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Ilocos Sur Polytechnic State College
(ISPSC)**

Abstract: - Graduate Tracer Studies (GTS) have been a recognizable practice worldwide as they allow better understanding between the connection of education and work. They are important especially to higher education institutions as it enabled them to accommodate changes in the society especially the demands of the actual and potential employers, through evaluation and constant review of their curricula. However, in Ilocos Sur Polytechnic State College – Main Campus, tracers used social media groups such as Facebook groups and Google Forms in conducting graduate employability tracing which sometimes leads to issues of representativeness, time-consuming, and data reliability. The goal of this study is to develop a Graduate Tracer System for Ilocos Sur Polytechnic State College with Analytics to address the issues of using aforementioned tools. The study was delimited to BS Computer Science graduates of ISPSC Main Campus from 2015-2023. Design Thinking framework was utilized by the researcher to hold together the data used to carry out the study. Furthermore, the Agile methodology was used for software development and Software Usability Scale (SUS) was used to evaluate the acceptability test of the developed system. The results of the study showed that the developed software gained a usability test of Strongly Agree which means that the application used for tracking and helpful in the graduate employability tracing of ISPSC.

Keywords: Analytics, Graduate Tracing, Graduate Tracing Analytics, Ilocos Sur Polytechnics State College

I. INTRODUCTION

In the dynamic landscape of higher education, the issue of graduate employability has become a focal point, driven by the changing demands of the global job market. The transition from education to employment is a pivotal phase for graduates, emphasizing the shared responsibility of educational institutions and industries in ensuring successful integration into the workforce.

Aligning educational offerings with industry needs is important as individuals possessing skills highly valued by employers are more likely to secure employment [1]. This necessitates an educational process that goes beyond traditional information transfer, focusing on the development of competences aligned with the constantly changing requirements of industries. To bridge the employment-education gap, continuous reflection and modification within educational institutions are essential, involving routine evaluation and improvement of courses, curriculums, and teaching strategies.

The global concern for graduate employability is evident in studies emphasizing the need for higher education institutions to adopt strategies like graduate employability tracers [3]. These tracers, as seen in studies on Information Technology Education and Industrial Technology graduates in the Philippines, provide crucial insights into the employability of graduates in specific sectors [4]. They underscore the significance of industry-relevant skills, practical knowledge, and curricular alignment with industry demands.

Analytics has emerged as a powerful tool in the realm of graduate employability tracing, as highlighted by various studies, including those by the World Bank, the European Commission, and the Commission on Higher Education in the Philippines. These studies utilize analytics to track employment outcomes, identify influencing factors, and understand the quality of institutions [5,6,7].

In the northern part of the Philippines, Ilocos Sur Polytechnic State College employs various methods, including social media and Google Forms, for graduate employability tracing. However, potential issues of representativeness, selection bias, and data reliability exist with the such current method.

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Recognizing these challenges, the researcher proposes a comprehensive and technology-driven graduate tracer system with data analytics for Ilocos Sur Polytechnic State College. The study intends to 1) determine the information requirements of the proposed system; 2) determine the features of the proposed system; and 3) determine the extent of usability of the proposed system.

By incorporating advanced analytics, the study aims to revolutionize how the institution assesses and responds to the employability needs of its graduates, contributing to improved graduate employability tracing and resilient infrastructure. This aligns with United Nations Sustainable Development Goals 4 and 8, promoting quality education and decent work and economic growth.

II. REVIEW OF RELATED LITERATURES

This section contains literature and studies related to the Graduate Tracer with Analytics for Ilocos Sur Polytechnic State College (ISPSC).

Graduate Employability

Graduate employability refers to a graduate's ability to obtain and maintain employment throughout their career. Employability skills are critical to a company's or industry's growth and development. Employability skills relevant to obtaining employment after graduation include work-integrated learning, career development learning, practical experiences, and personal qualities and attitudes [8,9].

