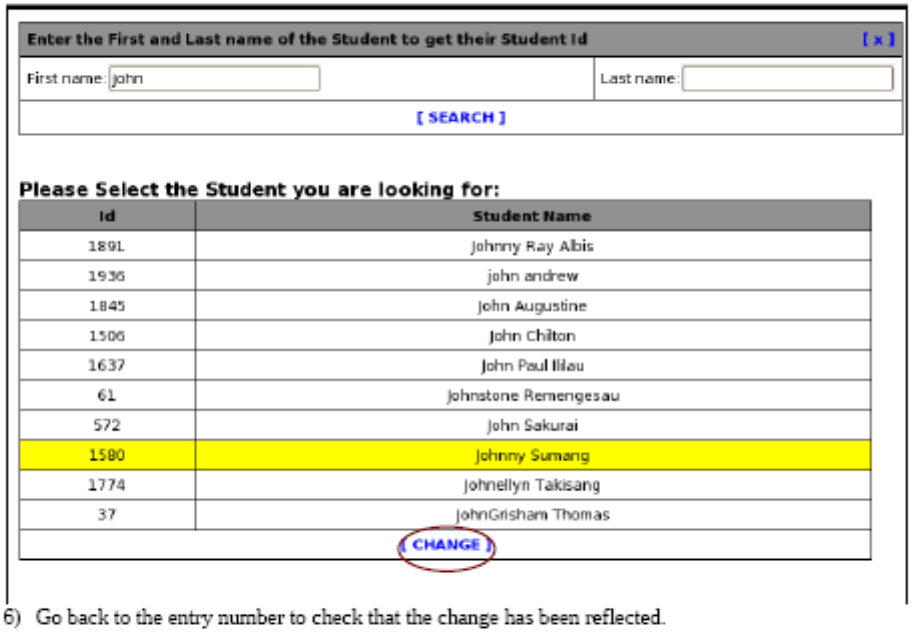
Line	Errors		Student Info			School Info		Grade	Responses
	Symbols	Sync	Id	Student Name	Change	Id	School Name		
1		[sync]	[redacted]		[C]				d|c|a|b|c|a|c|c|a|c|b|b|c|d|b|a|c|d|b|d|b|c|a|d|b|c|c|a|b|d|a|c|b|d|c|a|
2		[sync]	1917	Whitney Ruluked	[C]	1	jfk	6	d|c|a|b|c|b|a|c|d|b|a|b|c|d|c|d|a|a|b|c|b|b|d|c|b|b|b|a|c|a|d|b|b|d|c|c|
3		[sync]	1939	Swingly Shiro	[C]	13	ksror	6	a|a|c|a|b|a|d|b|b|b|c|c|c|d|c|a|b|b|c|b|a|a|b|b|b|a|c|c|b|c|a|d|d|d|

4) This will bring up the student search page. Simply fill in the student's first name and last name.

Tip: If the person's name is Johnny Sumang, you can look for the person just by his last name Sumang alone. (Not necessary having to key in all information in). If the student's handwriting is illegible and we are not sure if it is Johnny Sumang or Johnny Sumong, we can key search by Johnny as first name and Sum as last name. The search engine will take care of that. Then click on **Search.



5) This will bring up a list of students. Select the student which we want to change the entry number to reflect. It will **highlight in yellow**. Click **Change** after that.



Enter the First and Last name of the Student to get their Student Id [x]

First name: john Last name:

[SEARCH]

Please Select the Student you are looking for:

Id	Student Name
1891	Johnny Ray Albis
1936	john andrew
1845	John Augustine
1506	John Chilton
1637	John Paul Ililau
61	Johnstone Remengesau
572	John Sakurai
1580	Johnny Sumang
1774	Johnellyn Takisang
37	JohnGrisham Thomas

[CHANGE]

6) Go back to the entry number to check that the change has been reflected.

