ANALYTIC INSIGHTS WITH EQUALEARN: A WEB SYSTEM FOR BATANGAS STATE UNIVERSITY'S GENDER AND DEVELOPMENT OFFICE

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Major in Business Analytics

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ABSTRACT

By bringing increased efficiency, control, and accuracy to manually performed tasks, technology's rapid advancements along with the rise of automation have created a significant change on human's traditional way of doing things. Batangas State University's Gender and Development Office manages all initiatives aimed at enhancing gender equalities and inclusivity through manual processes, among them are the programs, advocacy campaigns, and training as outlined on the annual Gender and Development Plan and Budget. The Office's manual processes are prone to inefficiencies, delays, and errors, especially when it comes to reporting, data gathering and analysis, verifications, participant registration, attendance, and evaluation. To address these challenges, the researchers designed and developed a web-based learning management system that will digitize and improve almost all GAD Office's operations when it comes to PAPs implementations and management in order to lessen the challenges faced by them. The majority of their manual procedures have been automated by the system, which has improved PAPs management as well as information dissemination and increased the efficiency and effectiveness of their organization. It also includes comprehensive reporting and informative analytics features that provide results for decision-making and PAPs development.

1   INTRODUCTION

1.1   Background of the Study

Most of the humans' manual ways of doing things have been revolutionized by technology and automation that are now an integral part of our lives as they have transformed how we do our manual work and systems. There are several benefits that automation has brought to manual activities that lack efficiency, control, and precision. Automation has resulted in making more manually performed tasks done by machines or computer-system modules as they reduce or eliminate the labor or physical support to run. The adoption of automation and technological advancements especially in analytics has not only somehow reduced the workload of human processes that enables them to focus more on complex and strategic tasks but also helped them enhance data analysis, productivity, efficiency, and effectiveness.

Aside from there being a need to transform unequal relations between men and women toward the kind of development that is more equitable and sustainable, the Gender and Development approach was also developed early in the 1980s as a development perspective founded on the principles of people-centered and rights-based development. This approach focuses on the social, economic, political, and cultural elements that impact how women and men engage with,

utilize, and take control over resources and activities. GAD refocuses attention from the necessity of involving women in development to the study of socially constructed relationships between men and women. Gender mainstreaming is an integral part of GAD because it is a strategy in integrating gender perspectives in institutional policy, programs, projects, and activities towards greater sustainability of gender equality development outcomes.

In Batangas State University, there is an extension office for Gender and Development that focuses on gender mainstreaming activities to raise awareness among stakeholders and is dedicated to promoting gender equality and inclusivity within the university community and even outside of it. To address issues, attain goals, to raise awareness about gender issues, and promote a more inclusive culture, the office conducts a variety of gender mainstreaming initiatives including advocacies and campaigns like the awareness raising campaigns about LGBTQ+ rights and issues that addresses the limited recognition, acceptance, and inclusion of all gender identities and sexual orientations, the National Women's Month Celebration in accordance with Republic Act No. 6949 and Proclamation Numbers 224 and 227 highlighting the role of women in national development and nation building, and the 18-day Campaign to End Violence against Women in accordance with Proclamation Number 1172 series 2006 and Republic Act Number 10398 which raises awareness and consciousness, the activities on the promotion of

mental health in relevance with Republic Act Number 11036 affirming the basic right to mental health in order to increase the number of available programs that promote mental health. The last one is the training concerning gender sensitivity to involve men in GAD initiatives since the involvement of men in addressing gender issues is only limited, and training on capability development for extension workers focusing on development and implementation of gender responsive PAPs. These initiatives are guided by an annual Gender and Development Plan and Budget (GPB) formulated through the help of four entry points such as policies that can be memos, executive orders, department orders, special orders, administrative orders, or memoranda which are the organization's official statements and declarations supporting gender mainstreaming which can also include Framework/Strategic Plan, specific guidelines, a manual of implementation, and national and sectoral plans. Next is the people or relevant stakeholders' who assume the task of gender mainstreaming which consists of the sponsor, the change agent, the target, and the advocate. The other entry point is the enabling mechanisms which involve GAD Focal Point System, GAD Funds Audit, and Learning Management System. The fourth entry point is the PAPs (Programs, Activities, and Projects) that serve as a strategic entry point to mainstream Gender and Development as it involves the actual implementation of the organization's mandate. The inputted data by the learners from the conducted PAPs are gathered

and analyzed by the office to determine the impact and effectiveness of their initiatives then be used for further improvements and creation of new initiatives.

The process of GAD is operated by the GAD Focal Point System which is a collaborative, interdependent group of individuals entrusted with promoting and facilitating gender mainstreaming. Additionally, it is one of the organization's enabling mechanisms that was put in place to guarantee, support, direct, coordinate, and keep an eye on the creation, execution, evaluation, and updating of their plans as well as the programs, activities, and projects linked to them. It consists of a Head/Chairperson who is in charge of formulating policies that promote directives and the goal of gender mainstreaming, and the one who signs and approves the GPB and GAD AR, an Executive Committee that guarantees the implementation of GAD programs, activities, and projects within the timeframe specified in the GPB, a Technical Working Group who leads the conduct of advocacy activities and information campaigns on GAD, and the Secretariat who coordinates with other GFPS members.

Manual procedures and lack of web management system indeed categorize delays, errors, and inefficiencies but still, the Gender and Development Office of Batangas State University does not have any existing web system to manage their PAPs and are currently utilizing manual procedures hence, challenges take place.

To connect to people and to manage their initiatives, they currently use Facebook and other manual modalities which lack centralization. In total, their office prepares more or less 19 PAPs annually but then, they just manually handle and store information and details from learners' assessments, registration, attendance, as well as evaluations which are overwhelming, error-prone, time-consuming, and cause delays. The office struggle with the inconvenience of using pen and paper when tallying learner responses just to analyze data because of the lack of efficient analysis and proper analytics that hinders them to easily understand the results and impact ranking of PAPs to draw insights and recommendations, the other challenge is they are having trouble verifying the records to decide whether a learner will be allowed to access the process that has prerequisite such as attendance, evaluation, and e-certificate issuance. Moreover, the Gender and Development Office has also issues on reconducting some repetitive initiatives that just basically serve the same purpose which are costly and time-consuming to organize but must still be conducted over and over again. Lastly, the audience constraints and the reach of some of their initiatives since not everyone, especially those from outside the university are capable of attending at a physical venue.

The researchers created a web-based learning management system for PAPs to help the organization solve the said problems. It can help enhance information dissemination and improve their PAPs implementation, efficiency, accuracy, and

effectiveness. The system will automate most of their manually performed tasks and it will equip them with efficient reporting features, and better data analytics that can be used for better decision making and creation of next initiatives to conduct.

The developed project contributes to some of the United Nations' Sustainable Development Goals. By automating PAPs management tasks and implementing gender mainstreaming initiatives, it enhances educational quality, promotes gender equality, and advocates to reduce inequalities. The project's data-driven approach empowers the office to create informed decisions, streamlines operations, and enables easy and equitable access to online educational resources for all genders which enhance inclusivity (SDG 10), as well as the quality of education (SDG 4). It also aligns with SDG 5 since it focuses on gender equality and showcases gender mainstreaming initiatives, and empowerment programs.

1.2   **Purpose and Description**

The general purpose of this study focuses on the development of a web-based learning management system that helps transform and improve the processes of Batangas State University's Gender and Development Office. It aims to address the inefficiencies and challenges associated with manual processes when it comes to managing processes and data analytics.

The developed system serves as the centralized digital platform of the office in handling their PAPs information and initiatives. It will be beneficial to a variety of learners from inside and outside the university in the form of students, employees, teaching and non-teaching personnel, parents, women from partnered communities, and the like, because different available informative resources can be accessed in the system whenever they want to gain knowledge and awareness regarding any of the GAD's programs, and advocacy campaigns. The admin or the head of the office is the one who creates and manages staff and accounts, content moderation, data dashboard, analytics, reporting, system monitoring, as well as the manual adding of data which is usually used in case the automated data gathering is unavailable. The staff is in charge of managing the contents of the system but the adding of contents requires approval from the admin to make them visible to the website, and there's also a feature that the staff can easily activate or deactivate any contents. For the learners, they are able to navigate across the system even before logging in but they won't be able to enroll or join any available programs, activities, and projects unless they're already logged in to the system. Learners will still use the system for registration, attendance, evaluation, and assessments even during offline programs. The system could serve a great help to the GAD Focal Points since the generated metrics and analyses will provide them the comprehensive view of the evaluation results, user demographics, and PAPs

impact ranking that will enable them to know their level of effectiveness. Hence, the Focal Points can improve their decision-making, easily distinguish the details on where to focus more, and then come up with new ideas for the necessary initiatives or PAPs to be developed and conducted next based on the presented results with the help of descriptive and prescriptive analytics. Basically, The implementation of the system encompasses a comprehensive approach to automating PAPs management and leverages the analytics capability of the Office.

1.3   Objectives of the Study

The main objective of the project is to design and develop a web system for Batangas State University's Gender and Development Office to improve their processes by automating most of their manually performed tasks while leveraging analytics. Specifically, it aims to attain the following:

1. To provide a learning management system that centralizes the programs offered by the office.

2. To streamline the processes when joining and managing program offerings along with the digitalization of learning assessment, pre-test, post-test, registration, attendance, and evaluation.

3. To provide descriptive and prescriptive analytics that will help in decision-making in developing new PAPs through the following:

   a. Evaluation results

   b. Program metrics result

1.4   **Scope and Limitations**

The developed web-based management system provides a platform that only covers the processes of Batangas State University's Gender and Development Office when it comes to learning management and PAPs implementations by automating most of their manually performed tasks. The system is open for all users inside and outside BatStateU, specifically students, employees, teaching and non-teaching personnel, women from partnered communities, parents, and the like as long as they have the means to access it online. If the programs are conducted face-to-face, the system will still be used in handling registration, attendance, evaluation, and assessments. For e-certificate issuance, only the learners who finished a course and who complied with registration, attendance, and evaluation will be eligible to get a certificate. When the system encounters a problem with the automated data gathering, there will be an option where the administrator can manually upload the data to the system. The system will utilize descriptive and prescriptive analytics by allowing the Administrator to include the targets or GPB

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of the office in the system that will be compared to the past and current generated data from the learners, evaluation results, and impact ranking of PAPs that will be analyzed in order to determine the overall impact and effectiveness of the initiatives in order to produce result which will be used to the decision-making in developing PAPs. Lastly, the administrators will be able to have the copy of all generated reports from the system.

