Development of an Alumni Databank: The Case of Nueva Ecija University of Science and Technology

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Abstract- The Nueva Ecija University of Science and Technology is the third oldest University in Nueva Ecija province. As the year progresses, the University keeps producing thousands of graduates during each academic year. An average of 4,737 individuals graduated from different programs during the past five years. The University is obligated by the Commission on Higher Education to collect up-to-date data and information through the CHECK system. Unfortunately, the office of alumni affairs and placement, which is in charge to collect and manage the graduates' information, does not have an automated alumni database system. This paper presents the development of an alumni databank. The online database record management system for alumni considerably benefits the University's Alumni Affairs and Placement Office, particularly in tracing its graduates and managing graduates' profile information. It can manage alumni profiles, notify graduates of job advertisements, and is capable of generating statistical reports with data analytics. Security measures were also employed to protect against any potential system breach and unauthorized use.

Keywords-alumni databank; electronic collection; analytics; higher education institution

I. INTRODUCTION

The Nueva Ecija University of Science and Technology (NEUST) is the third oldest school in the province of Nueva Ecija. Its academic mandate started in June 1908 in San Isidro, Nueva Ecija. Through the years, its name changed as more course offerings were introduced along with the increase of enrollees. It started providing vocational expertise as Wright Institute (1908-1928). In 1929, it was named Nueva Ecija Trade School (1929-1953) offering secondary education, then Central Luzon School of Arts and Trades (1953-1964), in 1964, it was promulgated as Central Luzon Polytechnic College (1964-1998) specializing in engineering courses, and in 1998 it started to be named Nueva Ecija University of Science and Technology [1]. The University produces thousands of graduates each academic year. A yearly average of 4,737 individuals graduated from different programs in the past five years [2]. The University's graduates are deployed in various industries, promoting the University and allowing it to attract more students and maintain its competitiveness.

The Commission on Higher Education (CHED) mandates that Higher Education Institutions, either private, local, or state Universities, to submit data/information [3, 4]. With this development, the University regularly collects and manages records of its graduates. Data collection is a fundamental step to take in each research study [5]. According to authors in [6], databases for alumni are vital to every learning institution. They emphasize the school's needs in collecting data and information to communicate, verify, archive, and research the alumni. Many studies show that most colleges and universities, either private or public, must have a management tool to protect, maintain, and record their data. Hence, Graduate Tracer Studies (GTS) are commonly becoming a regular practice worldwide [7]. Doing this data/information collection helps the University monitor the graduates' placement, their specific skill sets, and the industry qualifications requirements.

NEUST regularly conducts tracer studies to follow-up on its graduates. The CHED per se has a Knowledge Management Division which is composed of three sections: Information Management, Knowledge Resource, and System Integration. Each section's primary purpose is to formulate, coordinate, and implement policies and guidelines related to higher education data collection, processing, and data banking through the Higher Education Management Information System (HEMIS) in all CHED offices and higher education institutions through the integration of CHED Electronic Collection and Knowledge System (CHECKS) [8]. Authors in [9], conducted a tracer study of Bachelor of Science in Information Technology (BSIT) graduates. They extracted BSIT graduates' data with personal information from the registrar's office of the campus using Google Forms [10]. After getting the list, the link https://tinyurl.com/bsit–tracer16–18 was disseminated to the CICT NEUSTSIC closed group. The authors in [11] undertook a survey with the help of some students and other faculty members of the College of Business Administration and Accountancy of their Academic Institution. Various means of data gathering were utilized, such as email and facebook messaging. The same instruments were used in the tracer study conducted in NEUST Atate Campus with a total of 118 graduates, 65 of which were BSITs (27 graduates of the year 2018 and 38 graduates of the year 2019), 24 were BSBAs (Batch 2018), and 29 were BSEntres (Batch 2019) [12].

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In NEUST, the Alumni Affairs and Placement Office does not maintain an automated alumni database system to keep relevant data of the University graduates. Instead, they still collect, process and file alumni data manually, which is tedious. The difficulty of Alumni Affairs and Placement Office starts when the graduates receive their diploma and other vital records from the University. Obtaining data from them becomes more challenging due to the lack of communication, changes of personal information, and lack of pertinent linkage to them. Thus, it takes some time to generate timely and reliable reports. To address these concerns, the development of an NEUST-SIC alumni databank is timely and relevant to the needs of the University. The developed Alumni Databank intends to establish a network between the graduates and the Alumni Affairs and Placement Office. The provision of analytics allows the information to be processed quickly, enables clarity of communication, and focuses on further analysis [13]. The printable reports are inclusive of graduates' total number and employability and are filtered according to gender and course. The Alumni Databank is deemed necessary to know and assess the graduates' present status [14] and for the University to have an alumni record repository.

