

Design and Implementation of Baggao North Central School Computer-Based Record Management System

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Abstract

This study aims to design and develop a computer-based student record management system for Baggao North Central School. The system is expected to streamline the administrative tasks of the school, from keeping track of student records to generating reports. Its user-friendly interface makes it easy for staff to navigate through the system, reducing the chance of human error during record-keeping. Additionally, the quick access feature enables staff to locate student records within seconds, making it an invaluable tool for effective academic management. The system incorporates security features to maintain the privacy of sensitive student information, ensuring that only authorized individuals have access to the data. Moreover, the system ensures that data is always up-to-date and accurate, minimizing the risk of issues arising from inconsistencies in recordkeeping. The system allows selected staff members to input, edit, and view student-related information, promoting seamless information flow within Baggao North Central School (BNCS). This promotes efficiency in managing student records and enables timely decision-making when necessary.

Keywords: Computer-based, record management system, design and model

1. Introduction

With the advancement of information technology (IT), computer-based information systems (CBIS) have eventually replaced manual systems in educational institutions to assist in the production of pertinent information that is used for both management and decision-making. The global spread of technology has changed the rules of the game, and the expectations for an innovative approach to managing educational operations have piqued the interest of system developers. Educational institutions have begun to rely on CBIS to handle administrative tasks, streamline communication, and provide data analysis for informed decision making. The creation, administration, and application of CBIS focus on the management of data by utilizing software and computers to handle information processing, transmission, archiving, and retrieval as necessary. CBIS also led to improved efficiency, cost reductions, and enhanced services for students [1].

Today, one of the essential CBIS being utilized in educational institutions is the student records management system (SRMS). This system has optimized the recording and sharing of student information,

resulting in faster access to necessary data. The effectiveness and efficiency of the services provided to students, particularly in student records management, which includes several processes such as registration, monitoring, and reporting, are significantly influenced by SRMS. The importance of SRMS in an educational institution lies in its ability to manage and store important data and information. It ensures compliance with regulatory requirements, improves efficiency and decision-making, and enhances the overall accountability and transparency of the institution [2].

In the Philippines, national high schools have limited access to CBIS, which greatly affects their overall education system. This creates a gap in information and technology literacy, putting Filipinos behind in today's digital age. Alternatively, the lack of access to CBIS in national high schools can be seen as an opportunity to create innovative solutions that cater to the unique needs and limitations of national high schools in the Philippines. With this in mind, the groundwork of this study is to design and implement a computer-based student record management system for Baggao North Central School (BNCS). This system will automate administrative tasks and provide timely access to student information, which aims to improve school staff productivity. Furthermore, the system will increase data accuracy and reduce errors associated with manual record-keeping. The system also aims to improve accuracy and data security, thus ensuring compliance with the data protection regulations of the BNHS. The implementation of this system will result in a more efficient workflow and reduce the workload of staff members. It will also provide the BNHS with a centralized and secure database for easy access and analysis of data.

2. Statement of the Objective

The main objective of the study is to develop a computer-based record management system for Baggao North Central School and specifically aims to:

- 1) have an electronic tool in keeping student records
- 2) enables staff to quickly find student records
- 3) ensure that only authorized individuals have access to the data
- 4) generate reports, list of learners, new, transferred in and transferred out.

3. Materials and Methods

3.1. Study Design

The Design Science Research (DSR) framework was utilized in this study to gather, process, and analyze data. DSR is a problem-solving framework that aims to improve the knowledge bases of science and technology through the creation of innovative artifacts that address issues and enhance the context in which they are implemented. DSR focuses on creating and evaluating IT artifacts with the intention of solving real-world problems. It involves a systematic approach to designing, developing, and testing solutions that are aligned with the needs and requirements of the target user population. DSR framework are represented by constructs, models, methods, and implementations to expand the limits of organizational and human capabilities. This framework should enable both individuals as well as organizations to tackle difficult issues and accomplish their objectives more effectively. Project studies that utilize DSR are frequently involve cross-disciplinary cooperation between academics and

professionals from various disciplines [3]. Figure 1 shows the DSR framework that is used in this study with various application domains.