The system is limited to Batangas State University Alangilan Campus and does not include all extension campuses of Batangas State University. It is important to acknowledge the limitations that could affect the project's results. The identified limitations of the study include the possible implementation problems, learners won't be able to join any initiatives unless they will create an account and will sign in to the system, the result generated by the system may still be subjected to further testing and validation before implementing them to ensure its credibility, and lastly, for the issuance of e-certificates, the system won't be able to independently generate them so certificates must be imported to the system by the administrators. For assessments, the system is limited to multiple-choice questions for both the pre-test and post-test.

1.5   **Definition of Terms**

For a better understanding of the flow of thought of the study, the following terms are defined.

Change Agent. the person or group in charge of performing the change. The ability to identify possible problems, create a strategy to address them, and carry out the change successfully determines the agent's success. Typically, the -are the main change agents since they help the organization implement gender mainstreaming.

GAD. Gender and Development refers to the development perspective and process that is participatory and empowering, equitable, sustainable, free from violence, respectful of human rights, supportive of self-determination and actualization of human potential. It also acknowledges women's and men's unequal status and conditions in society.

GAD AR. Gender and Development Accomplishment Report outlines the initiatives and programs that the gender focal point completed in a given time frame, together with the associated implementation costs.

GFPS. The GAD Focal Points System is an interactive and interdependent assembly of individuals within all government agencies assigned to initiate and expedite the integration of gender perspectives.

Gender Mainstreaming. It refers to the process of designing, implementing, monitoring, and evaluating policies and programs in all social, political, civil, and economic areas with consideration for the concerns and experiences of both men and women to ensure that inequality is avoided and that men and women benefit equally. It is the process of determining how any proposed action, such as laws, regulations, or programs, will affect both men and women in all contexts and at all levels.

GPB. GAD Plan and Budget is an organized collection of projects, activities, and programs as well as budget allocation with gender issues and/or GAD mandates, causes of gender issues, and specific goals for addressing gender issues within a given time frame using suitable approaches and GAD activities.

Learning Management System. A collaboration of institutional components, management procedures, and technology where knowledge is created, disseminated, and used to increase activity effectiveness and efficiency.

PAP. GAD Projects, Activities, and Programs refers to the gender responsive and gender sensitive initiatives formulated to educate and enhance one's knowledge when it comes to gender, equality, and inclusivity.

2   REVIEW OF RELATED SYSTEMS/STUDIES

2.1   Technical Background

This section explains the technical concepts and principles relevant to the web-based learning management system and provides a foundational understanding of the underlying technologies and principles that enable the development, implementation, and deployment of the solution.

The web-based system enables users to access PAPs initiatives and the staff as well as the administrators to manage them. It also includes tools for e-certificate issuance and it offers numerous benefits to the GAD Office including improved learning management, reduced errors, and streamlined processes.

Additionally, it involves various programming languages that are used in the development and implementation of the system. The following technologies, frameworks, and programming languages were utilized:

Visual Studio Code. Visual Studio Code was initially released by Microsoft in 2015 as a cross-platform, open-source, and lightweight alternative to the Windows- focused Visual Studio IDE. Microsoft released VS Code to cater to a wider audience of researchers familiar with various operating systems, including Windows, macOS, and Linux.

The software tool was chosen due to its fast and lightweight, with a user-friendly interface that makes for an enjoyable development experience. (Corrales, 2023)

PostgreSQL. Advanced, enterprise-class, open-source PostgreSQL relational database supports querying with both relational and non-relational JSON data. With over 20 years of community development behind it, it is an extremely reliable database management system. This thorough and collaborative approach has contributed to its high levels of resilience, integrity, and correctness.

The software tool was chosen for its reliability, strong reputation for stability, data integrity, and consistent performance. It has advanced features that ensure data is consistently available, accurate, and secure, making it an ideal choice for developers and researchers who prioritize dependability and accuracy in their data management systems.

PHP. PHP, which stands for "PHP: Hypertext Preprocessor," is a widely-used open-source scripting language primarily designed for web development. PHP scripts are executed on the server, enabling dynamic content generation and interaction with databases. Its flexibility and ease of integration with various databases and platforms contribute to its popularity in building web applications.

The software tool was a top choice for researchers because PHP allows for the quick development of dynamic web applications. Its simplicity and widespread use make it easy for researchers to deploy and maintain projects efficiently. PHP integrates well with databases like MySQL, which is crucial for managing and processing large datasets.

HTML. HTML, or Hypertext Markup Language is the standard markup language used to create and structure web pages and web applications. It provides a set of elements or tags that define the structure and content of a web document, including text, images, links, forms, and multimedia.

The software tool was a top choice for researchers in creating web contents as it integrates seamlessly with other web development technologies and tools such as CSS (Cascading Style Sheets) for styling and JavaScript for interactivity.

CSS. CSS stands for Cascading Style Sheets, a style sheet language used to describe the presentation of a document written in HTML or XML (including XML dialects such as SVG or XHTML). The ability of CSS to separate the presentation layer from the content layer is a key factor that sets it apart from other tools. These features empower researchers to create visually appealing and responsive web designs, making CSS an essential tool and an excellent choice.

JavaScript. JavaScript is a versatile and widely used programming language primarily used for creating interactive and dynamic web content. Originally developed for client-side scripting in web browsers, JavaScript is now also used in server-side development (Node.js) and for building websites, desktop, and mobile applications.

JavaScript was a preferred option for researchers due to its lightweight and efficient language that can be used to build scalable and high-performance web applications and websites ensuring that JavaScript-based software performs well.
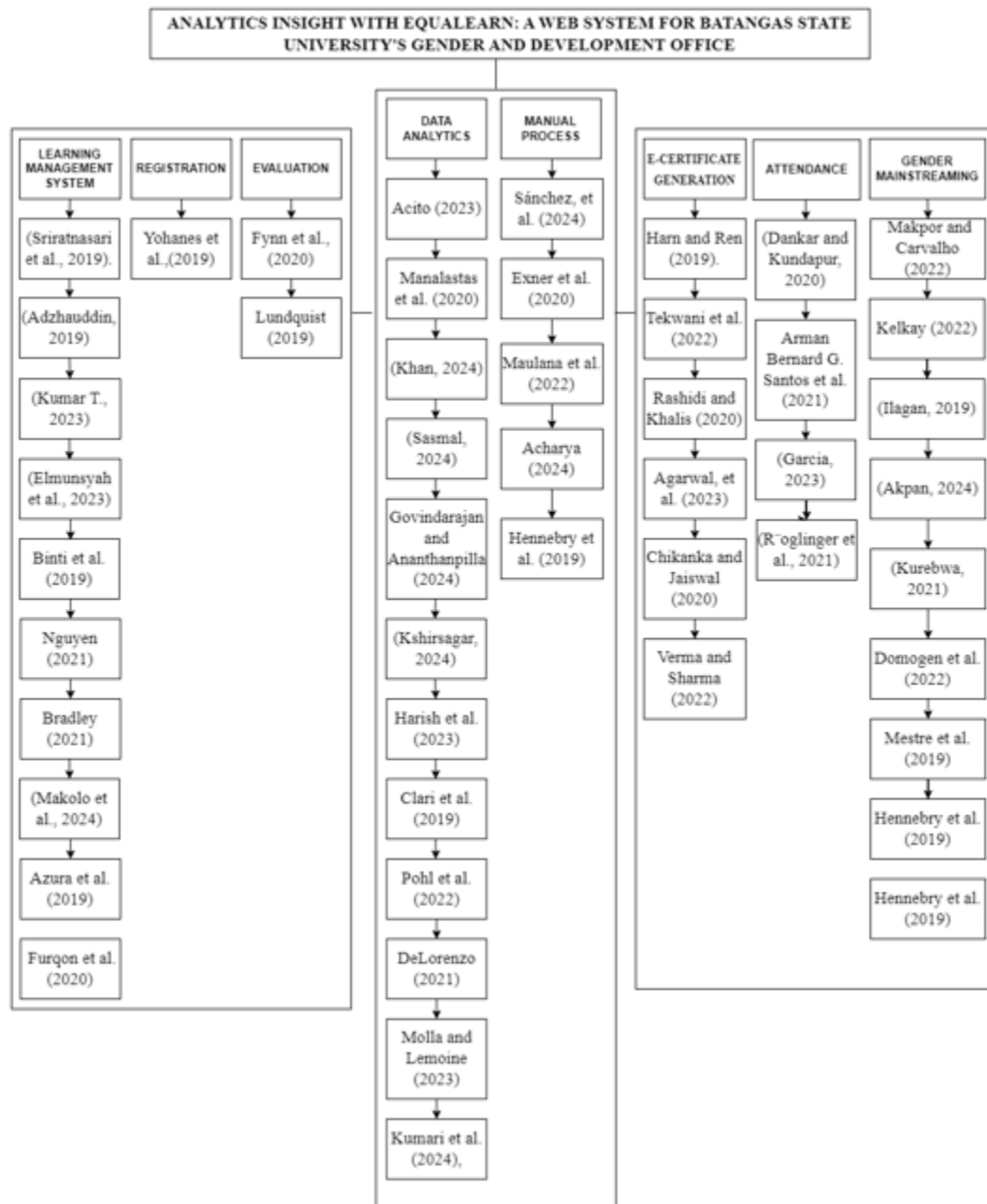
Literature Review Map

Figure 2-1. Literature Review Map

2.2   **Related Studies**

Learning Management Systems.

In advanced, information and communication technology (ICT) in the education sector is opening up new horizons for opening opportunities (access) and improving the quality of education at all levels, paths and types of education. Education by utilizing a face-to-face learning system is still the main model of education. In recent years, the on-line learning (e-learning) model has developed. In the present world of education, the existence of an e-learning system has received appreciation from students because of different learning techniques from the traditional classroom techniques. There are people, curriculum development, LMS, assets, and technology to deliver the substance in e-learning. (Sriratnasari et al., 2019).

The Learning Management System (LMS) has been established in a number of universities worldwide to help connect students and lecturers without the confines of the traditional classroom. It is an environment with digital software which is designed to manage user learning interventions as well as deliver learning content and resources to students. Since the LMS system has already been

implemented and it has also been made compulsory for the lecturers to apply in their daily lectures, it is vital to identify feedback of students as users of LMS, as stated by Adzhauddin (2019).