II. OBJECTIVES

The greatest assets of any academic institution are the product of its labor, the alumni. For this reason, the objective of this study is to develop the NUEST-San Isidro Campus Alumni Databank, with the function to collect graduates' information that will help track their updated information as professionals and present a way to connect them to the University after graduation. Furthermore, this study aims to design an online database record of alumni, that is able to notify graduates for job advertisements, post future University activities, and capable of report generation with data analytics. It also adheres to demand technology that provides various services for storage and data availability from any place and at any time [15].

III. METHODOLOGY

This study used development research, a powerful method in the development of instructional technology. According to [16], the systematic review of designing, developing, and evaluating instructional programs, processes, and products must meet internal consistency and effectiveness criteria. The Technology Acceptance Model (TAM) was applied. Authors in [17] define the TAM as an information technology framework for understanding users' adoption and use of emerging technologies, particularly in the workplace environment. If a user perceives a technology as easy to use and perceives it as useful to his needs, chances are he will accept it [18].
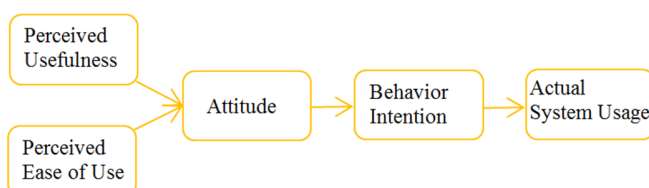

Fig. 1.   TAM.

TAM is an information system theory used to look at technology at work, which deals with user acceptability behavior. According to [19], the perceived usefulness defines the degree to which a person believes that the system's use will improve his performance. However, perceived ease of use refers to the degree to which a person believes that the system's service will be effortless. Authors in [20] stated that Perceived Usefulness (PU) and Perceived Ease of Use (PEOU) impact a person's state of mind toward utilizing a specific tool. The TAM models' primary goal is to determine the dominant use to accept or not to accept new systems, technology, instruments, or devices. It intends to utilize by controlling the individual's personality toward using a specific means.

IV. ALUMNI DATABANK DESIGN AND LIMITATIONS DURING THE DEVELOPMENT PROCESS

The NEUST San Isidro Campus Alumni Databank was developed for only the NEUST San Isidro Campus. The data were gathered through online interviews conducted with the campus alumni coordinator. Further references were taken from the mandates of the CHED relevant to the graduate tracer studies, which were taken online. System Development Life Cycle (SDLC) was used in the development process. According to [21], a conceptual model includes policies and procedures for developing or altering systems throughout their cycle. Authors in [22] determined that SDLC is a mechanism used to produce deliverable systems and a vital instrument that aids in effective and efficient information systems. Authors in [23] explained that the lifecycle of an information system passes through various phases, starting with its conception down to the stage when it is no longer available for use. Figure 2 depicts the typical development phases followed systematically with tasks such as planning, analysis, design, implementation, and maintenance required to accomplish new or modified information systems.

Fig. 2.   Information system life cycle.

The development starts with the planning phase where the researcher understands the problem and identifies and lays down possible threats and project constraints that may hinder the integration. In addition to that, a Gantt chart was created to monitor the progress of the project. The context diagram, drawn in Figure 3, defines and identifies the extreme boundaries and course of information of the entire system.
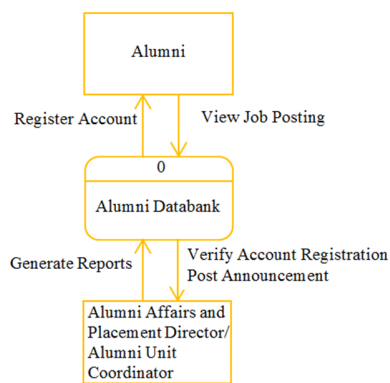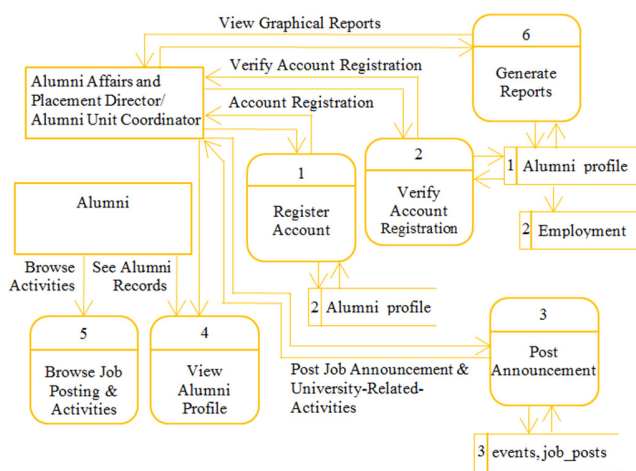
Fig. 3.   Context diagram.