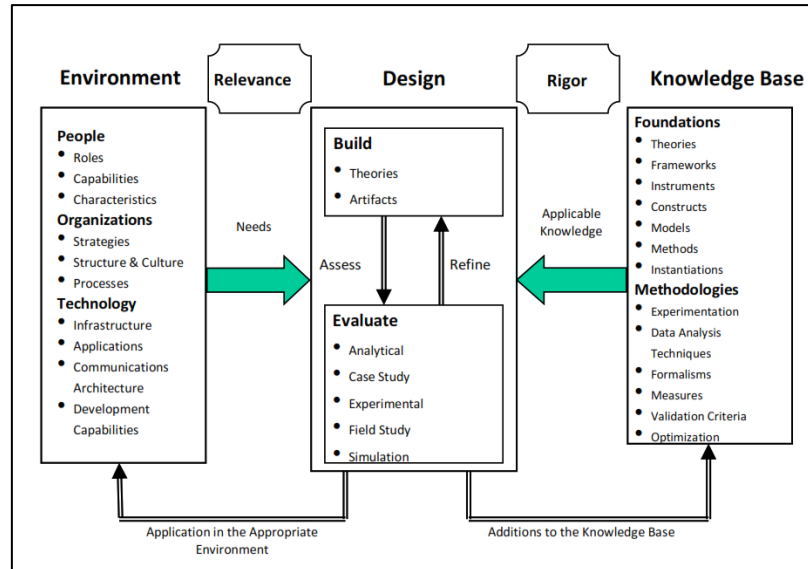


Figure 1. Design Science Research Framework [3]

DSR framework provides a comprehensive and structured approach for solving problems across various industries, such as healthcare, education, and business operations. Its versatility makes it accessible to different fields, promoting a holistic view for effective problem-solving and future development. DSR framework is highly preferred by research communities owing to its dynamic and innovative approach towards solving real-life problems. It accounts for designing a problem-solving system by constantly refining and consolidating scientific knowledge with practical experience. DSR framework enables a holistic view and a structured methodology for future developments, and it is designed to create solutions while also contributing to academic understanding. The framework provides a structured approach that involves problem identification, solution design, implementation, and evaluation as shown in Figure 2.

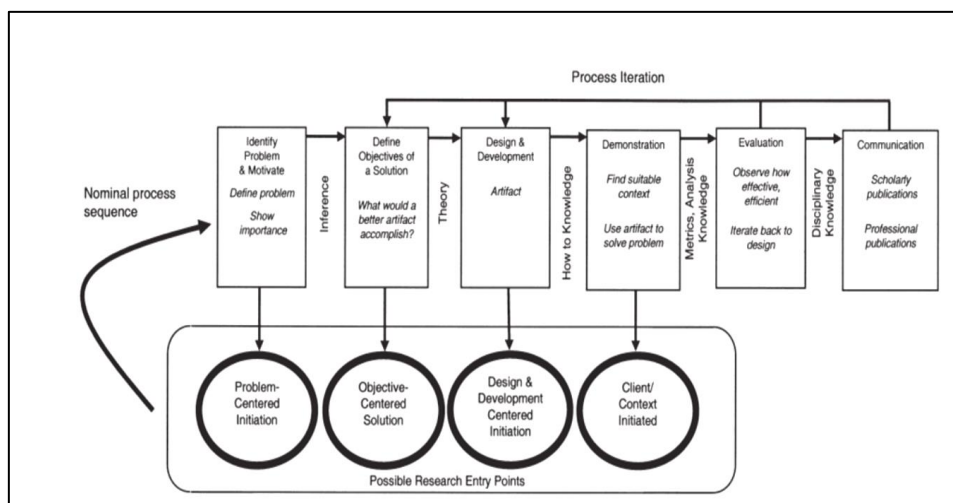


Figure 2. Design Science Research Process [3]

3.1.1. Project Model

The study is driven by a model that displays the architectural layout of a computer-based record management system, allowing users to input data, process data, store it in a database with a user-friendly user interface and generates reports. Figure 3 shows the project model.