Systems (LMS) reinforce teachers and students in the learning process. A standard LMS supports an inclusive learning environment for academic progress with interceding structures that promote online collaborative-groupings, professional training, discussions, and communication among other LMS users.

The web-based Learning Management System (LMS) has been implemented to enhance operational efficiency and data management in various educational institutions globally. This digital platform is designed to streamline processes such as participant registration, attendance tracking, and evaluation, thereby reducing manual errors and delays. Similar to findings by Azura et al. (2019), the use of LMS not only improves communication between educators and students but also fosters better data analysis and reporting capabilities.

In the study of Kumar T. (2023), Learning Management Systems (LMS) are revolutionizing the way we impart and absorb information. These platforms, often taken for granted, are powerful agents of change, particularly in the fight for gender equality. By removing barriers, standardizing learning experiences, and offering tailored solutions, LMSs are setting the stage for an egalitarian future.

The Learning Management System is an equal platform for all, unlike traditional classroom settings, which can sometimes perpetuate gender biases, LMS platforms standardize the learning experience for all. With the same interface, resources, and opportunities, every user — regardless of gender —starts on an equal footing where women and gender minorities can express themselves without fear of in-person bias or harassment.

As technology continues to advance and the importance of digital learning grows, there are several emerging trends in the impact of LMS: personalized learning, gamification, mobile learning, social learning, analytics, and data-driven insights. Overall, the emerging trends in LMS design focus on creating a more engaging and personalized learning experience that is accessible, collaborative, and data driven. (Elmunsyah et al., 2023).

According to Furqon et al. (2020), LMS has revolutionized the way learning is conducted by offering an interactive, flexible, and accessible platform for both students and instructors. Their findings revealed that LMS contributes to improved academic performance and positive student perceptions of online learning, primarily due to its ability to provide a centralized location for learning materials, assessments, and communication. However, the study also pointed out that the full

potential of LMS is often underutilized due to limited teacher training and lack of system customization.

The rise of technology has undoubtedly revolutionized education delivery worldwide. In today's interconnected world, the traditional model of formal learning—confined to a single physical location—is increasingly becoming obsolete. Modern learners are often dissatisfied with the conventional stand-and-deliver teaching approach that restricts attendance times, venues, and participation modes. The advent of advanced communication technologies and mobile devices has empowered a new generation of information consumers to seek knowledge independently, without the necessity of gathering in a physical space. Recognizing this shift, software vendors, open-source developers, and educational institutions have adopted systems that facilitate remote course management and enhance student engagement, paving the way for more flexible and inclusive learning environments (Turnbull et al., 2020).

Registration.

According to Yohanes et al.,(2019) the development of increasingly advanced and rapid information technology has now spread in almost all fields such as education, event organizer, business, health, and government. Information technology has enhanced the ability to exchange knowledge and accelerate the

flow of information and communication. The technology plays a very important role to ensure the organization runs more effectively and efficiently, one of which is when an event is held. One series of activities in organizing an event is the registration of participants. Registration is done to collect prospective participant data regarding the event to be held. An organization that organizes an event or event requires a registration process for participants to take part in the event. Therefore, a registration process that is fast, precise, and easy is needed so that the event is held as expected.

Evaluation.

Based on the study of Fynn et al.,(2020) over the past 20 years, there has been a growing appreciation of the importance of evaluation to inform evidence -based interventions to support population-wide changes in physical activity and to justify policy and practice. Evaluation can be defined as the "systematic examination and assessment of the features of an initiative and its effects, in order to produce information that can be used by those who have an interest in its improvement or effectiveness".

Evaluation is a form of inquiry that seeks to address critical questions concerning how well a program, process, product, system, or organization is

working. It is typically under-taken for decision-making purposes and should lead to a use of findings by a variety of stakeholders, as stated by Lundquist (2019).

Attendance.

One of the most common academic processes that institutions/universities follow is that of maintaining student/staff attendance. However, it has been observed that the conventional method of taking students' attendance on registers to confirm their physical presence is still prevalent. This method is time consuming, inefficient and prone to human error. (Dankar and Kundapur, 2020).

In accordance with the study of Arman Bernard G. Santos et al. (2021), With today's fast technical developments, traditional methods of checking, recording and calculating data are becoming more and more obsolete. Improving productivity of the technology is the most important consideration in order to replace manual or traditional operations. With the emergence of computer technologies today, many manually processed operations have been automated by most computer software. The automation of manual processes saves time, energy and resources. Computer technology has also become an aid in teaching. Lots of computer applications nowadays help to facilitate risky transactions in terms of data handling and manipulation. Computers are also used as a tool to automate monotonous classroom practices such as attendance control and monitoring.

Automation. In today's business world, there is a growing trend towards automation. As technology advances, businesses are finding new ways to automate their processes to save time, money and improve efficiency. It has the power to revolutionize industries and transform the way we work, enabling organizations to achieve higher levels of productivity and innovation. (Garcia, 2023).

Manual Process.

The impact of developing technologies in information systems project management is examined by Sánchez, et al. (2024). The administration of projects is changing because of process automation. These technologies enable organizations to analyze vast data sets, ensure data security, visualize project outcomes through virtual testing, and automate repetitive tasks, leading to reduced project time and costs. Integrating these emerging technologies can significantly improve project efficiency and profitability that is in line with the project's goals, which include using these technologies to create a data-driven online system. By doing so, it illustrates how new technologies could build a system that is more effective and efficient.

As stated by Exner et al. (2020) The failure management process was considered in terms of its interaction with the operational activities in an assembly line. The process for production-related failure management is sufficiently

described in the literature, but so far only a few approaches exist that analyze the interactions between production and quality processes in a dynamic model. The research highlights the importance of considering these processes together for optimizing failure management, which aligns with our capstone project's aim to automate and improve PAP management. Even though our project focuses on an online system for administrative tasks, both the mentioned study and our project show that improving manual processes can make things run smoother overall. Study

Maulana et al. (2022) investigated how Business Process Management (BPM) improved root cause identification within a monitoring system. Their research highlights the effectiveness of BPM in analyzing and enhancing manual processes, leading to a more efficient system. This aligns with the project's goal of automating PAP management. Although the project focuses on developing an administrative web-based system, the value of a well designed, centralized approach for improved functionality.

E-Certificate Generation.

The Generalized Digital Certificate (GDC) is a unique approach for user authentication and key formation that was developed by Harn and Ren (2019). GDC uses user public information that has been digitally signed by a

reliable authority as a means of authentication, as opposed to typical public-key certificates that depend on public key verification. By doing away with the requirement for intricate public-key management, the following could make the process of generating e- certificates for BatStateU's Gender and Development Office easier to handle within your web system.

Data Analytics.

Based on Acito (2023), data Analytics is a multidisciplinary field that uses statistical analysis, computational techniques, and data visualization tools to extract valuable information from raw data, aiding in decision-making, problem-solving, and predictions." It outlines a three-tiered analytics classification system that fits the demands of the GAD office: descriptive, and prescriptive. This is consistent with the project's objectives, which include developing a web -based system for the Gender and Development office at BatStateU that would improve operational effectiveness, offer data-driven insights, and facilitate the creation of e- certificates. With analytics, the capstone project can convert manual procedures into a comprehensive, automated system that will improve decision-making and streamline operations.

A training program was carried out by Manalastas et al. (2020) to enhance the data analysis abilities of Gender and Development (GAD) focal persons. Their

results demonstrated the value of these programs by demonstrating how training improved knowledge and proficiency in software-assisted data analysis. This is in line with your project, "Analytic Insights with EqualLearn," which seeks to give a data-driven web system and maybe give them access to data analytic tools.

The transformational potential of data analytics for efficient decision -making is emphasized by Khan (2024). The study emphasizes the use of data analysis to reduce risks, enhance situational awareness, and obtain insights. This is in line with the project which seeks to provide a data-driven web system. The system can enable the office to make data-driven decisions for their efforts by offering data analysis capabilities.

A study by Sasmal (2024) investigates the convergence of data engineering with artificial intelligence (AI). The study demonstrates the effectiveness of AI methods for data analysis tasks, such as machine learning and natural language processing.

This aligns with the project, which offers data analysis features. While the project has a specific application for data analysis, it reflects the broader trend of using AI to enhance analytics capabilities.

Govindarajan and Ananthanpilla (2024) emphasize the significance of data analytics for decisions made on products in general. They employ similar ideas

within a particular setting. By utilizing data analytics to guide their work and maybe provide e-certificates, this project seeks to create a data-driven web system. This fits in with the larger trend of leveraging data to enhance customer experiences and make smarter decisions.

Kshirsagar (2024) emphasizes the potential of big data analytics for organizations to gain valuable insights and improve decision-making. This aligns with the goals of the project, a data-driven web system designed for the Gender and Development Office. By collecting and analyzing data on program participation, evaluation results, and impact, this can provide the office with crucial information to assess the effectiveness of their initiatives and optimize future programming for gender mainstreaming at BatStateU.

The function of data analytics in enhancing productivity and efficiency across a range of decision domains is emphasized by Harish et al. (2023) as they underscore the significance of data analytics in operation management. They categorize data analytics techniques into three groups: data visualization, statistical analysis, and artificial intelligence/machine learning. They also identify four phases of operational characteristics. By data gathering, analysis through visualizations, and maybe machine learning, this organized approach is in line

with the concept and can help the organization at BatStateU make informed decisions.

Clari et al. (2019) highlight the underutilized potential of learning management system (LMS) data for optimizing platform usage. Their research proposes a methodology for analyzing LMS data to identify areas for improvement and inform decision-making within a specific institutional context. This aligns with your project's development of a data-driven web system. By analyzing PAP management data, this can provide valuable insights to improve program effectiveness and decision-making processes.

According to DeLorenzo (2021), the integration of data analytics into Learning Management Systems (LMS) has significantly transformed educational practices by providing actionable insights into student performance and engagement. The study emphasizes that educational institutions can enhance their teaching strategies by leveraging data analytics to monitor student progress, thereby empowering learners to make informed decisions regarding their educational journeys. This finding aligns with the need for Batangas State University's Gender and Development Office to automate and optimize its Programs, Activities, and Projects (PAPs) management, enabling a more data-driven approach to assess and improve gender mainstreaming initiatives.

Molla and Lemoine (2023) highlight the importance of utilizing data analytics to promote gender mainstreaming in development programs. Their research illustrates how data-driven methodologies enhance the monitoring and evaluation processes of gender-focused initiatives, allowing for more equitable and inclusive outcomes. The authors argue that analytics not only aids in measuring program effectiveness but also identifies areas for improvement, which is crucial for the GAD Office at Batangas State University as it seeks to streamline operations and enhance its initiatives' impact on gender equality and inclusivity.