Graduate employability has become a crucial concern in higher education worldwide, with an emphasis on bridging the gap between academic knowledge and practical job skills. Graduate employability tracer studies have emerged as valuable tools for assessing and enhancing graduates' readiness for the workforce. Universities play a crucial role in enhancing graduate employability by developing students' skills and competencies, providing practical experiences, and aligning their graduate attributes with industry requirements.

Graduate Employability Tracer Studies

Graduate tracing is an essential component of higher education institutions' efforts to evaluate the effectiveness of their programs and the employability of their graduates. It involves systematically tracking the career trajectories and outcomes of alumni to inform program improvements and ensure that graduates are prepared for the job market [10]. Successful graduate tracing initiatives can lead to program enhancements, curriculum adjustments, and improved student services. Understanding the potential impact on the institution is important for justifying the investment in such systems [11].

International Studies

In United Kingdom, the country's Destinations of Leavers from Higher Education (DLHE) surveys graduates to understand their career outcomes by examining factors such as employment rates, job roles, and salaries [12]. The DLHE has been instrumental in shaping higher education policies and practices to improve graduate employability. Australia's Graduate Outcomes Survey collects data on graduates' employment status, salary levels, graduate satisfaction with their education and the relevance of their studies to their careers [13]. It provides insights into how educational institutions can better align their programs with industry needs.

Canada's National Graduates Survey investigates the employment outcomes and job satisfaction of graduates from various programs and institutions such as job match, income, and the influence of co-op programs on employability [13]. The survey informs policy decisions and program improvements in Canadian higher education.

These tracer programs serve as essential tools for enhancing graduate employability and fostering a dynamic synergy between academia and the workforce, ultimately benefiting both students and society at large.

Graduate Tracer Studies in the Philippines

The Commission on Higher Education (CHED) in the Philippines conducts graduate tracer studies to track the employment outcomes of graduates from different degree programs and regions. These studies provide insights into the employment trends and challenges facing Filipino graduates, aiding in policy development and program enhancements [14].

The University of the Philippines (UP) conducts an annual graduate tracer study to assess the employability of its alumni by examining graduates' employment rates, industries they enter, and the skills they find most valuable. It helps UP tailor its programs to meet industry demands and improve graduates' job readiness [16, 17].

Pangasinan State University (PSU) has conducted several graduate tracer studies focusing on education graduates. These studies assess the preparedness of education graduates to meet the demands of the teaching profession. The findings help PSU refine its teacher education programs to align with the evolving needs of the education sector [18].

With these, the Philippines recognizes the critical importance of graduate tracer studies in shaping the future of higher education and employment outcomes. These studies, conducted at various levels, provide invaluable insights into employment trends, challenges, and graduates' readiness for their chosen professions. Furthermore, by systematically tracking the career trajectories of their alumni, these institutions can refine policies, enhance programs, and align curricula with industry demands

Analytics in Graduate Employability Tracer

Analytics plays a pivotal role in modern graduate employability tracer programs, offering deeper insights into graduates' career outcomes. By leveraging data analytics, institutions can identify patterns and factors influencing employability.

For example, a study conducted from a university in Malaysia analyze the employability of their graduates using data analytics. The study found that graduates with higher GPAs and more work experience were more likely to be employed [19].

Furthermore, Senekal and Smith [20] employed analytics to investigate the employment outcomes of graduates across various industries in the Philippines. The study found that graduates who possessed skills in data analysis, programming, and project management had higher employability rates in the IT industry.

These studies demonstrate the potential of analytics in graduate employability tracer programs to provide deeper insights into graduates' career outcomes and identify factors that influence employability. By leveraging data analytics, institutions can improve their educational offerings and better prepare students for real-world careers.

III. CONCEPTUAL FRAME WORK

In order to hold together the ideas that to carry out the study, the Design Thinking framework was utilized by the researcher.