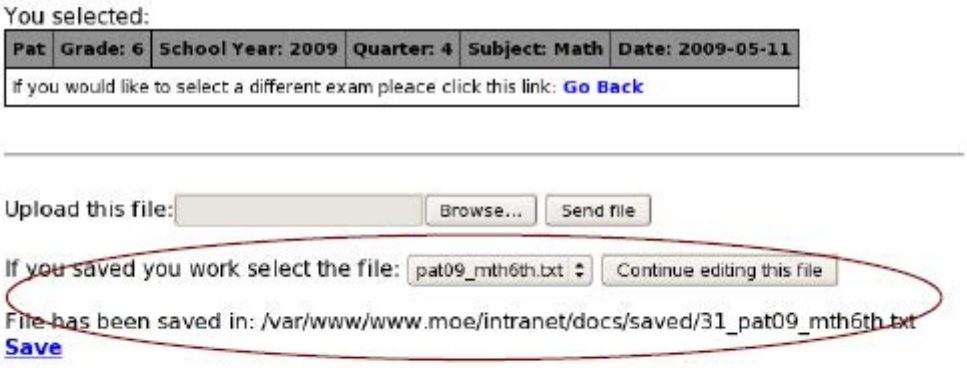
Line	Errors		Student Info			School Info		Grade	Responses
	Symbols	Sync	Id	Student Name	Change	Id	School Name		
1		[sync]	1580	Johnny Sumang	[C]	12	gbh	4	d|c|a|b|c|a|c|c|a|c|b|b|c|d|b|a|c|d|b|d|b|c|a|d|b|c|c|a|b|d|a|c|b|d|c|a|
2		[sync]	1917	Whitney Ruluked	[C]	1	jfk	6	d|c|a|b|c|b|a|c|d|b|a|b|c|d|c|d|a|a|b|c|b|b|d|c|b|b|b|a|c|a|d|b|b|d|c|c|
3		[sync]	1039	Swingly Shiro	[C]	13	koror	6	a|a|c|a|b|b|a|d|b|b|b|b|c|c|c|d|c|a|b|b|c|b|a|a|b|b|b|a|c|c|b|c|a|d|d|d|
4		[sync]	1052	Mariann Michael	[C]	13	koror	6	d|c|a|a|a|a|a|d|a|b|b|c|c|c|c|c|c|d|b|d|d|b|a|c|b|d|b|b|d|a|d|d|a|c|a|b|

** Tip: Dont forget to save your work after every few valid changes!

VI. Saving the form

1. To save the form, click the **Save** link on the top of the page.

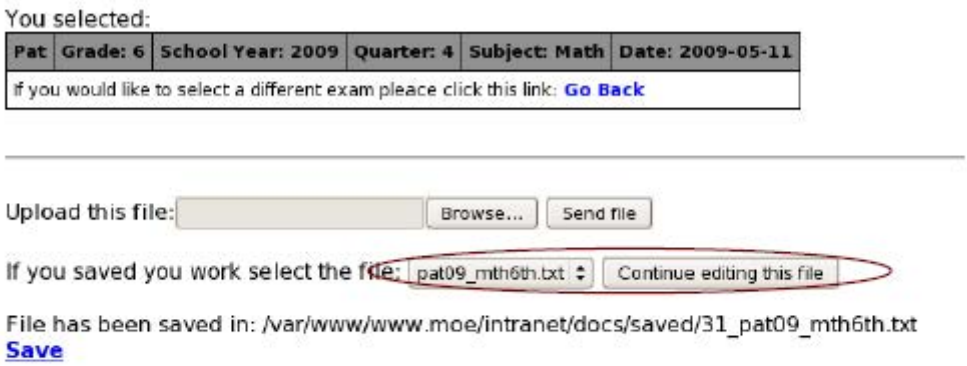
2. If the file was saved correctly, the form will reflect that. You will also see the ability to come back to the form at a later time to edit it.



Uploading scan responses	
Requirements : Column format, file format	

VII. Resuming a saved file

To resume a saved file, simply select the relevant test that you want to resume editing under "Scan New Form" and select **Continue editing this file.**



VIII. Submission

After all the errors detected by the application has been fixed, the data is now ready to be submitted to the database for storage and analysis. Click on **Submit Data To Database.** Once the data has been submitted, there will be a confirmation page.