Gender Mainstreaming.

According to Makpor and Carvalho (2022) Gender mainstreaming is an approach, strategy, and/or a method of achieving the goal of gender equality. It explores the need for a gender approach in digital government research, challenges its adoption and outlines the opportunities of integrating gender in research of digital governance for the goal of achieving gender equality.

As stated by Kelkay (2022), most participants of the study who are currently working in study offices are clear with the concepts of gender and gender mainstreaming, but they did not have clear understanding on the point that promoting gender equality. Besides, the study offices did not fully employ different tools and techniques for gender mainstreaming practice. The finding also

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showed that the participants of the study offices have less access to training and retraining opportunities of gender and gender mainstreaming. Lack of commitment and attention on the part of decision-making bodies, lack of continuous access to gender awareness and sensitivity training were identified as the major challenges. The study may assess current gender mainstreaming practices and identify opportunities and challenges in mainstreaming gender issues in selected government offices.

Ilagan (2019) examined a government higher education institution in the Philippines and discovered that while academics and administrators were generally aware of gender mainstreaming programs, administrators were more knowledgeable. The study also showed that gender mainstreaming was applied least in research and most in instruction. This indicates the need for better gender mainstreaming throughout a higher education institution, as well as for focused efforts and maybe data-driven web systems such as Equality Learning.

The significance of gender mainstreaming in attaining gender equality and national development was studied by Akpan (2024). He brought attention to the fact that, although making up almost half of the population, women are underrepresented in politics. According to their research, gender mainstreaming—a tactic used to include gender issues into policymaking—can be

a vital instrument for advancing gender equality and, eventually, sustainable development. The purpose of your study is to empower the GAD office through data-driven decision- making, and this research may help advance efforts toward gender equality more broadly.

Gender mainstreaming is the ongoing application of a gender viewpoint throughout the creation and implementation of policies, programs, and initiatives, according to Kurebwa (2021). This strategy makes sure gender equality is considered at every stage of the decision-making process, rather than just adding to women's concerns. Gender mainstreaming reveals the distinct demands and challenges faced by men and women by examining their everyday lives. This helps to ensure that laws and practices are not predicated on prejudice or preconceptions. This idea is in line with the capstone project's objective of offering data-driven insights to enhance their decision-making and PAP management procedures.

According to Mestre et al. (2019), resistance to gender mainstreaming in the higher education curriculum is a prevalent issue driven by deeply ingrained institutional and cultural factors. The study highlights how this resistance often manifests through a lack of commitment from leadership, insufficient resources, and reluctance to challenge traditional gender norms within educational structures.

Hennebry et al. (2019) emphasize that comprehensive data systems are essential for the successful integration of gender mainstreaming policies, particularly for marginalized groups. This supports your project's aim to provide a centralized platform that facilitates better data management and reporting for the GAD office, improving both efficiency and program evaluation.The project fills these critical gaps by providing a web-based system that automates inefficient manual processes, integrates data analytics, and ensures real-time reporting elements that are vital for successful gender mainstreaming.

According to Theobald et al. (2020), one of the critical barriers in gender mainstreaming within health policy is the absence of robust systems for monitoring and evaluation. These tools are necessary for effective policy implementation, but are often overlooked, leading to shallow integration of gender equality principles. The project addresses this by digitizing and automating processes, enabling more efficient data collection, analysis, and reporting—all crucial for tracking the impact of GAD initiatives.

Related System

Learning Management System.

As per the study of Binti et al. (2019), the evolution of the Learning Management Systems or LMS has made teaching and learning a lot more

practical, exciting and innovative in higher education. The LMS provides the means and ways for universities to manage and administer courses. It is mainly a type of application which allows students to obtain materials from lectures, discussions, assessments and as a medium of virtual interaction between instructors and other students. Learning is blended and complemented by this tool as instructors can mend or add on to knowledge given using other means besides what is already given in the classroom. Hence learning and teaching takes on a different level which is virtual and online.

Similarly, Nguyen (2021) stated that the Learning management system (LMS) software application or website is designed to deliver courses, acquire knowledge and control learning. In 1924, Sidney Pressey invented the first 'teaching machine'; it looked like a typewriter with a window that could administer questions. There were two windows, one was used to show the questions and the other was covered by the answers. In the digital era, LMS has become the dominant platform for learning administration at university including schooling announcement, lecture deliveries, exam revision, report submission, online assignment and courses registration.

Based on the study of Bradley (2021), Learning Management Systems (LMS) also provides teachers and students with an online classroom that

reinforces learning processes. In   online classroom environments, Learning Management.

The features of LMS include instructional features; they are used in course development, creation of announcements of the course. The content management features enable instructors to upload learning materials such as files, slides, PDFs, audio files, and videos. User management features involve importing and exporting user accounts in LMS. In addition to that it creates and manages user accounts and profiles and other user's data. Interactive features enable communication between teacher and students. Students and teachers should have an ability to post questions and receive answers from group members. (Makolo et al., 2024)

Attendance.

Automation is prevalent in other process management lifecycle phases (e.g., in process execution), process (re-)design commonly requires manual activities such as traditional creativity techniques, making it time-consuming and labor-intensive. Thus, automated process (re-)design holds high yet unexploited potential for long- term corporate success since it could accelerate process (re-) design and make it more efficient as well as less dependent on human creativity, (R¨oglinger et al., 2021).

Manual Process.

As stated by Acharya (2024), the use of manual procedure record systems might result in redundant data, inconsistent results, and time-consuming data collecting. the automated, centralized method that minimizes error-proneness and simplifies the administration of student data by providing a single, easily accessible interface. By giving the GAD a central center to handle event registration, e-certificates, attendance, and assessment tracking, the project aligns with centralized information management. The system's ultimate goals are to achieve the benefits mentioned above by streamlining operations, reducing redundancy, and improving decision- making through automation and data-driven analytics.

Hennebry et al. (2019) emphasize the need for automated and centralized data management systems to support effective gender mainstreaming. Their work highlights how manual processes hinder the ability to scale programs and track meaningful metrics for gender equity initiatives, especially for marginalized communities like migrant women workers.

E-Certificate Generation.

Tekwani et al. (2022) The process of generating the certificates is not a specific system and various committees and student organizations have their own

ways of producing and distributing these certificates. Also, there is not a system which would make sure if the certificate is genuine and verify the student's skills. Because it is possible to create such certificates at low cost and the process to verify them is complex, as they need to be verified manually. These problems can be dealt with with the help of a unique platform which would help the organizations to generate the certificates online and distribute them to the students. Generation System also helps a user to verify if the certificates belong to the students or the organization. It verifies a candidate's claim for a certificate acquired from an institution. The verification system is helpful in easy and fast certificate authentication to help educational institutions and other organizations to combat forgery and report falsely claimed certificates, with minimal requirement of human interaction.

Rashidi and Khalis (2020) proposed a web-based system for automated certificate generation, highlighting the benefits of a centralized online platform for educational institutions. Their findings support the inclusion of an e-certificate feature in the project. Following on aligns with the goal of streamlining processes for GAD offices, potentially including the issuance of e-certificates for program participants.

Agarwal, et al. (2023) used Python to create a software platform that generates and sends certificates automatically in large quantities. The platform comes in especially handy when organizing large groups of people for lectures, workshops, or other events. Their work demonstrates how automation may streamline the process of creating and distributing certificates, which is in line with the e-certificate generation component of your project.

According to Chikanka and Jaiswal (2020), the system is not only designed and developed to save paper but also to organize the distribution in an effective way to minimize aberration and speed up the process 100 times it usually takes with a simple and user-friendly design interface. This research work enables an end-user to choose their desired certificate template and template format without any prerequisite knowledge just by clicking a few buttons and typing from the system GUI. This system verifies the participants' information from the access database and generates the certificates of all the participants in a portable document format.

As cited by Verma and Sharma (2022), the majority of organizations deal with the challenge of creating unique certificates for various occasions and requirements, which can occasionally be more difficult to create on demand. The system available can insert the name of the candidate into the pre-designed

certificate. Project aims to solve the issue by providing several choices for the institute to generate certificates as per their needs. The built-in material for different kinds of certificates, which include certificates of participation, certificates of appreciation, certificates of attendance, etc., eases the institute's overhead for designing multiple certificates. The certificates will be mailed to the respective candidates, providing feedback on every mail sent by the system. It involves very little human effort and is reliable due to the feature of automatic mailing and keeping a backup of original certificates.

Data Analytics.

According to Pohl et al. (2022), data analytics is crucial for obtaining business insights that can lead to improvements in performance. Businesses use data analytics to improve key performance indicators like market share, profit, and sales. Determining if the current data pool is adequate for generating significant conclusions and choosing the right analytical techniques present problems for the projects. Event registration, e-certificate generation, and assessment tracking are just a few of the data analysis features of the system that can offer insights to eliminate inefficiencies and promote improved decision-making. Through the implementation of a comparable performance evaluation methodology for data analytics, this project aims to illustrate the concrete advantages of a data-driven

strategy in enhancing operational effectiveness and accomplishing strategic objectives.

According to Kumari et al. (2024), data analytics has transformed various fields by optimizing decision-making and improving organizational processes through the extraction of insights from vast datasets. It emphasizes the use of data analytics for enhancing efficiency and providing data-driven recommendations, which is crucial for businesses and organizations aiming to optimize their operations.

Gender Mainstreaming.

Domogen et al. (2022) investigated the integration of Gender and Development (GAD) perspectives in modular instruction materials, highlighting a gap between faculty awareness and implementation. The finding aligns with the potential role of the project for Gender and Development Office. By providing a centralized platform for resource sharing and potentially offering guidance on integrating GAD principles, this could support faculty in effectively mainstreaming gender equality within their programs.

2.3   **Synthesis**

One of the critical aspects of Learning Management Systems (LMS) is its ability to create an inclusive learning environment, as discussed by Bradley (2021). LMS has become a cornerstone in modern education, revolutionizing the way educators and audience interact with learning resources and each other. It gives people the ability to manage virtual learnings where seminars, training, activities, and cooperative learning are conducted online. The way education is provided and experienced has changed significantly as a result of the shift to a digital world. As a result of new developments in technology and developing trends, learning management systems (LMS) have the ability to further improve educational results and experiences for both educators and audiences.