Fig. 4.   Level 1 representation of the DFD processes.

The analysis phase included the detailed examination of collected data and user needs. In this way, processes can be tailored to fit any desired process [24]. This study dissected the collected data in multiple analyses to solve issues and come up with accurate and appropriate findings. Authors in [25] stated that one of the prerequisites for each computer system is the assurance of data integrity. By this process, the system will make sure that no changes are made in the database while in operation. This study follows three comprehensive stages of data analysis motivated by [26] which breaks down that data analysis covers everything from reading the source method of data collection to the creation and visualization of the extracted data. The evaluation was first. This stage helps determine and characterize the information of collected data to provide an outcome to achieve a goal. Secondly, the cleaning stages classified the information belonging to its entities. This eliminates duplications, irrelevant data, white spaces, and not valuable records. The output of this process is data integrity. Lastly, the summarizing stage assures that the collected data are reliable and rich in information, which is the basis for formulating data-driven decisions.

The design phase included designing the application, the database, and the user interface. This stage shows the way the system was conceptualized and ensures that the requirements have been met. Several software engineering diagrams were made to recognize users' roles and the workflow processes of the developed system. Figure 4 illustrates the technical drawing showing how the developed Alumni Databank system worked.

The implementation phase started with coding and a series of tests to evaluate the system's functionality and usability. Lastly, the integration of the developed system into its new environment was conducted. Features of the developed system are limited only to graduates' online registration, posting of job fairs, and NEUST alumni-related activities, and organization job hiring. The alumni coordinator of the said campus is the one who will maintain and manage the Alumni Databank system. The use-case diagram in Figure 5 shows the distinct function and role of the user to the developed system. In this case, it describes the system's capability and how a particular user will utilize it.
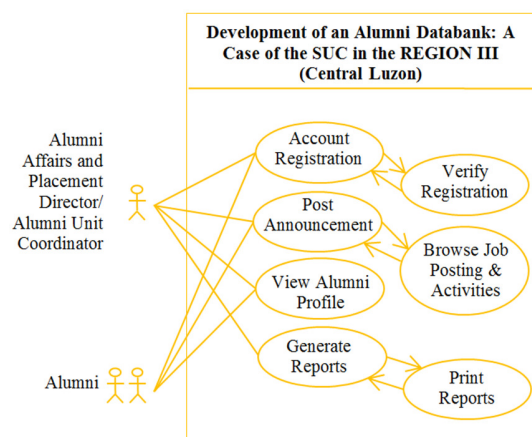

Fig. 5.   Use-case diagram.

A. Database Modeling

The representation of database modeling in information systems is a conceptual way to describe the data structure, which is required in database management. In this way, the data collection will be easy to organize, manage, maintain, protect, and provide access to as a computerized database. There are a lot of structure diagrams in designing a database. One of the most frequently used and applied in this study in illustrating the relationships of different entities to each other within the system is the Entity Relationship Diagram (ERD) (Figure 6). The presented database schema identifies the relationships and attributes in each entity, e.g. users related to alumni, works, and education belong to the same class. In this case, the values recorded to alumni, works, and education are also recorded to the users. The values from the users are all recorded to the alumni, works, and education. The primary purpose of the ERD of the Alumni Databank is to visualize the physical database which is helpful in identifying mistakes and design flaws that allow necessary adjustments. Data entries have to be performed by the end-users who are the alumni and the Alumni personnel.

B. Security

The developed Alumni Databank incorporates protective measures and protocols to protect the information and limit the