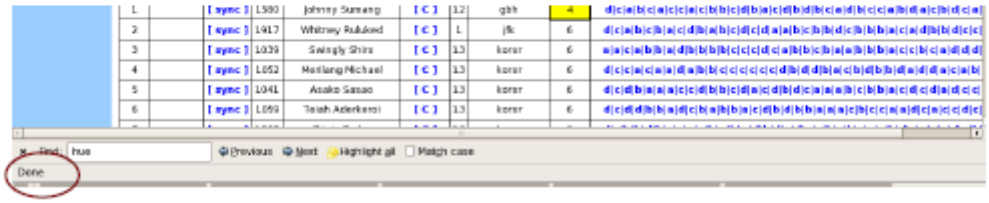
220	[sync]	74	Leony Tebelak	[C]	9	ngeremlengui	6	d|c|d|c|c|b|d|a|a|b|a|c|c|d|c|c|d|a|b|a|c|a|a|c|b|b|b|a|d|d|b|c|d|c|d|b|
221	[sync]	73	Leahlany Flores	[C]	9	ngeremlengui	6	d|c|d|b|d|o|a|d|o|b|b|b|b|a|a|c|a|a|a|b|b|c|c|d|b|c|a|a|c|b|c|a|c|d|a|c|
222	[sync]	69	Alely Shiro	[C]	9	ngeremlengui	6	d|c|a|a|d|b|a|d|a|b|a|a|c|a|b|d|d|a|b|b|b|a|d|c|b|b|b|a|a|d|d|c|c|d|d|b|
223	[sync]	76	Olshane Tebelak	[C]	9	ngeremlengui	6	c|c|a|b|d|c|d|c|d|a|c|b|b|a|c|b|c|a|b|d|a|a|a|a|b|d|d|c|d|b|d|b|d|b|c|b|
224	[sync]	77	Rita Modad	[C]	9	ngeremlengui	6	d|c|c|c|b|c|d|c|a|d|a|c|b|c|b|d|a|b|d|b|a|c|d|c|m|b|c|d|b|b|c|a|a|b|d|c|
225	[sync]	70	Diana Ilemelong	[C]	9	ngeremlengui	6	d|c|a|b|d|a|b|d|b|d|a|d|b|c|a|c|c|c|a|c|d|a|b|c|b|a|b|d|d|d|d|c|b|d|a|b|
226	[sync]	75	Meilin Chin	[C]	9	ngeremlengui	6	d|c|d|b|d|b|a|d|d|b|b|a|c|c|c|d|d|a|b|b|a|c|d|d|b|b|b|d|a|c|d|a|d|d|a|b|
227	[sync]	71	Disraelyn Flores	[C]	9	ngeremlengui	6	d|c|a|b|d|a|a|c|b|b|a|d|b|c|b|b|d|b|c|d|d|b|b|b|d|b|d|a|a|d|b|d|o|o|o|o|
228	[sync]	1865	Kenelly Rekemel	[C]	L6	peleliu	6	c|a|c|b|d|c|a|d|o|b|b|c|c|c|b|c|a|b|a|a|a|c|a|a|b|b|b|b|c|a|d|a|d|c|d|a|
229	[sync]	1859	Kuniko Francis	[C]	L6	peleliu	6	d|c|d|c|c|b|a|b|b|d|a|b|c|c|c|d|b|a|b|a|c|a|c|b|b|a|b|a|b|c|d|c|d|c|a|b|
230	[sync]	1864	Jenny Otoi	[C]	L6	peleliu	6	d|c|a|b|d|a|a|c|b|c|a|a|c|d|c|d|c|b|a|c|c|b|d|c|c|c|b|a|c|d|a|c|a|d|d|a|
231	[sync]	241	Salaam Alsaif	[C]	L7	angaur	6	d|c|d|b|d|d|a|d|o|o|b|c|c|o|b|c|b|a|b|o|c|o|d|c|a|b|b|o|o|o|o|b|b|d|b|b|
232	[sync]	242	Tsungio MacLewis	[C]	L7	angaur	6	d|c|d|b|d|b|a|d|a|b|b|c|c|c|c|c|b|a|b|b|b|o|o|o|o|o|o|o|o|o|o|o|o|o|o|o|
233	[sync]	400	Bridgette Ronald	[C]	15	meyuns	6	c|b|b|a|a|c|c|d|b|c|d|c|a|a|c|a|a|d|a|a|d|a|c|a|c|d|d|a|c|a|c|b|c|a|c|d|
234	[sync]	423	Spence Wasisang	[C]	15	meyuns	6	d|c|a|c|c|d|c|c|b|b|a|c|b|c|b|d|a|c|c|c|a|b|d|a|b|c|a|d|b|b|c|b|d|b|d|a|
235	[sync]	1003	Jay Jay Sidoi	[C]	L3	koror	6	b|c|b|c|a|b|c|b|d|b|c|o|a|c|b|c|d|o|b|c|c|b|c|a|c|b|a|c|c|c|b|d|a|a|c|b|
236	[sync]	1857	Marshal Kemesong	[C]	L2	gbh	6	d|c|c|d|a|b|a|c|d|d|b|c|c|c|c|c|d|d|b|c|b|d|b|d|b|b|a|b|b|c|c|a|c|b|a|
237	[sync]	607	Mark Pollol	[C]	7	airai	6	d|c|a|d|a|b|c|c|b|c|c|b|b|d|c|b|d|b|a|c|d|a|a|a|b|b|b|c|c|d|b|d|c|c|c|b|
238	[sync]	137	Twilber Johnsen	[C]	2	ngarchelong	6	b|c|c|d|c|c|b|a|b|b|a|a|c|a|a|d|a|b|c|c|b|a|a|b|c|b|b|a|d|a|b|b|c|b|c|a|
239	[sync]	131	Brandon Siliang	[C]	2	ngarchelong	6	c|c|a|d|c|b|a|c|o|b|a|b|c|c|c|c|b|a|b|c|c|a|a|b|b|b|b|a|d|a|b|b|d|c|a|a|
240	[sync]	132	Darmin Temong	[C]	2	ngarchelong	6	d|c|d|c|d|b|c|b|d|o|c|c|c|c|d|b|a|b|d|c|a|d|c|a|b|b|c|d|c|a|b|b|b|b|b|