Many advantages come with using technology and automation for tasks like evaluation, attendance, and registration, such as better data management, decreased errors, and higher efficiency. These adjustments not only improve operational efficiency but also support a creative and adaptable organizational management strategy. As technology expands, automation is expected to further change traditional operations, providing possibilities to increase productivity and revolutionary improvements across a range of industries.

In line with the digitization of learning materials and learning initiatives such as seminars and training, the issuance of the certificate of participation also emerged to boost efficiency. In the study of Rashidi and Khalis (2020), they proposed a web-based system for automated certificate generation, highlighting the benefits of a centralized platform for educational institutions. This centralized approach streamlines the process, allowing for efficient certificate production and distribution with minimal human intervention. The system's automation capabilities reduce the risk of errors and ensure consistent quality in certificate generation. The process of generating and distributing e-certificates has been streamlined and the risk of falsification has been minimized through automation, and different authentication techniques. By reducing the need for paper records and enabling digital record-keeping, these innovations not only increase operational effectiveness but also promote sustainability.

2.4   **Conceptual Framework**
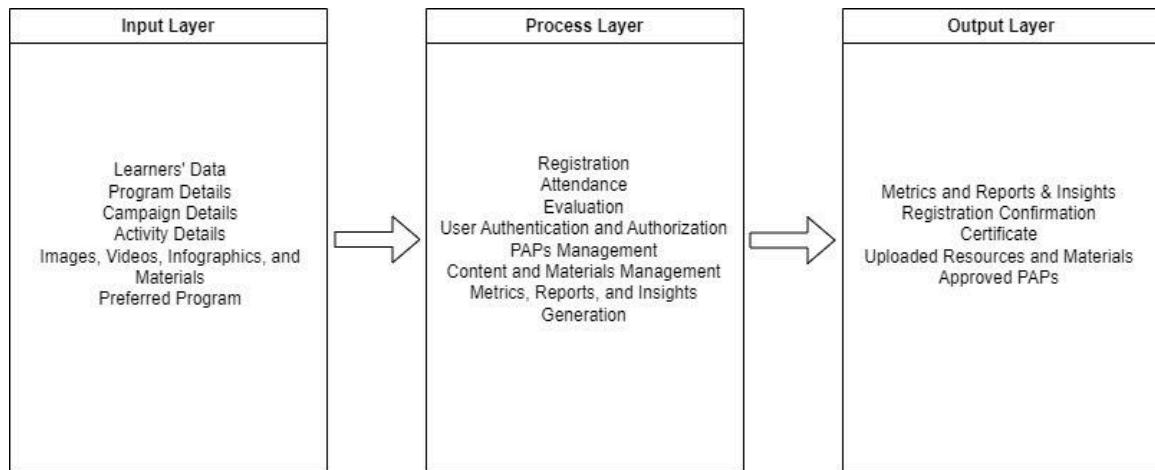
Figure 2-2. Conceptual Framework

Figure 2-1 shows the conceptual framework of the system, explaining how it manages information across three main phases: input, process, and output.

In the input phase, the system collects important information, such as learners' data, program details, campaign details, and activity information. It also gathers content like images, videos, infographics, and materials, along with participants' preferred programs. This information ensures that the system can provide relevant and engaging content for users.

In the process phase, the system carries out key tasks to manage operations. These tasks include registration, tracking attendance, and evaluations. It makes sure that user authentication and authorization are in place to verify if users are eligible to access the system. The system also takes care of managing PAPs, as well as the

content and materials, to keep everything running smoothly. Additionally, it analyzes data and produces reports and insights. To ensure high-quality results, the data is cleaned and checked during this phase before being saved securely in the system's database.

The output phase provides valuable results from the processes. These include registration confirmations, certificates of participation, approved PAPs, and uploaded resources and materials for learners to access. The system also creates detailed reports with important metrics and visual insights, helping admins and stakeholders make better decisions. Through these outputs, the system enhances learning experiences and supports effective program management and decision-making

3   DESIGN AND METHODOLOGY

The chapter provides the concepts and methods utilized to design and develop the web-based system for the learning management functionalities.

3.1   Data Collection

The data collection process is critical in ensuring the reliability and validity of the system outputs. For this project, both primary and secondary data sources will be used to gather relevant information.

3.1.1   Primary Data Sources

Primary data refers to firsthand information collected directly from users and stakeholders. The following methods will be employed:

- **Interviews**: GAD Focal Point System Members (GFPS) and learners, will be interviewed to understand attendance management challenges and specific requirements for the Learning Management System.

- **Survey Questionnaires**: A survey will be distributed to GAD Focal Point System Members and learners to gather their perspectives on functionality, reliability, usability, and maintainability, and possible issues with the current attendance practices.

• **System Testing Data**: During the prototype testing phase, usage logs and feedback will be collected from selected participants interacting with the LMS. This data will assess system performance, focusing on accuracy, response time, and reliability in attendance tracking and program management functionalities. The testing will help determine if the LMS efficiently handles core tasks, such as tracking participation and assessments.

3.1.2   Secondary Data Sources

• **School Policies and Records**: Official GAD Office policies related to attendance, program management, and assessment standards will be reviewed. This ensures that the LMS aligns with institutional guidelines and supports GAD initiatives effectively.

 • **Technical Documentation**: Technical references, such as database requirements for MySQL and documentation on best practices for secure data handling, will guide the LMS's technical development. This helps the system accommodate the necessary data volumes and ensures robust functionality.

3.1.3   Sampling Technique and Size

To make sure the sample is statistically significant and fairly represents the population, the right sample size must be chosen. Slovin's formula, a popular technique for determining the smallest sample size needed to represent a population within a specified margin of error, was employed by the researchers to accomplish this.

Figure 3-14. Slovin's Formula

Within a specified margin of error, the smallest sample size needed to adequately represent a population can be found using Slovin's formula. Its simplicity makes the formula especially helpful. In order to ensure that the sample was statistically significant and adequately reflected the population, 200 responders was the sample size needed to represent 400 people with a 0.05 margin of error.

3.2 Data Analysis

The survey results were analyzed to evaluate user feedback and system performance. Researchers used quantitative methods with descriptive statistics to summarize and interpret the data, aiding in decision-making for system improvements and user satisfaction. Statistical measures, including mean, frequencies, and weighted mean, were calculated using Microsoft Excel for data analysis. The weighted mean from survey responses provided a general view of respondents' agreement with various statements about the system. A higher weighted mean indicated greater satisfaction or agreement among users, while a lower mean suggested dissatisfaction or disagreement. This analysis effectively identified areas for improvement and captured user perceptions.

To calculate the **Weighted Mean** of survey responses, the formula is as follows:

$$\text{Weighted Mean} = \frac{\sum (f \times x)}{\sum f}$$

Figure 3.15 Weighted Mean Formula

Where:

f = Frequency of each rating (e.g., number of respondents who chose "Strongly Agree" or "Agree

")

x = Score for each rating (e.g., 5 for "Strongly Agree," 4 for "Agree," and so on)

$\Sigma(f \cdot x)$ = Sum of the products of each frequency and corresponding score

Σf: Total number of responses

Using the weighted mean allows us to capture the distribution of responses across different ratings (from 1 to 5) for each criterion (e.g., Functional Suitability, Reliability, etc.). This metric offers an average rating while accounting for how many respondents chose each rating level, giving a more accurate reflection of user satisfaction and the overall perception of the portal's quality attributes.

This approach is beneficial for the survey because it reflects both the strength and the consistency of user feedback, aligning with the goals of assessing each quality characteristic comprehensively.

Collected data will be analyzed to determine patterns, assess user feedback, and evaluate the LMS's overall effectiveness and performance, aligning with the project's objectives.

3.2.1   Quantitative Analysis

Quantitative data from surveys and attendance logs will be analyzed using descriptive statistics, such as percentages, means, and standard deviations. The following tools will be utilized:

- **Microsoft Excel**: Excel will be used for organizing, cleaning, and initially analyzing survey data.
- **SPSS**: This statistical software will support the computation of advanced metrics, enabling a detailed analysis of trends related to attendance, program participation, and system usability.

For example, survey results will provide insights into user satisfaction before and after the system's deployment, while attendance logs will allow for comparisons of attendance rates, highlighting the LMS's impact on attendance monitoring.

3.2.2   System Performance Analysis

The data collected during system testing will be used to evaluate the following metrics:

- **Attendance Tracking Accuracy**: Comparison between recorded attendance in the LMS and manually reported attendance records to verify the accuracy and reliability of the automated attendance tracking system.

- **Program and Activity Registration Consistency**: Measurement of accuracy in user registration for GAD Projects, Activities, and Programs (PAPs). This includes metrics on registration data consistency, confirming that all user registrations are accurately logged and processed without duplication or omission.

- **System Response Time**: Average time taken by the system to process and confirm attendance or registration entries, as well as learner interactions with program content. This metric helps assess the efficiency and responsiveness of the LMS.

- **Error Rate**: Frequency of errors such as duplicate entries, missed attendance logs, or failed registration attempts to evaluate the reliability and robustness of the system. This will highlight any areas that may require adjustments to ensure consistent performance.

3.3   Project Concepts

The main goal of the project is to improve the processes of BatStateU's Gender and Development Office particularly in PAPs implementations and

learning management by automating most of their manually performed tasks, and by enhancing their data analytics capabilities. The output of the project aims to serve as a centralized system for offered programs, advocacy campaigns, learning materials, certificates, assessments, registration, evaluation, and attendance handling. For analytics, there will be a set of comprehensive data visualizations of impact ranking of Gender and Development Project, Activities, and Programs as well as the evaluation results. Valuable insights, recommendations, and reports that will enable data-driven decision-making will also be produced.

The project underwent an iterative development cycle that enabled the researchers and the stakeholders to constantly collaborate and engage to make the most out of the project. It results in early detection of issues and continuous improvements which greatly helped the project to meet its goals.