possibility of data breach. To ensure the integrity and security of the system, the Alumni Databank has a user maintenance that allows two kinds of accounts that can be used to access the system. The "Admin Account," is the alumni coordinator, has complete control and responsibility for managing the system, and uses all the available functionalities, and the "End-user Account" with limited access and designated for the university graduates. Authentication features were used as the first line of protection. Only users with authorized username and password can access it. Also, the system administrator may check all the registered users which will serve as a countercheck for bogus accounts.
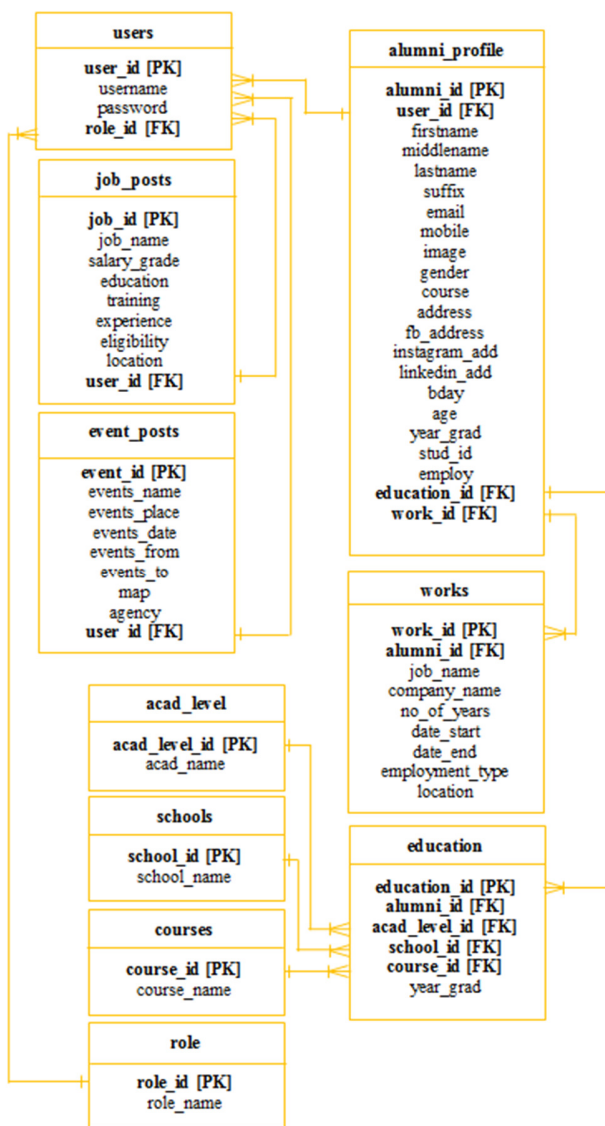

Fig. 6. An example ERD used in the development of the Alumni Databank.

V. RESULTS AND DISCUSSION

The Alumni Databank system was developed in order to help the Alumni Affairs and Placement Office of NEUST to collect data and locate the graduate's whereabouts and have updated information about them. Figure 7 presents the system's architecture design. An internet connection is required to facilitate communication between the alumni and the developed Alumni Databank [27]. The front-end of the system was developed using HTML5 for the web structures, CSS3 for design, and JavaScript for the system's functional behavior. JQuery was also used for a more graphical representation of tables. Bootstrap 4.1.3, an open-source front-end toolkit, was used to make the web application responsive [28] and Fontawesome Webfont icons provided the visual icons. Using these front-end utilities, the Alumni Databank system was developed. Back-end development refers to the server-side of an application [29], which means users cannot see how the back-end works. However, this code integrates the system between its database to the browser. To make this integration possible, PHP 7.3.4-2 [30] was used. MariaDB Ver 15.1 Distrib 10.3.23 was used for defining the database structure along with MySQL Workbench and Sublime Text3 for coding.
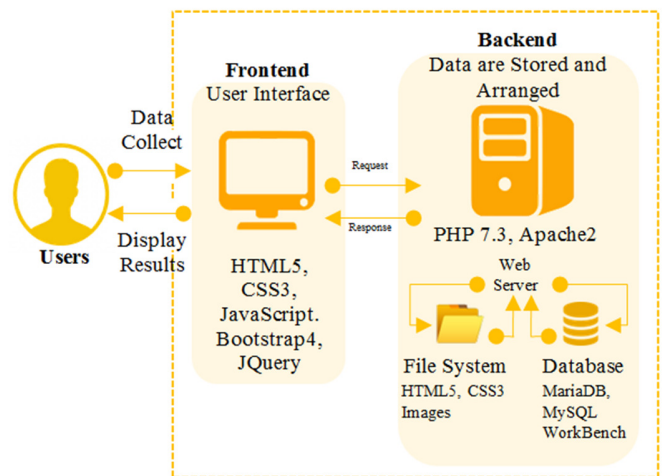

Fig. 7. Web application architecture of the Alumni Databank.