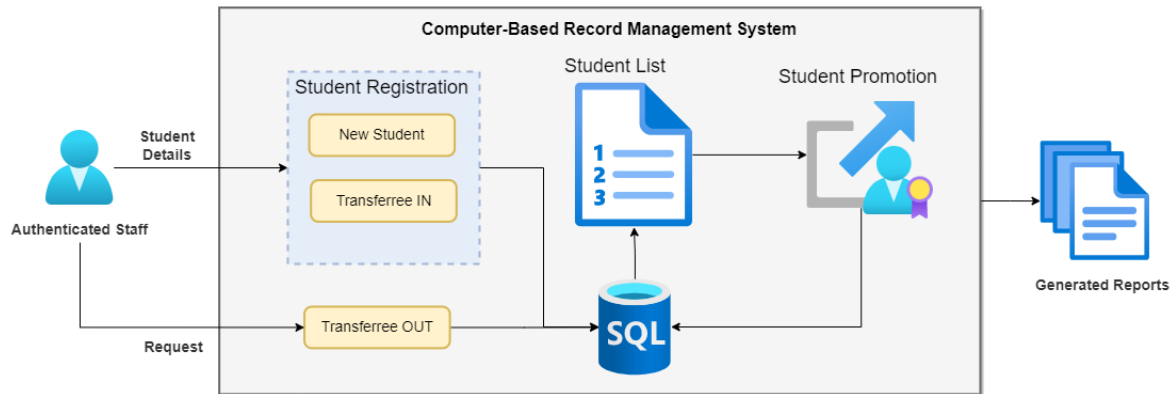


Figure 3. *Computer-Based Record Management System Model*

3.1.1.1. Student Registration

Once the staff has been authenticated through login using the registered username and password, the staff can input the data of new student and student who is transferring into the school. Student registration primarily collects the data by inputting of the necessary data like the student's personal information, parents and guardian's information and the Learner Reference Number (LRN), a permanent twelve (12)-digit number submitted per DepEd Order No. 67, s. 2011 [4]. The entered data are then stored to the electronic database and could be used for retrieval and generation of reports.

3.1.1.2. Transferee (Out)

Authenticated staff can swiftly process a student's request for a transfer out by retrieving the data for the registered students and changing the status of the requesting student. The student record will be updated and will be listed in the transferred-out students.

3.1.1.3. Student List and Generation of Reports

Managing the student's information are done using the module that is able to list registered students, filter according to the remarks e.g., new pupil, transferee in and transferee out. This module allows the staff to search using the student's LRN, last name and first name. The module enables the generation and printing of reports according to the listed remarks above.

3.1.1.4. Student Promotion

Updating and promoting student to the next grade level are done by retrieving the qualified student verified by the adviser using either by the LRN, student first name or last name. The changes will update the database and the report.

3.1.2. Program Structure

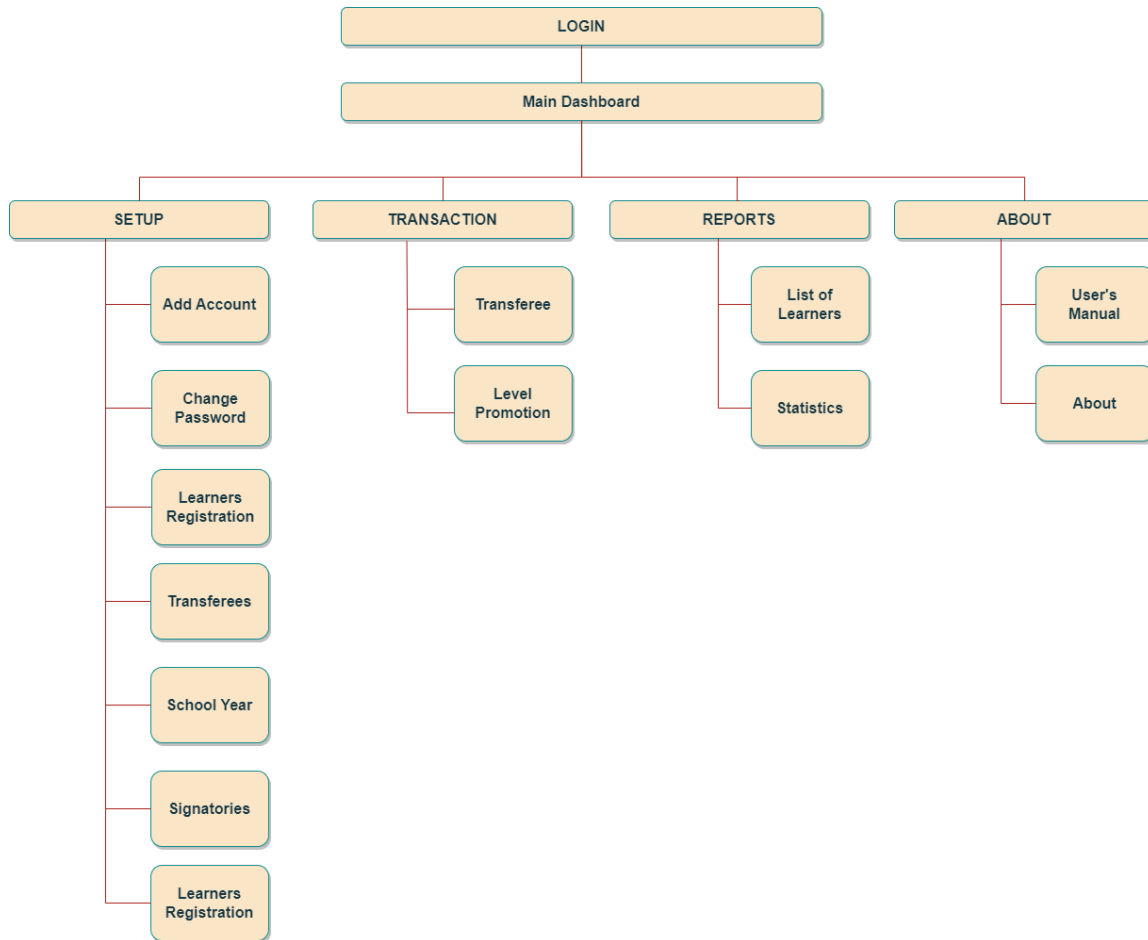


Figure 4. Program Structure of Computer-Based Record Management System

3.1.3. Description of the Software and Hardware Components

- a. **Hardware.** Personal Computer with minimum of 4GB of Random Access Memory (RAM), 64 Bit of Video Graphics Adapter (VGA), monitor, keyboard and mouse.
- b. **Software.** Microsoft Windows 11 or 10 Operating System, XAMPP, Crystal Report, Java Development Kit and MySQL Connector.
- c. **Printers.** Any type of office-based printer for printing reports.