[Submit Data To Database]

Important Note

As the scanned form deals with huge amounts of data in the text file and also error checking with the database, you may experience some slowness. We ask for your patience and to execute/do one thing at a time.

A good practice is to wait until the status-bar in the browser says Done before proceeding to do any more changes or actions.



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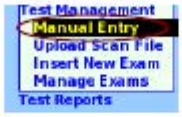
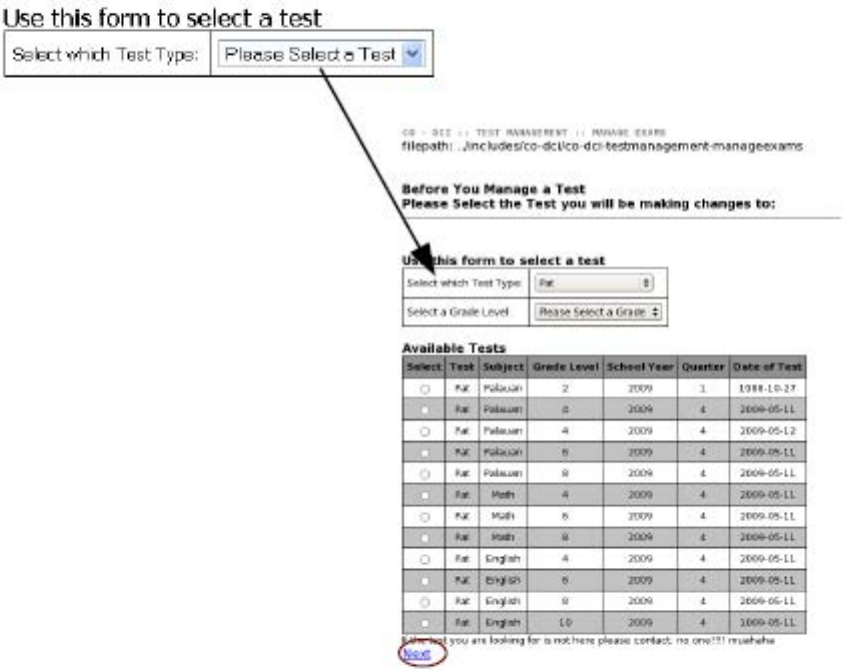
Manual Entry