Tracking graduate whereabouts is significant for Higher Education Institutions (HEIs). Moreso, the integration of industry 4.0 in the education system impacts strategic leadership [31] and transforms data-driven operations. The Alumni Databank is designed to keep the graduate's records of NEUST - San Isidro Campus and of the University as a whole. Figures 8 and 9 show the reports through a bar chart, the graduates per year and per course. The assigned campus alumni coordinator will have access to maintain and manage the system, while only administrators and coordinators have full access to the Alumni Databank. The end-users' privileges include creating and updating their profiles and browsing posted job advertisements and announcements.

Figure 10 displays the announcement module wherein the administrators and coordinators can manage the creation of job advertisements and University-related activity announcements. Only the administrator and the system developer can access the system database backup, access the graduate's lists and information, generate reports, and have the privilege to modify the system if there will be any change request.
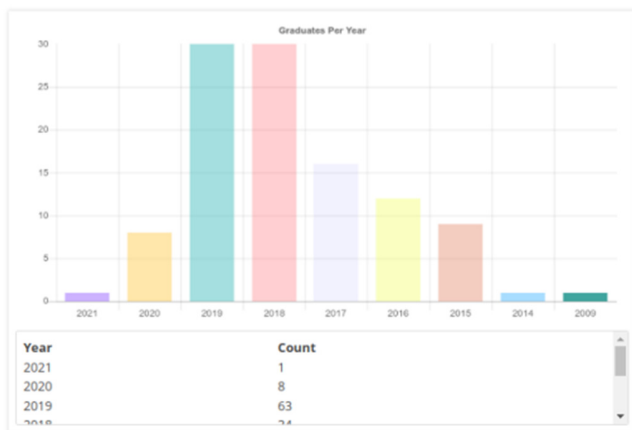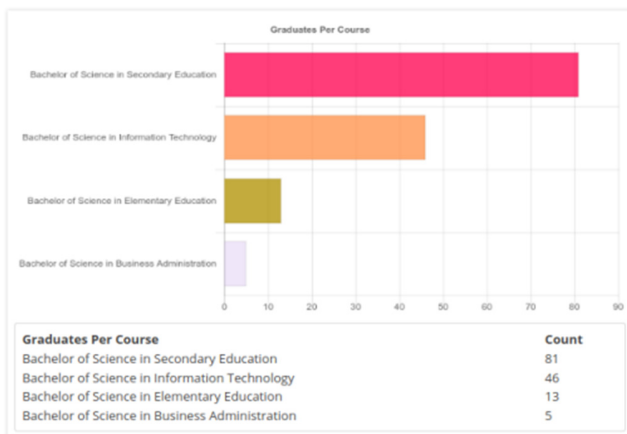
Fig. 8. Graduate reports per year.

Fig. 9. Graduate reports per course.

Fig. 10. Job advertisement, University related activity announcement page.

The developed Alumni Databank establishes a network between the graduates and the Alumni Affairs and Placement Office. It considerably benefited the Office, particularly in tracing its graduates and managing their profiled information. With the existing system of graduates tracing, the office staff in charge encounters difficulties in merely looking for them via social media platforms, not to mention the limited data

available. Some graduates who are not active in social media or whose profile is different from their actual names are not tracked at all. Thus, the preparation of needed reports takes a lot of time and is prone for being incomplete, and is less reliable. This system would make it easier to prepare the documentation required by the CHED by establishing a standard communication gateway with graduates to collect their information after graduation. Compared to the manual system, obtaining data from them is no longer tedious since graduates themselves may update their personal information like contact numbers, address, and pertinent linkage to them can be acquired, tasks which were previously difficult to perform. The needed reports can easily be generated, printed or downloaded in PDF format by authorized system users. Data analytics was also integrated for a visual presentation of reports which have been more useful as compared to traditional reports created with the manual system.

VI. CONCLUSION

The repository of alumni record management for NEUST San Isidro Campus, was developed with the following functionalities: online registration, posting job opportunities offered by the University and other job advertisements from partner agencies. Reports with analytics were provided inclusive of generation of graduates statistics, employability and graduates aggregated according to their gender. The developed system was able to produce printable reports of alumni records with some data analytics. For further improvement in the future, the following recommendations are hereby given:

- Integration of the Alumni Databank system to the University system for full utilization in the NEUST - San Isidro Campus.

- Considering the said system implementation as a benchmark in aligning the inputs and processes of the NEUST, the said system can also be utilized in other Colleges/Campuses.

- The University Management of Information System (MIS) may integrate the Alumni Databank system to the University Portal for deployment.

- The Alumni Affairs and Placement Office director, the Vice President for Academic Affairs, the Vice President for Research, Extension and Training office, and all Alumni Coordinator per Colleges/Campuses in cooperation of the Deans and Directors may provide a set of guidelines regarding the system use prior to implementation.

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