Figure 1. Design Thinking Framework

Design thinking, according to Interaction Design Foundation (2022), is a non-linear, iterative approach that teams use to understand users, reframe challenges and create innovative solutions for prototyping and testing. Five (5) phases make up the framework: empathize, define, ideate, prototype, and test.

Empathize. In this stage, the researcher, typically through user research such as interviews and surveys, developed an empathic grasp of the issue they are attempting to solve. Survey forms and interview guides were used as data gathering instruments.

Define. In order to generate a focused and well-defined problem that will be solve in the following phases, the researcher assessed the user wants, seeing trends, and distilling the essential difficulties to address the proper issues and developing valuable solutions.

Ideate. In order to answer the identified problem or design challenge from the previous phases, the researcher investigated a wide range of potential solutions, concepts, and approaches.

Prototype. The development of the prototype helped the researcher hone designs and make informed decisions, resulting in more efficient and user-centered final solutions.

Test. In this stage, users and stakeholders were given the prototype in order to gather feedback, monitor interactions, and judge the viability of the suggested solutions.

IV. METHODOLOGY

This chapter shows the software development methodology, design thinking process, data gathering techniques, and sources of data employed and utilized by the researcher in the conduct of this study.



Figure 2. DevOps Software Methodology

In this study, the researcher will be employing the DevOps software methodology to develop the Graduate Tracer for Ilocos Sur Polytechnic State College software.

DevOps is a collection of methods that integrates software development (Dev) with IT operations (Ops). Its primary purpose is to bridge the gap between development and operations, allowing for faster development and more frequent releases [21]. DevOps is a valuable methodology that can be used to improve the speed, quality, reliability, and cost-effectiveness of software development. It is a highly relevant methodology for the development of the Graduate Tracer for ISPSC, as it will help to ensure that the software is developed and deployed quickly, efficiently, and reliably.

The DevOps software methodology has six (6) phases which are the following:

Planning. Under this phase, the study's scope was mapped out by the researcher, objectives and tasks were determined, a strategy for their effective completion was developed.

Coding. To create high-quality source code that adheres to the software's specifications, the concepts and plans made from the previous stage were converted into functional code, unit tests were conducted also to validate the code's dependability and thorough code documentation to facilitate future comprehension and maintenance.

Building. To do this, the written code from the previous stage was compiled and packaged by the researcher in a way that enables effective deployment.

Testing. To ensure that the developed software complies with the specifications, performs as intended, and is error-free, extensive testing procedures such as functionality testing were employed, test reports created at this stage will offer perceptions into the performance of the software and flag any flaws found.

Integration. During this stage, the researcher provided input on test results from the previous stage to guarantee its quality and adherence to coding standards.

Deployment. During this phase, the software was be deployed to the intended environment to make sure it works as planned in various scenarios.

Operation and Monitoring. In this stage, the software's behavior was be monitored using feedback forms, and performance metrics will be obtained to gauge its effectiveness.

Release and Iteration. In this stage, users provided feedback along with problem reports and feature requests and will be retrieved by the researcher. The collected feedback forms will be consolidated by the researcher for a basis of improvement for the software.

V. RESULTS AND DISCUSSIONS

In this section, the outcomes and discourse of the investigation are presented. This encompasses an examination of the effectiveness of graduate tracer studies in facilitating the delivery of high-quality educational programs, the role of the graduate tracer study system as a quality assurance tool for enhancing the curriculum, and an evaluation of the acceptability and usability of the newly developed system. Using Software Usability Scale (SUS).

Information Requirements of the System

In order to develop the Graduate Tracer software, the researcher gathered the following information based on the Graduate Tracer Survey (GTS) of the Commission on Higher Education (CHED):

Graduate Personal Information. Under this information requirement, the researcher gathered the respondent’s name, address, email, contact number/s, civil status, sex, birthday, region of origin, province, and location of residence.

Graduate Educational Background. Under this information requirement, the researcher gathered the respondent’s educational attainment (bachelor’s degree), professional examination passed, and reasons for taking the degree.