3.4   **Development Model**

The researchers utilized the Agile Methodology in developing the system since it's more adaptable to changes in a project and it enables collaborative workforce between researchers and clients along with constant communication. Also, this cooperative approach improves the efficiency of the development process since it helps to find and fix the problems as early as possible.
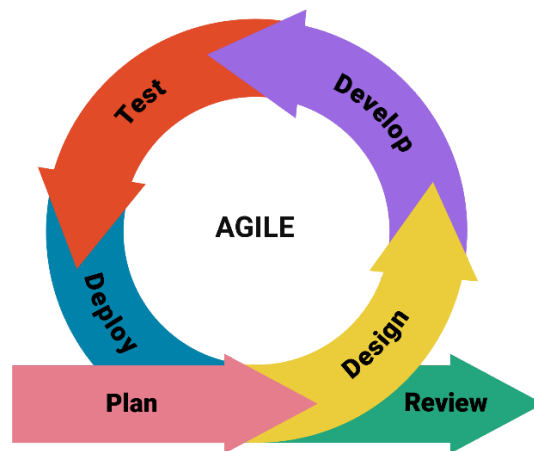
Figure 3-1. Agile Methodology

The Agile Methodology which was utilized contains different phases such as Planning which includes defining project scope, identifying requirements, and estimation of project timeline. It's to be followed by a design phase that involves designing the project's architecture, database, and interface while also assuring that it aligns with project requirements.

Next to that is the Development, wherein the plans, identified requirements and designs are turned into action and actual features through functional codes. With the iterative and collaborative approach of Agile Methodology, the project

adapts to feedback and changes as the development progresses.

After the Development Phase, testing takes place. During the aforementioned phase, the codes are tested to ensure that they work as planned and that they're free from any error or anomaly. The constant testing in Agile throughout the development process enables early detection of problems as well as the delivery of quality output.

For the Deployment Phase, the developed software is being released to the end users through a hosting provider. Aside from ensuring that the system is successfully deployed and functional, the project team must also provide training to the end-users on how they can effectively use it.

To complete, a review must be conducted to ensure that the deployed output aligned with the requirements. This is the phase where the stakeholders will give their feedback and concerns for potential further improvements.

3.5   Requirements Analysis

The BatStateU's Gender and Development Office implements the manual processes in managing Projects, Activities, and Programs and uses Facebook as their only digital platform. Not everyone can attend the office's face to face

initiatives, and most of their learning materials are not accessible. Therefore, many people who want to join and gain knowledge on Gender and Development initiatives must wait until the office conducts them again. Although there is an available social media platform, they still find it difficult to provide comprehensive information and materials to people.

The management of assessments, registration, attendance, and evaluation were done through pen-and-paper, and google forms, tallying of collected data was manually conducted for analysis and reports, as well as the verification of attendance and evaluation records for the one-by-one issuance of e-certificates. These processes are prone to delays and errors which cause inconvenience to the office as they also perform different tasks. It requires plenty of time and energy to manually analyze the attendee demographics, evaluation results, and impact ranking of projects, activities, and programs in order to come up with conclusions and insights that will be used in understanding trends and patterns, making decisions and in identifying which activities or initiatives are to be offered next.

Fishbone Analysis

The fishbone diagram is utilized to identify and visualize the possible causes of a problem and reveal the areas of weaknesses of a process to help boost problem-solving. The researchers utilized the simple type of fishbone diagram

since it's the most used among other types, it can be used in different industries and functions, and it also allows the use of any categories.
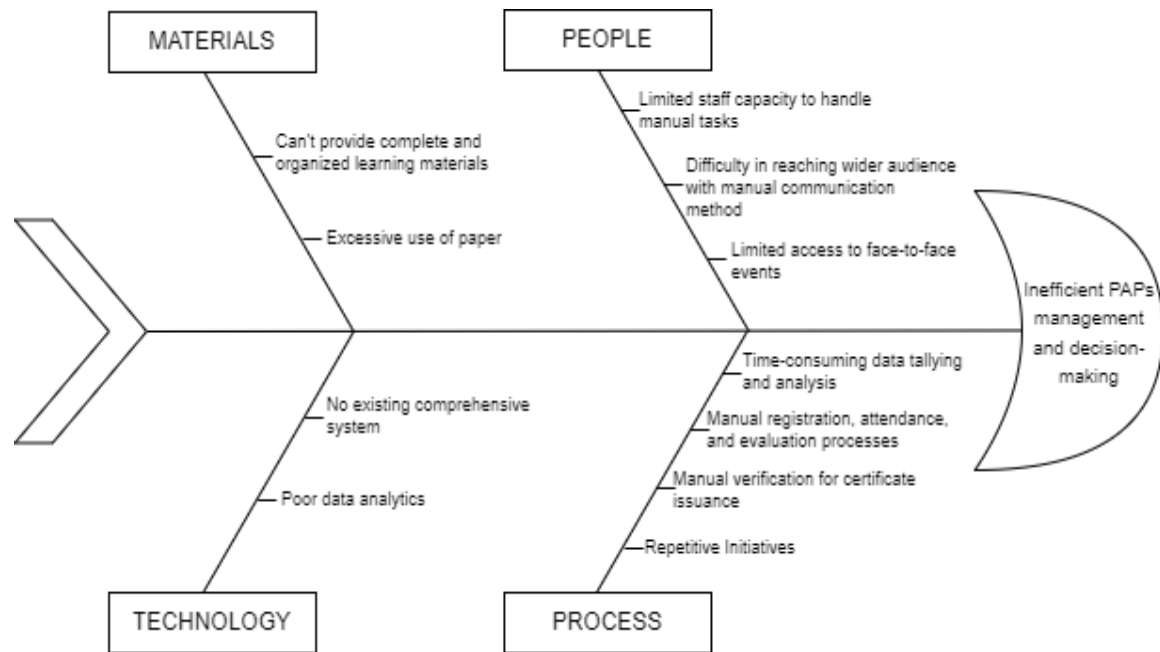
Figure 3-2. Fishbone Diagram

Figure 3-2 displays a simple fishbone that illustrates the main problem of the client, which is the inefficient PAPs management and decision-making, along with the categories of its causes such as people, materials, processes, and technology.

System Boundary

57

The system is a web-based PAP and learning management platform that was developed to streamline processes, manage data, enhance analytics, and generate reports.
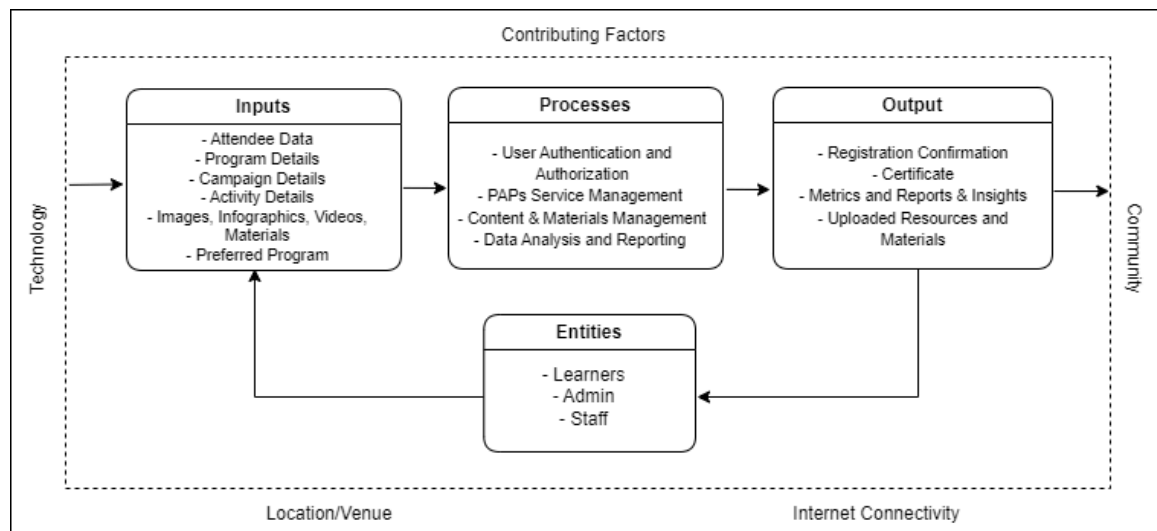
Figure 3-3. System Boundary

Figure 3-3 illustrates the system boundary that separates the internal and external factors to understand the scope and boundaries of the system. The system contains an input, process, and output that are important to monitor the data and transactions conducted through it. The web system provides features for learners, staff, and administrators. Learners such as students, employees, teaching and non-teaching personnel, women from partnered communities, and parents have the ability to view announcements or explore and join any GAD PAPs offerings , access learning materials or resources, and download certificates of participation.

Administrators which are in the form of GAD Head and Executive Committee have the ability to handle PAPs proposal and management, and retrieve data. Administrators from the GFPS-Technical Working Group have the ability to oversee the whole system, approve PAPs proposals, manage user accounts, as well as utilize data analytics and reports created.

a. System Design

At this phase, the system design had been defined where diagrams were produced in order to show the processes and information of the system and provide a deeper understanding of how it works. The diagrams include data flow diagram, use case diagram, and sequence diagram.

Data Flow Diagram

This section provides a comprehensive view of the system by illustrating its processes, depicts the information, and data flows that are transferred between different components of the system.

Figure 3-4. Context Diagram

Figure 3-4 illustrates how different external entities such as heads, attendees, and administrators interact with the system. Attendees in the form of

students, employees, teaching and non-teaching personnel, women from partnered communities, and parents are able to create their own accounts, explore and join any PAPs services, and input their data and feedback. Heads are the ones who are responsible for adding PAPs proposals, announcements, and targets in the system. Administrators oversee the whole system, managing announcements, certificate issuance, user accounts, as well as the PAPs approval and application. In return, Attendees can also acquire registration confirmation, and certificate of participation aside from the knowledge that they get from the offered services. The heads get the approved proposals while the Administrators are able to have the metrics, analytics visualizations, reports, and even insights.
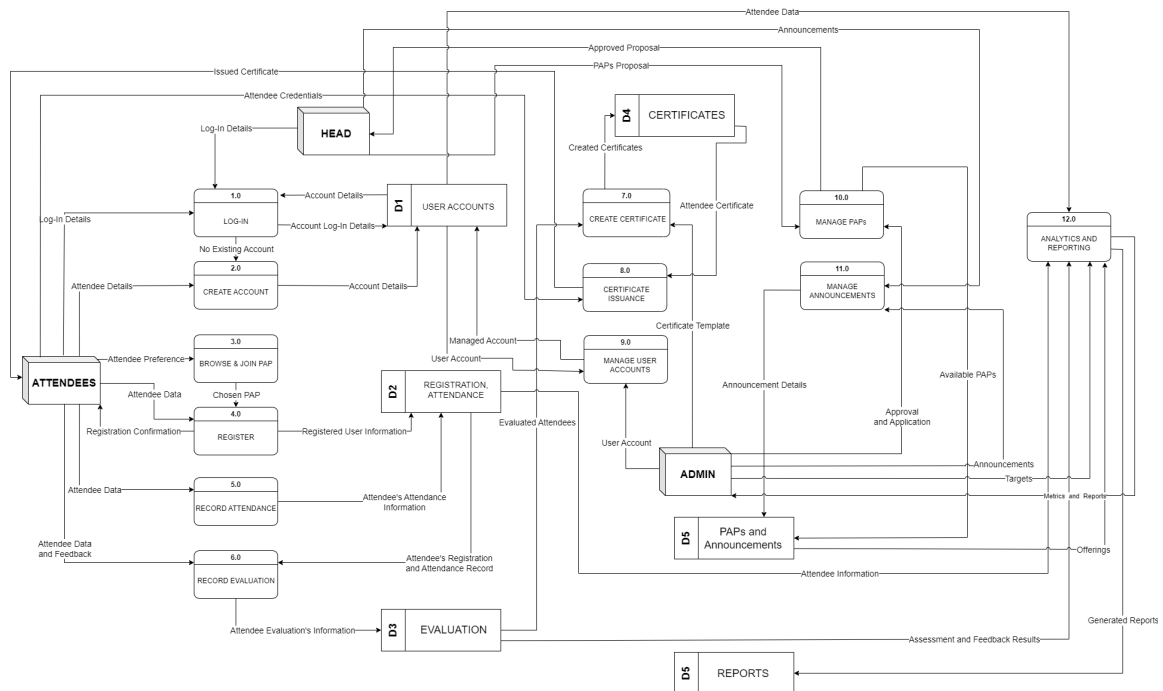
Figure 3-5. Level 0 Diagram

