AN AGILE METHODOLOGY APPROACH IN DEVELOPING A STUDENT INFORMATION SYSTEM

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ABSTRACT

The researchers conducted an inquiry into the operations of the school. It was found that a major part of their business process involves the use of Google sheets to manage their data, e.g. student information, teacher information, grades, etc., and is prone to human error thus resulting to an inconsistent and unreliable information. The goal of this project is to produce a school portal and student information system which will not only address the problem of data inaccuracy but will also allow the stakeholders of the school -- administrators, teachers, students, and parents --to achieve a better business workflow. The system developed specifically handles senior high component of the K to 12 program wherein a student enrolls in one of the four senior high academic strands: (1) GAS, (2) HUMSS, (3) STEM, and (4) ABM. The created system, which employed the agile methodology, handled student and teacher records management, grades computation and repository, curriculum administration, and scheduling. The browser- based system was evaluated by the school with satisfactory results. This paper shares the systems implementation process and results.

KEYWORDS – Student Information System, Agile Methodology, Google Sheets, Senior High Strands.

INTRODUCTION

Reedley International School was founded in 1999 by Nellie Aquino-Ong. Back then, it started as a review center to give personalized teaching to students aiming to enter the country's top universities. In 2000, Reedley opened its doors by offering High School levels with 80 students. [2] Reedley offered the Lower and Middle School levels and moved to a bigger facility in Pasig City with 250 students. In 2006, Reedley moved to a new location in Libis, Quezon City, educating over 500 students from 19 different nationalities. In 2016, Reedley moved again to a bigger and better site in Pasig City to its newly-built modern 11 story building to adequately serve its growing student population. Currently, the High School department has a total of 382 students. The Junior High School has 240 students while the Senior High School has 142 students.

The researchers were tasked to investigate their current problem on managing the data of their students and develop a system that caters to the needs of the client. These problems arose when the principal had to manually correct erroneous grades submitted by the teachers. In addition, there are no security measures to preserve the integrity and accuracy of their data, particularly with regard to the process of grading their students which involves manually entering and storing their data in Google sheets, sometimes leading to human error.

RESEARCH OBJECTIVES

The main objectives of the researchers are:

- To identify the client process issues on grades management;
- To propose a system that is tailored to the needs of the company; and
- To present the design and implementation of the student information system.

The researchers opted to use the agile methodology and collaborative sessions to get a better understanding of their client in order to cater to their needs. The gist of agile is to produce a working product that increments its features each sprint. Moreover, the benefit of dividing the whole project development process into sprints is that the output of each sprint is presented and the client to allow them to evaluate and test the system and suggest what needs to be changed or be added.

LITERATURE REVIEW

Student Information System

For University of Cambridge [2], Professor Alison Richard, Vice-Chancellor of the University of Cambridge, highlighted that information about students is essential since it is beneficial to aid both employees and students to go about their work and studies yet it is tedious to organize. The University implemented the use of the Cambridge Student Information System (CAMSIS). The value of CAMSIS is that it provides comprehensive and accurate information about the student body and also improves data quality, reduces the administrative burden dramatically and provides better services to both academic staff and students. Moreover, CAMSIS stores student information (whether graduate or undergraduate) from the beginning of their admission in the institution until the day they graduate.

Student Portal

An online portal makes it easier for students to access important information like their grades at home or somewhere provided that there is an internet connection. A student portal has several functions, it contains information on courses offered, temporary transcript of records, email programs, timetables, class schedules, and employee contact numbers. Moreover, it may also have extensions such as web resources like research hosts and online journals. The use of student portals can save a lot of money. For example, printing information in piles of papers saves printing and paper costs. It also makes the school environment-friendly since it reduces the use of paper for the printing of grades and announcements [3].

K to 12 Program

The program covers kindergarten and 12 years of basic education from primary, junior high, and senior high school. The purpose of this program is primarily to master the concepts and skills and prepare graduates for tertiary education. There are several significant values of the program such as building proficiency through language, gearing up for the future, nurturing the holistically developed Filipino. Moreover, Senior High is the last two years of specialized upper secondary education where students may choose their specialization based on interests and aptitude. A student in Senior High can choose among the three tracks such as Academic, Technical-Vocation-Livelihood, and Sports and Arts [4]. The Academic track consists of three strands and these are the following: ABM (Accountancy, Business, and Management), GAS (General Academic), HUMSS (Humanities and Social Sciences), GAS (General Academic), and STEM (Science, Technology, Engineering, and Mathematics).

Agile Methodology

Based on the definition of Sommerville [5], the Agile method is incremental development methods in which the increments are small, and, typically, new releases of the system are created and made available to customers every two or three weeks. This approach to software development interleaves program specification, design, and implementation. The involvement of clients greatly benefits the development process since they give rapid feedback on what to change or add in the next increment or sprint meeting.

METHODOLOGY

Research Participant

The researchers interviewed the stakeholders of the organization. They are namely: the general manager or the vice president, the admin, the teacher, the principal, the IT support technician, and the registrar. The participants assessed are both males and females, whose age ranges from 30 to 40 years old.