Trainings and Advance Studies Attended After College. Under this information requirement, the researcher gathered the respondent’s trainings and advance studies attended after college.

Employment Data. Under this information requirement, the researcher gathered the respondent’s employment data such as present employment and employment status, place of work, job level position, and initial gross monthly earning.

Features of the system

The following are the features of the Graduate Tracer System of ISPSC:

User Registration. This feature allows graduates to create accounts by providing necessary information. It typically involves filling out a registration form with details such as name, contact information, graduation year, and any other relevant data.

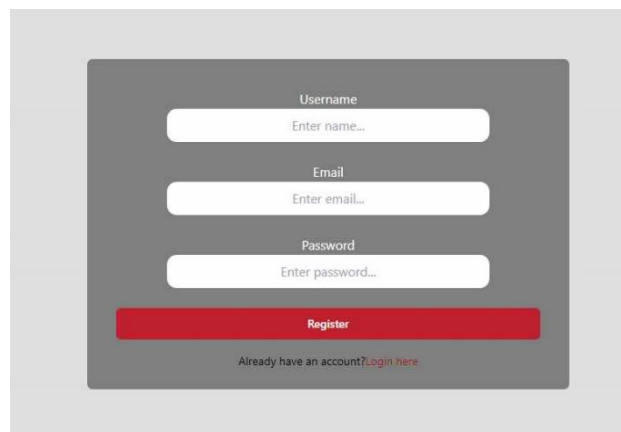


Plate 1. User Registration

User Login. After registration, graduates can log in to the system using their credentials (e.g., username and password). This ensures secure access to individual accounts and personal data

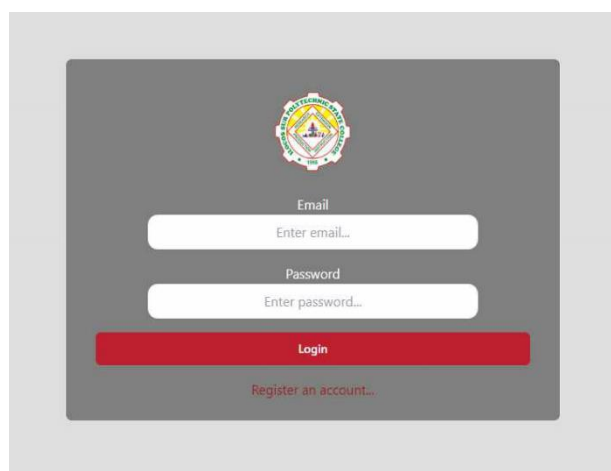


Plate 2. User Login

User Logout. This feature allows users to log out of their accounts, ensuring the security of their information and preventing unauthorized access.

Admin Login. Administrative personnel responsible for managing the Graduate Tracer study have a separate login. Admins typically have access to additional features and functionalities for overseeing the system.

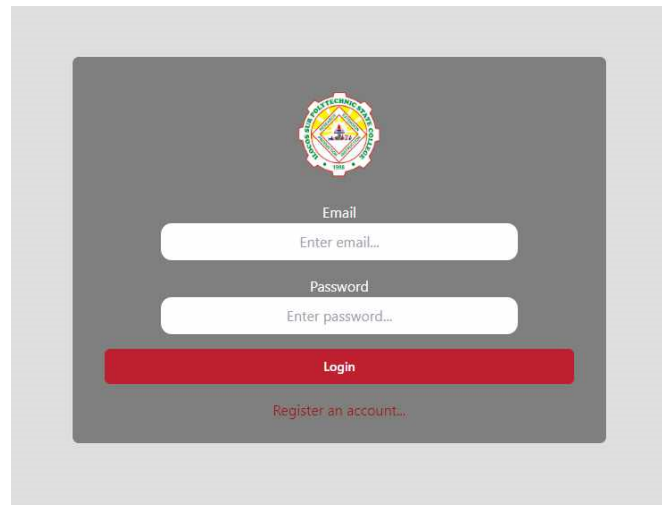


Plate 3. Admin Login

Admin Logout. Similar to user logout, this feature ensures that administrative sessions are securely terminated.