3.1.4. Software Migration Method

The researcher used the Direct Changeover software migration method in deploying the system to be used in operation. The file-based system was completely eliminated once the system underwent testing, and the student computer-based record management systems took its place [5] as illustrated in Figure 5.

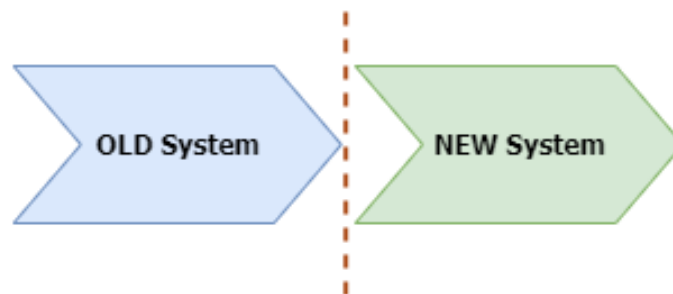


Figure 5. Direct Changeover Method

3.2. Respondents

In identifying the problems, the ICT in-charge and some faculty members of BNCS were the respondents.

3.3. Measures

The researchers used interviewing techniques to determine the issues that the ICT in-charge and concerned faculties observed and encountered in handling the students' records. The interview's findings were utilized to determine the Student Record Management Systems' features and functioning. Before the approach was established, direct observation was also employed to further study the issues the ICT in-charge and concerned faculties were experiencing. This instrument was also utilized after the system had been installed and was in use.

3.4. Procedure

The researchers conducted an interview at the BNCS to learn more about the requirements and difficulties associated with maintaining student records. The same procedure had been repeatedly followed by the researchers until all of the system's features and functionality were complete.

The researchers observed and documented how the staff in charge managed the student's information prior to the start of development. Paper files must be filed, and the documents must be separated one by one as part of managing the records. Each student's file will be individually organized and put in a different folder. Moreover, manual report generation is carried out by searching filing cabinets for each student's record. After completion and deployment for usage or production, the researcher evaluated the system's operation. In doing so, the system will produce accurate results.

4. Results and Discussions

The traditional way of managing and processing student records in BNCS take mores effort and consumes lots of time. The student's record and manual filing are continuously increasing every school

year. In addition, there is a lack of protection for student records as they are merely kept in a filing cabinet, which any person visiting the office can physically access the data. The developed computer-based record management system can securely store and manage student's record and generate pertinent reports.

The features of the computer-based student record management system

The computer-based record management system at BNCS is depicted in the succeeding figures along with its user-friendly Graphical User Interface (GUI) and characteristics. The system was developed by the researchers using Visual Basic 6.0 Enterprise Edition. Furthermore, the researchers employed MySQL as the system's repository and database management system (DBMS).

4.1 Security Features

The developed system is designed to prevent the danger of unauthorized change or deletion of the data and can offer a sufficient level of security for the records it maintains. Figure 6 shows the Add Account module to register the authorized system users and equipped with security questions to allow users retrieve the username or password when necessary. Furthermore, Figure 7 shows the login screen to allow the authorized users gain access to the system. This requires user to input the registered username and password. Additionally, the system limits the number of unsuccessful login attempts and will lock a user out for 10 minutes if they input the incorrect username or password more than three times in order to increase security and prevent the popular brute force attack. When necessary, the system also allows users to update their password.



Figure 6. Add Account



Figure 7. Login with Forgot Password

4.2 Intuitive User Interface and User Experience

The developed system uses an intuitive User Interface (UI) design that allows users to navigate without becoming lost, puzzled, guessing, experimenting, reading a manual, or even asking others by using appropriate colors, consistent design, keyboard shortcuts, clear and readable text.