Figure 3-5 provides the more comprehensive flow of the system by dissecting it into specific processes. The major processes, and data flows are further specified and illustrated here while including the data stores for each process. The diagram showed the data flows in the system for the attendees, heads and administrators along with the twelve specific processes. The figure elaborated the data flow diagram for a more specific understanding of the ongoing processes available for the users of the developed system.

Use Case Diagram

The general context or partial development of the system was covered in this section. The functions and interactions within the system were shown and demonstrated using the use case diagram as well as the necessary actors, use cases, and relationships for the system's operation.
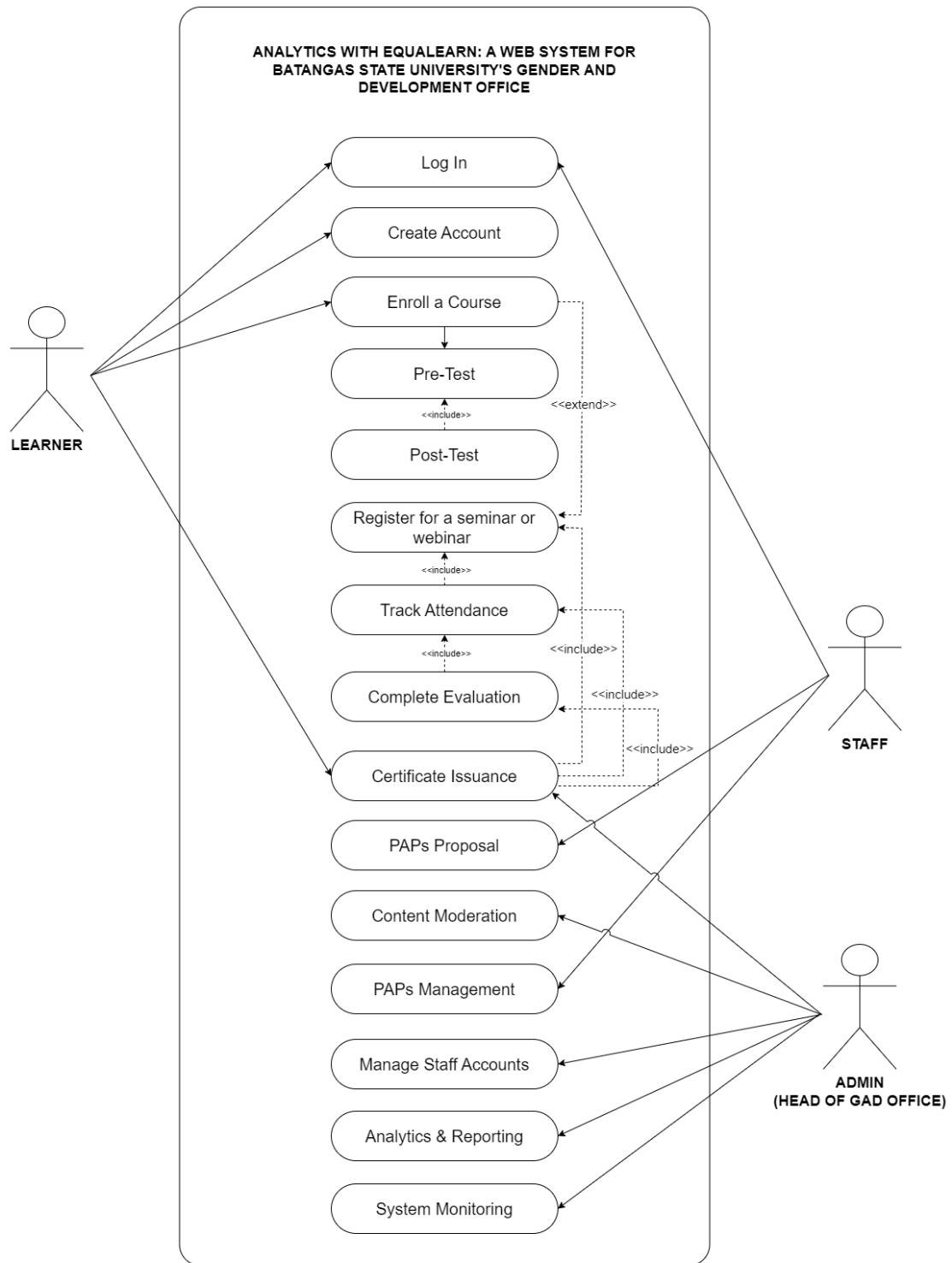
Figure 3-6. Use Case Diagram

Learner. Students, employees, teaching and non-teaching personnel, women from partnered communities, and parents can log in to the web system and those who don't have an account yet must create one first. Once logged in, learners can already fully navigate the system and access the advocacy campaigns, as well as the programs to enroll in any available courses to answer assessments, access learning resources, and join a seminar or webinar, then comply with registration, attendance, and evaluation. The learners can also download their own certificate of participation.

Staff. The staff can log in to the system using the account given by the administrator to be able to propose and manage PAPs.

Administrator. This person has the most comprehensive view and access to the web system. He/she can configure the system, handle certificate issuance, moderate PAPs content, manage staff accounts, monitor the system, analyze data, and generate comprehensive reports..

Sequence Diagram

The sequence diagram shows how information is shared between the database, system, learner, staff, and administrator during the PAPs implementations and learning management procedures. The web system allows

interaction between different entities and components by acting as an administrative central point.
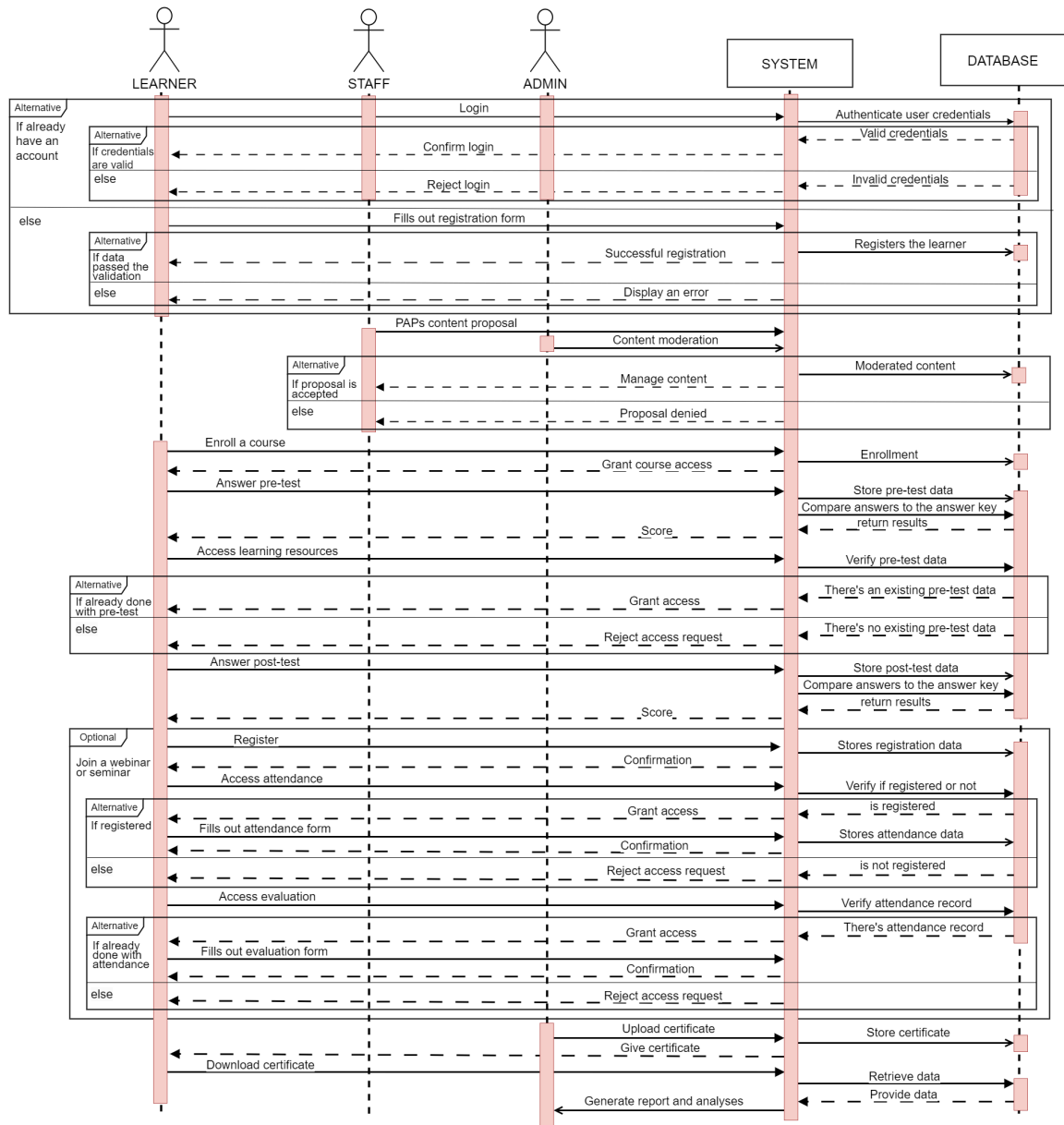
Figure 3-7. Sequence Diagram

As shown in Figure 3-7, the process starts as the learner, staff, or admin logs in to their accounts that will then be authenticated by the system with the database. If the account is valid, the system will grant them access to the system but if not, the login attempt will be rejected. Only the learner will be allowed to register or create an account if he/she doesn't have one yet.