Data-Gathering Procedure

The researchers made use of existing academic materials to discover the best applicable system that would solve the problem of the business regarding its present problems. The researchers also visited the company site to acquire more data about the exact process of the business workflow environment and conducted interviews with the stakeholders of the company. The researchers conducted an interview every once a month with different stakeholder wherein they gathered feedback and suggestions. A total of 3 Sprints were conducted, with each sprint consisting of 30 working days from Monday to Friday, and each working day with a total of 8 working hours. The team observed stand up meetings daily discussing the things that were needed to be discussed such as the issues that every member of the team was facing and what tasks have been finished. Additionally, the researchers made use of Trello boards to keep track of the tasks that were being done. The Trello board served as the Product Backlog of the entire project. From there, the researchers would pick tasks that were designed as User Stories and label them according to an estimate of how many working days it would approximately take to finish the said task. In the event that a task would not meet the deadline of a Sprint, it was moved as another task in the next Sprint.

Treatment of Data

The fundamental perception of the researchers of the business work process and business environment enhanced the primary functions and design of the system. This is because the researchers used qualitative data analysis. Every meeting with the client may yield input that will be consolidated in the following cycle of improvement. Client evaluation scores were submitted under strict confidentiality. The mean scores were calculated to determine the final results of the system.

Prototyping

The researchers developed a prototype of the system based on the primary software requirements specifications which defined what services were required from the system and identified the constraints on the system's operation and development. At the end of each Sprint, the researchers met with the client to present the implemented changes to the system from the problems that surfaced from the previous meeting, including his suggested changes.

An evaluation and certification form was also used to rate the system for (1) ease of use, (2) pleasant appearance, (3) reliability, (4) security, (5) efficiency, (6) completeness of function, (7) completeness of system, and (8) readiness for deployment. Each criterion was scored using the Likert Scale, with 1 (one) being the lowest, and five (5) being the highest.

RESULTS AND DISCUSSION

The researchers used agile development wherein they conducted sprint meetings to demonstrate the system each month since 2018 of August. After each sprint meeting, they gathered all the comments and suggestions of the client which aided the researchers in producing the system that caters to the needs of the company. Indicated below are accomplished tasks per sprint meetings.

For the first sprint, the researchers were able to finish the following tasks: create system database, login/logout, design login, logout error page, view user profile, register user profile, design menu page, enable/disable account status, password encryption, create section and subject, view list of accounts, view detailed user account, added exception handlers for error page statuses, added user status log, add/view batch-SY-Term, and added file upload for profile picture, and code debugging.

For the second sprint, the researchers were able to finish the following tasks: class record, filter status function, search function for list of accounts/subjects/sections/batches, update function for personal information, added pagination to user status logs, added toggle bar and table design, added class schedule for students, and removal of code duplicates.

For the third sprint, the researchers were able to create the following: assign teacher and students to a class record, add grades and topic, add filters to each user accounts, added search and pagination for user status logs, fixed URL restrictions, password request function, manage profile logs, fixed carousel design, and simplification of Java methods.

For the fourth sprint, the researchers were able to finish the following tasks: connect student account to parent account, auto compute for grades, link class record to grades, add/update/delete curriculum, manage grade approval logs, update class record, added non-submission of grades log, and major refactoring and tweaks.

Finally, for the fifth sprint, the researchers were able to finish the following tasks: add late grades, print the final report card, create a publish grades list, publish grades function (approve/decline), set a deadline for the system's adding of grades, system timespan for the admin, and major system overhaul.

The following figure below shows the Entity Relationship Diagram of the system. Personal Information has a one to one relationship to Accounts and it has different account types, states, and users such as Admin, Principal, Registrar, Parent, and Student. For every account status change a user status log is created to record who deactivated or activated an account. Also, for every account profile change, it will be recorded in a profile log to track modifications in specific user information.

For the Registrar, he/she creates the following for the Class Record: Curriculum and Section. For the Curriculum, it consists of Curriculum code and name, strand, batch, and subject. The subject indicates the subject code and name, units, strand, description, subject days (weekly basis), time start and time end, and a corresponding teacher. For the Section, it consists of section code and name, description, and its room.

For the Grades, the Teacher can add grades on the subject he/she handles. The topic percentage and score will be entered which then will be verified by the Principal. The Principal has the option to approve or decline the submitted grade of the Teacher the grade flow states can change from "SUBMITTED" to "APPROVED" or "SUBMITTED" to "DECLINED". Finally, if the grades are accepted, the grade flow states will change from "APPROVED" to "PUBLISHED". The data from the Grades table will be transferred to the Published table and then Students and Parents will be given the opportunity to view the final grades.