To key in the responses of each individual students manually for grades one through three, click on **Manual Entry.**

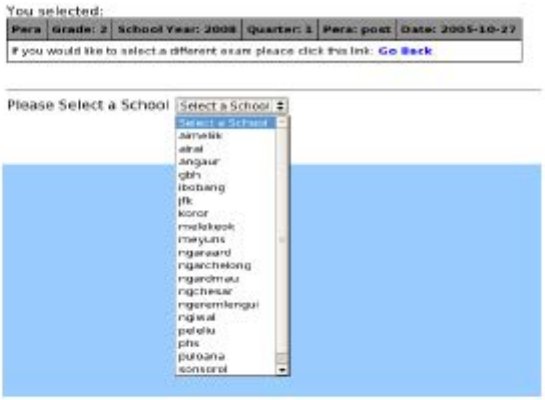


1. Select the Test Type and (optionally) the grade level and school year from the drop down menu that we want to upload for and click **NEXT**.

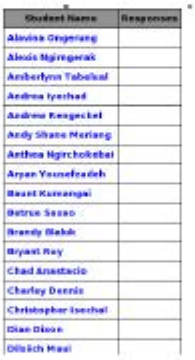
   (Tip: When the list gets long and hard to filter through, it may be easier to select the grade level and school year to see a shorter lists of tests already defined.)



2. Select a school where we want to enter the responses for:



3. A list of students in the school will appear.



4. Clicking on a student's name, we will be able to enter responses that the student has made. When we click **submit**, the information is uploaded onto the database.

NOTE: For **open response questions in tests like **MATH**, the response should be the **total number of points the student scored** for that question i.e 2 for 2 points.

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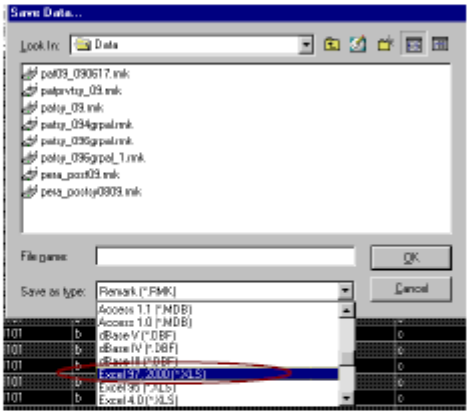
Appendix A. Changes that cannot be made using Remark Office and must be made using other software like Ms Excel before exporting to txt :

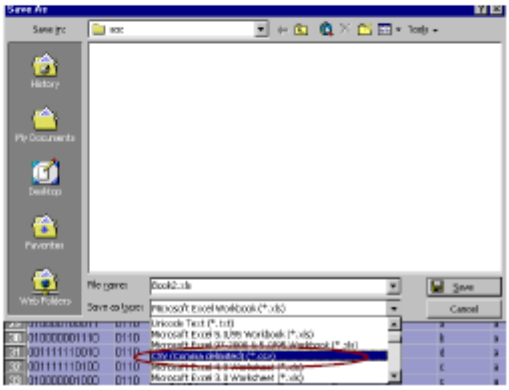
If there are some changes that cant be made using Remark Office before saving as .txt, you may want to consider exporting to Excel and doing some post processing(detailed in step 3). If this is not required, skip to section III on requirement for text file. For cases where there was no student id in the scanned sheet, i.e if it shows up as Error #3100 on the student ID, we can leave it as it is.

1) To export to Excel, go to **Save Data** as **Excel 97,2000(*.XLS)**

   **Note: Remember about the good file naming habit mentioned earlier.



2) In Microsoft Excel, after doing all the data correction if required, we need to save as .txt for the application but there is not an option to save as .txt Here is the workaround. Save as **CSV(comma delimited)(*.csv)**



3) For cases where there was no student id in the scanned sheet, note down the name so that it can be added in later on using the application.(dont stow the scanned sheets away yet as we may need to refer to them when doing the data cleaning using the application)

4) To change the filename to .txt, just **rename** by removing the .csv extension and changing it to .txt extension.

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