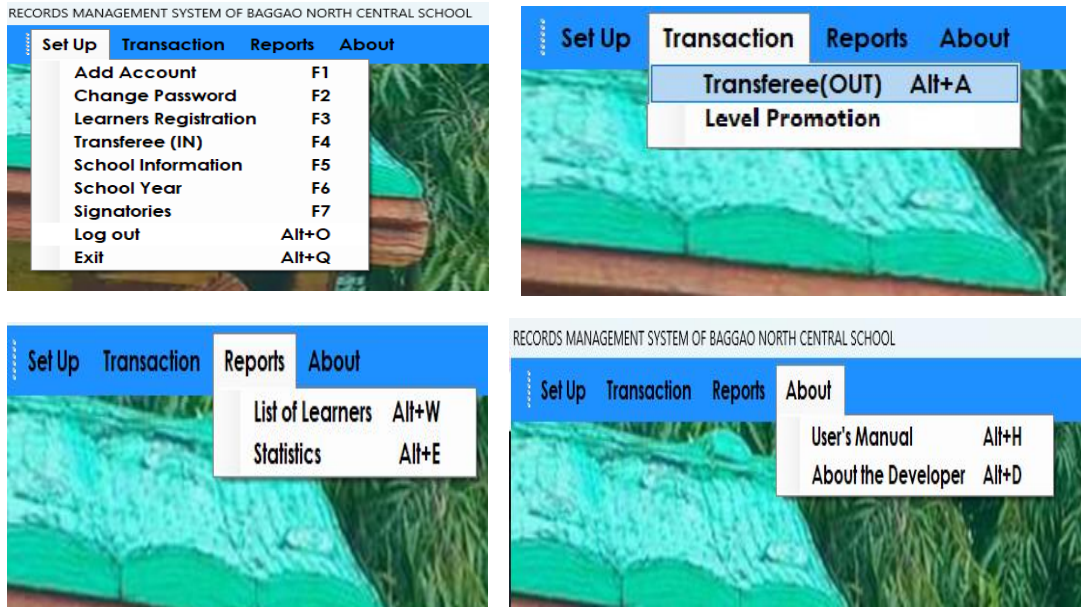


Figure 8. Main Menu

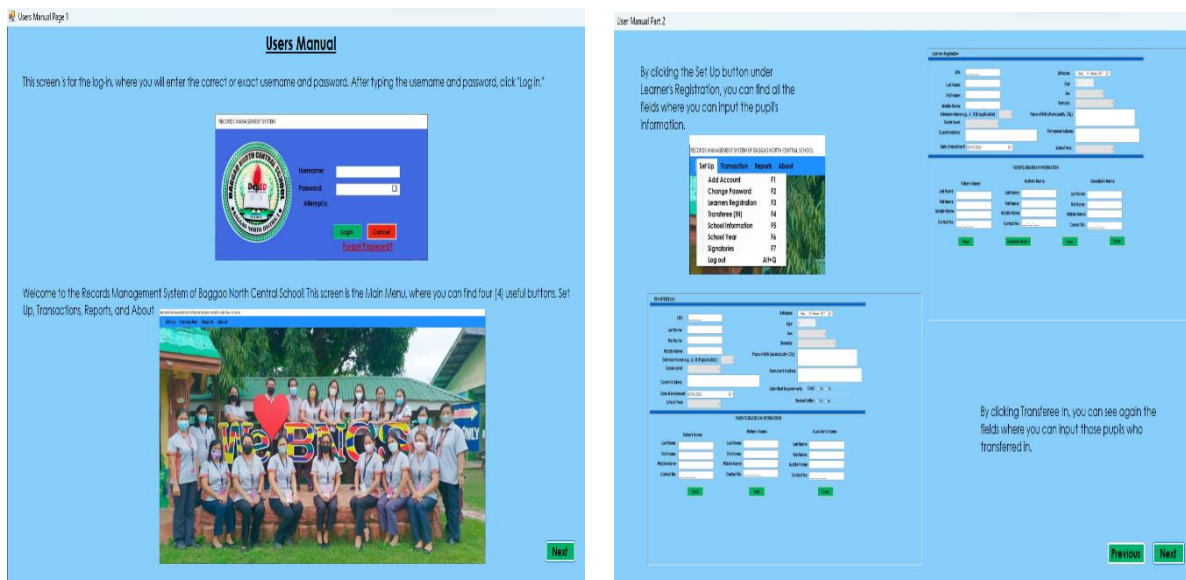


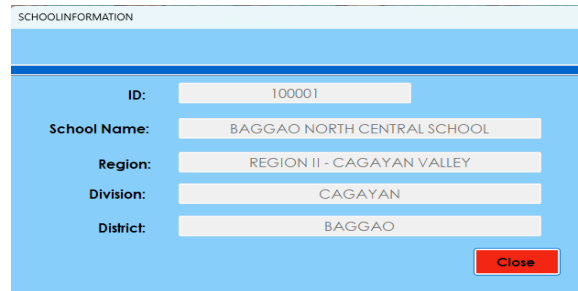
Figure 9. System User Manual

Figure 9 displays a built-in system user documentation that provides further information on the system's fundamental usage and operation. This enables the users to be more productive and efficient, while also increasing user experience.