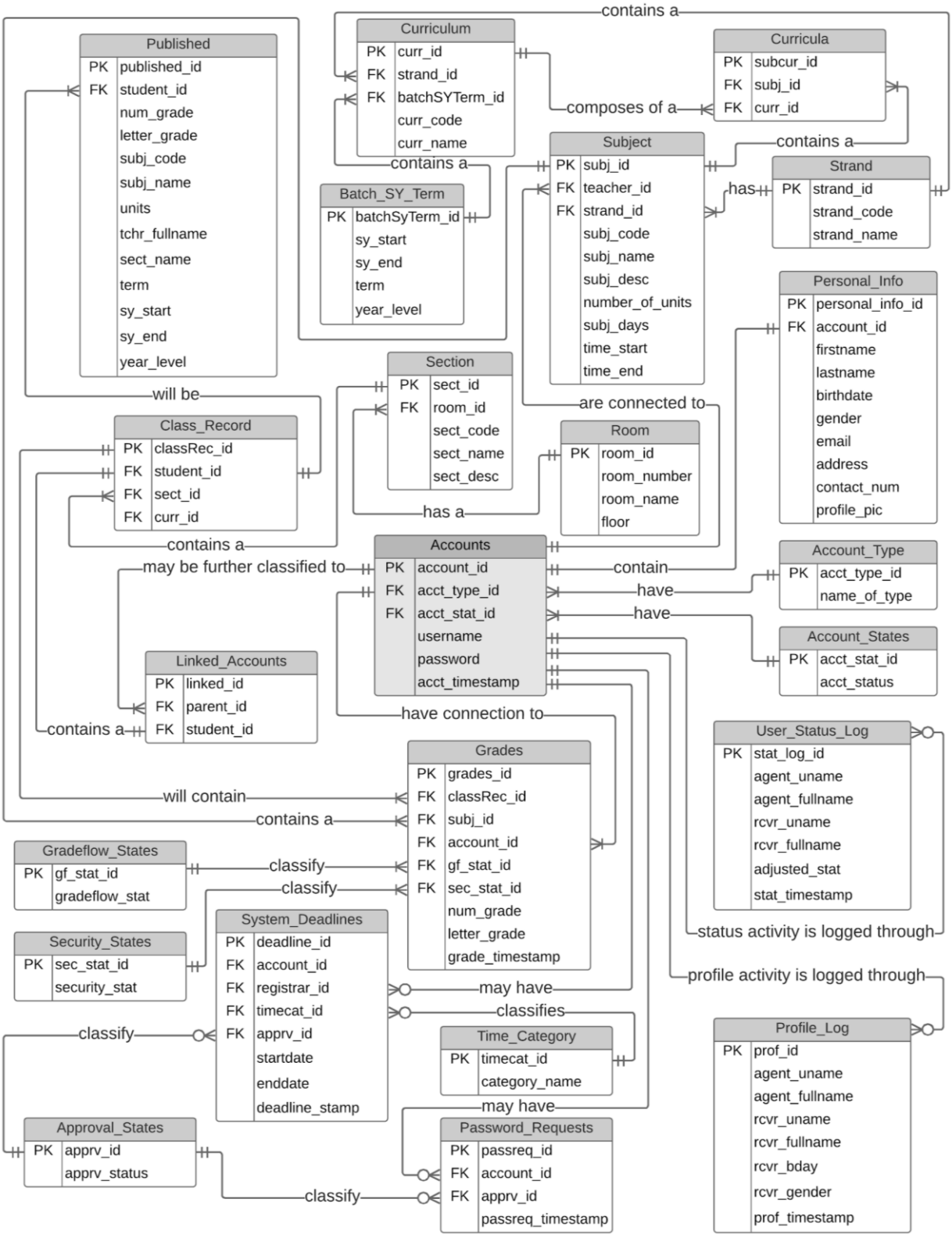

Figure 1. Entity-Relationship Diagram

CONCLUSIONS AND RECOMMENDATIONS

The researchers were able to recognize several problems of the company by conducting interviews with the general manager and employees of the company and observing the business process and the business environment firsthand. These problems were a combination of the traditional method of encoding student grades and the unsystematic way of generating report cards. This is because the current process of the company for student grades relies on Google Sheets. First, the teachers store student records. Second, the principal verifies if all the final grades of students are entered. Third, the registrar generates a report card for the verified student grades and sends an email to each student which contains their report cards per term. As a result, it gave rise to multiple problems down the road like delays in the processing of grades and inaccuracy of data.

On the other hand, the researchers recommend to add printing of grades on the future features of the system to trim down the time needed by registrar in managing the report cards. Also, the researchers want to generate notifications so that they are fully informed when there are changes done in the system.

Using the Agile Methodology, the researchers were able to adapt to the changing client demands and the problems that surfaced after each client meeting. At the end of the third sprint, the researchers were able to complete a functional prototype of the system. The client evaluation reflected the prototype's success.

Table 1. Mean Score of 3 Sprints

Criteria	Mean Score	Criteria	Mean Score
Ease of use	4.67	Efficiency	3.67
Pleasant Appearance	3.33	Completeness of Function	3.67
Reliability	3	Completeness of System	2.67
Security	4	Readiness for Deployment	4

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