Information Registration. This involves the collection and storage of relevant data about graduates. It includes academic information, employment status, career progression, and feedback about their educational experiences. The system allows graduates to update their information over time.

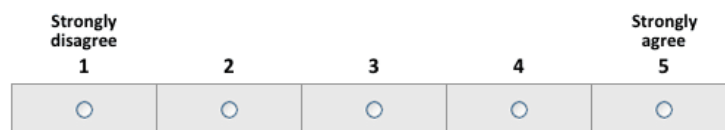
Viewing Registered Tracers. This feature allows both users and admins to access and view the registered graduate tracer information. Users may be interested in connecting with their peers or accessing aggregate data about the cohort, while admins can use this feature for analysis and reporting.

Responsive Layout. The user interface of the system was designed to adapt to different screen sizes and devices (e.g., desktops, tablets, smartphones). This ensures that the system is user-friendly and accessible across various platforms.

Fast Response. The system was designed to provide quick responses to user interactions.

Extent of Usability of the System

To determine the extent of usability of the graduate tracer system, the researcher used the System Usability Scale (SUS), a questionnaire used to evaluate the usability a wide variety of new systems, whether software or hardware. The system usability scale consists of only 10 questions, which are answered using a Likert scale:



1. I like to use this system frequently.
2. I find this system to be more complicated than it should be.
3. I think the system is simple and easy to use.
4. I need technical support to use this system.
5. I find the system functioning smoothly and is well-integrated.
6. I think there are a lot of irregularities in the system.
7. I think most people can learn this system quickly.
8. I find this system to be time-consuming.
9. I feel confident while using this system
10. I think there are a lot of things to learn before I can start using this system.”

The table below shows the result of the evaluation using the SUS questionnaire.

Table 1. Usability of the Graduate Tracer System

User	Questions											Y(even)	SUS Score	Interpretation
	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	X(odd)			
1	4	2	5	1	3	3	5	2	4	2	16	15	77.5	Good
2	4	3	4	2	4	2	3	2	4	2	14	14	70	Good
3	4	2	5	1	3	3	5	2	4	2	16	15	77.5	Good
4	4	2	5	1	3	3	5	2	4	2	16	15	77.5	Good
5	4	2	5	1	3	3	5	2	4	2	16	15	77.5	Good
6	5	1	5	1	5	1	5	1	5	1	20	20	100	Best Imaginable
7	5	1	5	1	5	1	5	1	5	1	20	20	100	Best Imaginable
8	4	2	5	1	3	3	5	2	4	2	16	15	77.5	Good
9	4	3	4	2	4	2	3	2	4	2	14	14	70	Good
10	4	2	5	1	3	3	5	2	4	2	16	15	77.5	Good
OVERALL												80.5	Good	

The table shows that the developed software gained a usability test of 80.5, interpreted as Good. The obtained score of 80.5 reflects a positive outcome, suggesting that the developed software performs well in terms of user experience and usability. This favorable usability rating indicates that users find the software to be effective, efficient, and satisfactory in meeting their needs during the testing phase.

VI. CONCLUSION AND RECOMMENDATION

In conclusion, the findings from our study unequivocally affirm the success of the developed software, as evidenced by an impressive usability test score of 80.5, categorizing the application developed for graduate tracer as "good." This outcome underscores the tangible benefits of the application in facilitating the efficient tracking of graduate employability among the BS in Computer Science graduates from the years 2015 to 2023 at ISPSC. The software not only demonstrated its functionality but also emerged as a valuable tool in enhancing the overall effectiveness of graduate employability tracing processes. This noteworthy achievement marks a significant contribution to the field, positioning the application as a reliable and impactful resource for academic institutions aiming to bolster their graduate tracking mechanism.

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