4.3 Data Entry and Information Management

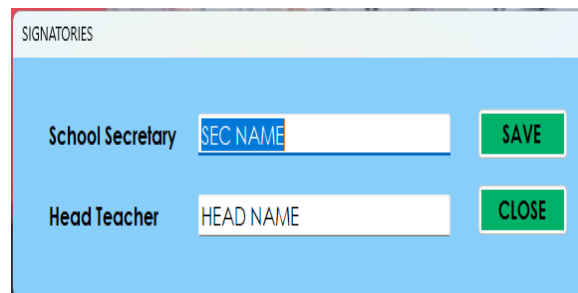
4.3.1 System Setup

The developed system enables the system administrator to manage and prepare school information, school year and authorized signatories before the system can be use in every school year.



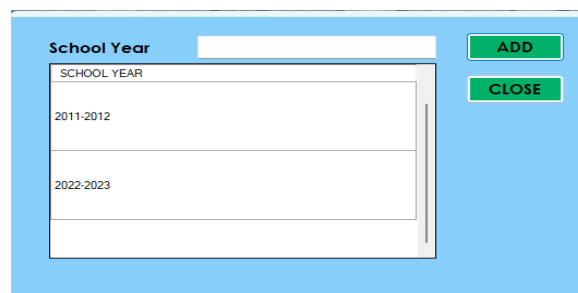
The screenshot shows a web form titled "SCHOOLINFORMATION". It contains several input fields with pre-filled text: "ID:" with "100001", "School Name:" with "BAGGAO NORTH CENTRAL SCHOOL", "Region:" with "REGION II - CAGAYAN VALLEY", "Division:" with "CAGAYAN", and "District:" with "BAGGAO". A red "Close" button is located at the bottom right of the form.

Figure 10. School Information



The screenshot shows a web form titled "SIGNATORIES". It has two rows of input fields. The first row is for "School Secretary" with a text input containing "SEC NAME" and a green "SAVE" button. The second row is for "Head Teacher" with a text input containing "HEAD NAME" and a green "CLOSE" button.

Figure 11. Authorized Signatories



The screenshot shows a web form titled "School Year". At the top, there is a text input field and a green "ADD" button. Below this is a table with the following content:

SCHOOL YEAR
2011-2012
2022-2023

At the bottom right of the form, there is a green "CLOSE" button.

Figure 12. School Year Managing Module

4.3.2 Student Registration

The developed system has refined the student registration process for new and transferees. Figure 13 shows the needed information in every student and includes some calculated components that can automatically compute e.g., age of every student according to the inputted birth date. This module also validates and checks the required data each time a user clicks the Add button, resulting in more accurate student records, reducing wait times and administrative effort. The Print button in this module can be utilized as well to generate a list of registered students. The identical process of student registration is shown in Figure 14 but as a transferee in classification.

Learners Registration

LRN: Birthdate:

Last Name: Age:

First Name: Sex:

Middle Name: Remarks:

Extension Name e.g., Jr., III (if applicable): Place of Birth (Municipality, City):

Grade Level: Permanent Address:

Current Address: School Year:

Date of enrollment:

PARENTS/GUARDIAN INFORMATION

Father's Name:	Mother's Name:	Guardian's Name:
Last Name: <input type="text"/>	Last Name: <input type="text"/>	Last Name: <input type="text"/>
First Name: <input type="text"/>	First Name: <input type="text"/>	First Name: <input type="text"/>
Middle Name: <input type="text"/>	Middle Name: <input type="text"/>	Middle Name: <input type="text"/>
Contact No: <input type="text"/>	Contact No: <input type="text"/>	Contact No: <input type="text"/>

Figure 13. Learners Registration Form

TRANSFEREE (IN)

LRN: Birthdate:

Last Name: Age:

First Name: Sex:

Middle Name: Remarks:

Extension Name e.g., Jr., III (if applicable): Place of Birth (Municipality, City):

Grade Level: Permanent Address:

Current Address: Submitted Requirements: Card: YES NO

Date of enrollment: Request Letter: YES NO

School Year:

PARENTS/GUARDIAN INFORMATION

Father's Name:	Mother's Name:	Guardian's Name:
Last Name: <input type="text"/>	Last Name: <input type="text"/>	Last Name: <input type="text"/>
First Name: <input type="text"/>	First Name: <input type="text"/>	First Name: <input type="text"/>
Middle Name: <input type="text"/>	Middle Name: <input type="text"/>	Middle Name: <input type="text"/>
Contact No: <input type="text"/>	Contact No: <input type="text"/>	Contact No: <input type="text"/>

Figure 14. Transferee In

TRANSFEREE(OUT)

TRANSFEREE

LRN: Remarks:

Last Name: Birthdate:

First Name: Age:

Middle Name: Place of Birth (Municipality, City):

Extension Name e.g., Jr., III (if applicable): Current Address:

Grade Level:

Request Letter:

LRN	LAST NAME	FIRST NAME	MIDDLE NAME	EXTENSION NAME	GRADE LEVEL	CURRENT ADDRESS	BIRTHDATE	AGE	SEX	REMARKS	BIRTH PLACE
1987651801	GARCIA	LALA	BUCALA		GRADE 2	CAGAYAN	12/1/2015	8	FEMALE	NEW PUPIL	CAGAYAN
1987651802	CABRERA	MICHELLE	SANTOS		GRADE 2	CAGAYAN	12/1/2015	8	FEMALE	NEW PUPIL	CAGAYAN
1987651803	PINERO	MICHAEL	JOVELLANOS	N/A	GRADE 1	DAGUPAN CITY	2/25/2017	6	MALE	TRANSFEREE O...	DAGUPAN
1988651803	VIZCARRA	CONRADO	PADUA		GRADE 2	DAGUPAN CITY	12/1/2015	8	MALE	TRANSFEREE IN	DAGUPAN

Figure 15. Transferee Out

Figure 15 allows the user to process a student's request for a transfer out by retrieving the data for the registered students and changing the status of the requesting student. The student record will be updated and will be listed in the transferred-out students.

4.3.3 Managing Student's Updates

Figure 16 shows the sample list of students and allows users to retrieve student records using student's LRN, last name and first name. This module enables the user to update and manage the information of every student as shown in Figure 17. Promoting students to the next level is done by updating the grade level of every qualified student in system and make the tedious process easier and organize.

LIST OF LEARNERS												
LRN / LAST NAME / FIRST NAME:										REMARKS:		
LRN	LAST NAME	FIRST NAME	MIDDLE NAME	EXTENSION NAME	GRADE LEVEL	CURRENT ADDRESS	BIRTHDATE	AGE	SEX	REMARKS	BIRTH PLACE	
1987651801	GARCIA	LALA	BUCALA		GRADE 2	CAGAYAN	12/1/2015	8	FEMALE	NEW PUPIL	CAGAYAN	
1987651802	CABRERA	MICHELLE	SANTOS		GRADE 2	CAGAYAN	12/1/2015	8	FEMALE	NEW PUPIL	CAGAYAN	
1987651803	PINERO	MICHAEL	JOVELLANOS	N/A	GRADE 1	DAGUPAN CITY	2/25/2017	6	MALE	TRANSFEREE O...	DAGUPAN	
1988651803	VIZCARRA	CONRADO	PADUA		GRADE 2	DAGUPAN CITY	12/1/2015	8	MALE	TRANSFEREE IN	DAGUPAN	

Figure 16. List of Learners

LEARNERS' INFORMATION	
LRN: 1987651803	Birthdate: Saturday, February 25, 2017
Last Name: PINERO	Age: 6
First Name: MICHAEL	Sex: Male
Middle Name: JOVELLANOS	Remarks: New Pupil
Extension Name e.g., Jr., III (if applicable): N/A	Place of Birth (Municipality, City): DAGUPAN
Grade Level: GRADE 2	Permanent Address: PANGASINAN
Current Address: DAGUPAN CITY	Date of enrollment: Monday, March 6, 2023
	School Year:

PARENTS/GUARDIAN INFORMATION		
Father's Name:	Mother's Name:	Guardian's Name:
Last Name: PINERO	Last Name: JOVELLANOS	Last Name: JOVELLANOS
First Name: RICHARD	First Name: ARMIDA	First Name: ARMIDA
Middle Name: CASTRO	Middle Name: CRUZ	Middle Name: CRUZ
Contact No: 0915-644-5454	Contact No: 0915-892-0656	Contact No: 0915-892-0656

Figure 17. Updating Learners

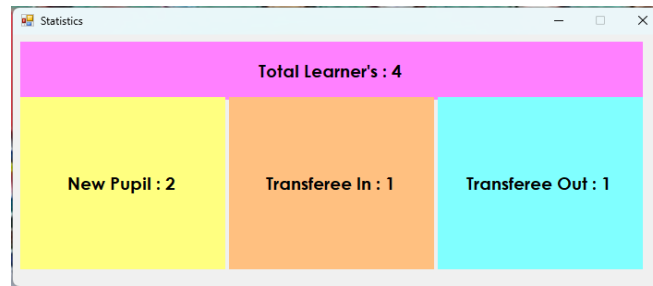


Figure 18. Status and Remarks

Figure 18 shows the current status of Total Learner, New Pupil, Transferee In, Transferee Out, as stored in the database respectively. The statistics module has a clickable link that will generate a report based on the category that the user selected.

4.2 Report Generations

One significant advantage of the developed system is automating the generation of reports that leads to the amount of time saved in manual data wrangling operations. The elimination of these manual procedures frees up a considerable amount of time for key personnels, allowing them to focus on higher-value duties that improve insight and drive smarter decisions.







Students List		 Department of Education Region II - Northern Luzon Schools Division of Cagayan Valley Municipality of Baggao BAGGAO NORTH CENTRAL SCHOOL				3/5/2023			
LRN	LAST NAME	FIRST NAME	MIDDLE NAME	EXTENSION NAME	GRADE LEVEL	CURRENT ADDRESS	AGE	SEX	REMARKS
1987651801	GARCIA	LALA	BUCALA		GRADE 2	CAGAYAN	8	FEMALE	NEW PUPIL
1987651802	CABRERA	MICHELLE	SANTOS		GRADE 2	CAGAYAN	8	FEMALE	NEW PUPIL
1987651803	PINERO	MICHAEL	JOVELLANOS	N/A	GRADE 1	DAGUPAN CITY	6	MALE	TRANSFEREE OI
1988651803	VIZCARRA	CONRADO	PADUA		GRADE 2	DAGUPAN CITY	8	MALE	TRANSFEREE IN
Prepared By:		SEC NAME School Secretary		Noted By:		HEAD NAME Head Teacher			
Students List		 Department of Education Region II - Northern Luzon Schools Division of Cagayan Valley Municipality of Baggao BAGGAO NORTH CENTRAL SCHOOL				3/5/2023			
LRN	LAST NAME	FIRST NAME	MIDDLE NAME	EXTENSION NAME	GRADE LEVEL	CURRENT ADDRESS	AGE	SEX	REMARKS
1987651801	GARCIA	LALA	BUCALA		GRADE 2	CAGAYAN	8	FEMALE	NEW PUPIL
1987651802	CABRERA	MICHELLE	SANTOS		GRADE 2	CAGAYAN	8	FEMALE	NEW PUPIL
Prepared By:		SEC NAME School Secretary		Noted By:		HEAD NAME Head Teacher			
Students List		 Department of Education Region II - Northern Luzon Schools Division of Cagayan Valley Municipality of Baggao BAGGAO NORTH CENTRAL SCHOOL				3/5/2023			
LRN	LAST NAME	FIRST NAME	MIDDLE NAME	EXTENSION NAME	GRADE LEVEL	CURRENT ADDRESS	AGE	SEX	REMARKS
1987651803	PINERO	MICHAEL	JOVELLANOS	N/A	GRADE 1	DAGUPAN CITY	6	MALE	TRANSFEREE
Prepared By:		SEC NAME School Secretary		Noted By:		HEAD NAME Head Teacher			

Figure 19. Sample Generated Reports

The developed computer-based record management system generates reports for the list of new pupils, transferee in, and transferee out and are formatted and organized to allow the viewing and printing in same format as shown in Figure 19. Although the system primarily stores data electronically, it also allows for document printing and archiving as needed, lowering printing costs and making it more environmentally friendly.

5. Conclusions & Recommendations

Overall, the record management system at Baggao North Central School has proven to be efficient and effective in improving the organization and accessibility of student records. With its user-friendly interface and comprehensive features, it has helped streamline administrative tasks and facilitate the delivery of essential services to students and faculty members. It has not only improved the school's organizational efficiency but also provided a secure and accurate way of storing important information. The system has also enabled easier access to student records, resulting in increased efficiency and productivity among school personnel. In addition, the system has simplified the registration process, reduced wait times and decreasing administrative workload. Besides that, the system reduced the possibility of human error during data entry, improving the accuracy of student records. These benefits have improved the system's sustainability, and the digitalization of student records has made it easier to access information instantly, enabling a better decision-making process. Furthermore, the system has reduced the cost of paper and printing, making it more environmentally friendly. Moreover, with the system's ability to generate reports, administrators are now better equipped to identify areas for improvement and implement changes. This has resulted in a more efficient system that maximizes resources and enhances the overall student service offered by Baggao North Central School.

In the future, the computer-based record management system at Baggao North Central School could be improved by adding more automation and customization features. For instance, the system could automatically generate reports, notifications, and reminders based on various parameters or allow users to tailor the displayed data and fields to their preferences. Another potential improvement for the system would be to integrate a data analytics tool. This would enable more efficient reporting and data visualization for the administrators. To enhance usability for the system's end-users, developers could focus on streamlining the user interface and improving system integration with other educational technology tools. This would ultimately lead to more organized and efficient data management. Additionally, providing clear and concise documentation and offering training to end-users can also help to improve usability. Another aspect to consider is conducting regular user testing and collecting feedback to address any identified issues or areas for improvement.

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