The Staff is the one who proposes PAPs contents in the system to be moderated by the administrator, if the proposal is approved, the proposed contents will finally reflect to the learner interface and be managed by the staff but if the proposal is denied, content won't reflect to the user end.

The learner will be able to browse any offerings, enroll in any available courses then answer pretest to access learning materials and be able to answer post-test. It is optional to join webinars or seminars wherein they will be needing to comply with the registration, attendance, as well as evaluation. Attendance can't be accessed unless registration is completed and evaluation can't be accessed unless registration and attendance are completed.

Lastly, the Administrator will be responsible for certificate issuance as well as in analyses and report generation.

i.   Software Requirements Specifications

This section includes the system's functional and non-functional requirements. Serving as a foundational support to ensure the consistency of the project objectives.

1. *Functional Requirements*

This section contains the functions and features that have been put in place to meet the identified needs. By providing a detailed look at how the system operates and accomplishes its goals, users and stakeholders gain a clear understanding of its capabilities.

1.) Learners

1.1.   It will consist of students, employees, teaching and non-teaching personnel, women from partnered communities, parents, and any other interested people from inside and outside BatStateU.

1.2.   Required to create accounts and log in to the system before they can join other initiatives.

1.3.   Can enroll in a course to answer assessments and access learning materials.

1.4.   Must comply with registration, attendance, and evaluation if

interested in attending a seminar or webinar.

1.5.   Can download their e-certificate once required parameters are met.

2.) Staffs

2.1. Must use the account given by the administrator to log in.

2.2. Can upload PAPs content proposal.

2.3. Responsible for managing PAPs implementations or offerings.

3.) Administrators

3.1.   Responsible for proposals or content moderation.

3.2.   Manages user accounts.

3.3.   Can access the data, reports, and analyses.

3.4.   Responsible for system monitoring

2. Non-Functional Requirements

This section provides a detailed overview of the non-functional aspects of the system, outlining how the system operates in terms of the key factors involved.

1. **Usability**

   a. For the benefit of administrative staff, and learners, the online portal will have an easy-to-use interface with clear design features, simple navigation, and a user-friendly layout.

   b. The system shall allow learners to be given access to the system, as well as the staff and administrators with their administrative functions.

2. **Security**

   a. To prevent cyberattacks, illegal access, and breaches of private and sensitive data, robust security measures must be implemented.

   b. The system shall enforce encryption standards and access controls to ensure data integrity during all interactions and restrict access to data records.

3. **Scalability**

   a. To meet new requirements for learning management and technical advances, scalability should be considered when designing the web system to accommodate increasing user loads and data volumes and to facilitate the inclusion of more features and functionalities.

4. **Reliability**

   a. There must be a backup plan in place for the system to be safe

against data loss and ensure that operations continue in the case of hardware failure or unexpected downtime.

b. The system shall limit downtime and maintain continuous access to PAP services, stored data, and other features.

5. Performance

a. The system shall provide the necessary results while enabling an adequate response and processing time on the internet.

ii.   Hardware and Software Requirements

This section shows the hardware and software requirements needed to be able to use or access the system.

Table 3-1. Software Requirements for mobile phones or tablets

Software	Specification
Operating System	Android 4.4 or iOS 12 or higher
Web Browser	Google Chrome, Opera, Safari, Microsoft Edge

Table 3-1 shows the software requirements needed to be able to use or access the system. For mobile phone or tablet, it includes the operating systems like Android 4.4, iOS 12 or higher and web browsers like Google Chrome, Opera, Safari, and Microsoft Edge.

Table 3-2. Software Requirements for PC or laptop

Software	Specification
Operating System	Windows 7 or macOS 10.15 or higher
Web Browser	Google Chrome, Safari, Opera, Mozilla FireFox, Bing, Microsoft Edge

Table 3-2 shows the software requirements needed to be able to use or access the system. For PC or laptop, it includes the operating systems like Windows 7 or macOS 10.15 or higher and web browsers like Google Chrome, Safari, Opera, Mozilla FireFox, Bing, and Microsoft Edge.

Table 3-3. Hardware Requirements for mobile phones or tablets

Hardware	Minimum Requirement
RAM	2 GB or higher
ROM	Minimal
Wi-Fi	1-2 Mbps or higher

Table 3-4. Hardware Requirements for PC or laptop

Hardware	Minimum Requirement
CPU	1.6 GHz Dual-Core Processor or higher
Hard Drive Space	Minimal
Wi-Fi	1-2 mbps or higher

Table 3-2 shows the hardware minimum requirements needed to be able to use or access the system. For mobile phone or tablet, it requires a minimum of 2GB RAM or higher, minimal storage space, and 1-2 mbps or higher internet speed. While for PC or laptop, it requires a minimum of 1.6 GHz CPU, minimal hard drive space, and a 1-2 mbps or higher internet speed.

iii.   Database Design

Database design is the methodical arrangement and control of data in a database system to enhance administration, retrieval, and storage. Creating tables, building the database structure, and putting the relationships between them in place. These tables are essential to this procedure, as are the limitations and other processes put in place to control data retrieval and storage. Figure 3-8 shows the Entity Relationship Diagram for the developed system.
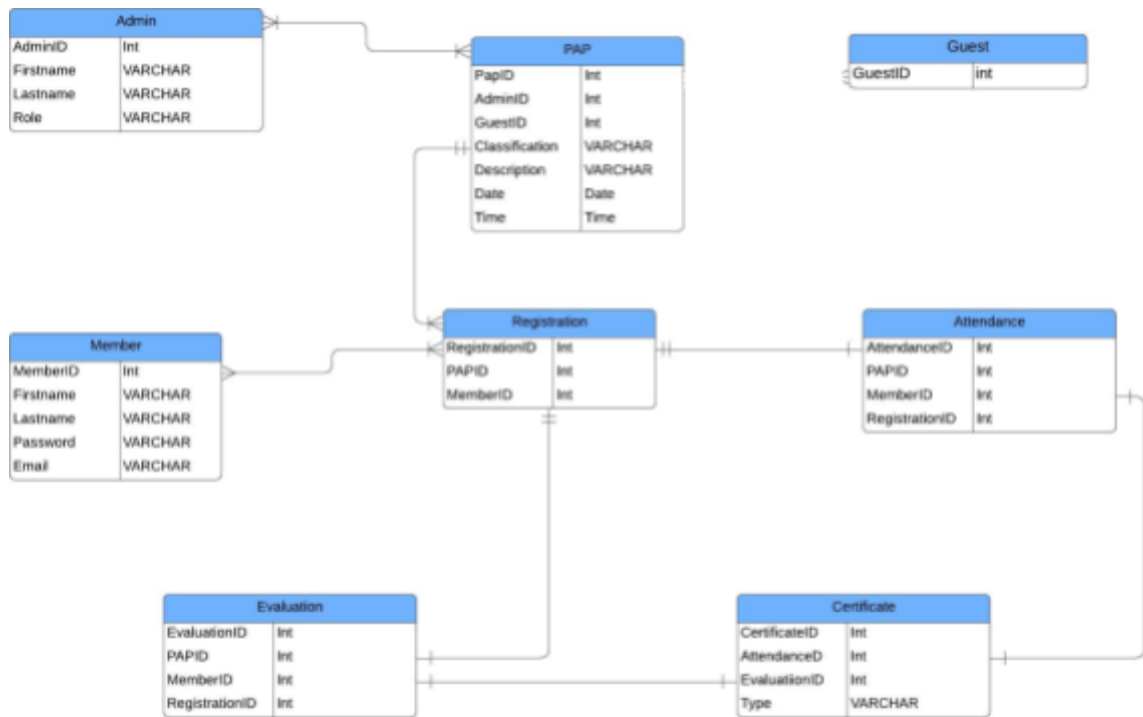
Figure 3-8. Entity Relationship Diagram

The relationships between the various components of the developed web system are shown in Figure 3-8. The entities that will make use of the system are shown in the figure together with the attributes that are associated with them; these attributes are what the system requires to function properly. Using both primary and foreign keys, the system further displays the relationships or connections between each entity. This design serves as an illustration to help visualize the components and the database structure of the system.

iv.   Trade-off and Multiple Attributes (STATUS: MODIFIED)

Trade-Off

The researchers carefully considered how to better manage resources for enhanced performance and satisfy competitive objectives using trade-off analysis. Table 3-5. shows two possible design variants together with their matching technology stacks.

Table 3-5. Multiple Technology Stacks

Design	Technology Stack
Design A	HTML, CSS, JavaScript, PHP, MariaDB, XAMPP
Design B	HTML, CSS, JavaScript, PHP, SQLite, MAMP

Design A, which utilizes PHP, JavaScript, MariaDB, XAMPP, HTML, and CSS, is an ideal choice for developing the Gender and Development (GAD) Learning Management System (LMS) due to its technical advantages and feature alignment with the system's requirements.

Firstly, HTML provides the foundation for the system's user interface, ensuring a clean, well-organized, and accessible layout for various learners, including students, employees, teaching and non-teaching personnel, parents, women from partnered communities, and more. CSS provides responsive, user-friendly designs across devices like desktops, tablets, and mobile phones, ensuring that LMS is

accessible which enhances learner experience.

JavaScript which is involved in the development of the pre- and post-assessments adds interactivity, allowing learners to respond to questions while handling a real-time validation of user input. On the backend, PHP handles important functionalities like learner registration, attendance, evaluation, pre- and post-assessment submissions, authentication, and many more, that seamlessly connect the front-end interface with the MariaDB database. MariaDB provides advanced database management capabilities, essential for securely handling large amounts of learner data, tracking evaluations, and managing personalized learning paths. This allows admin and staff to efficiently manage and upload materials and contents, and the modification of Programs, Activities, and Projects (PAPs).

XAMPP simplifies both the development and deployment processes by providing a flexible, cross-platform environment. It allows the system to be developed locally and then transitioned smoothly to production, minimizing downtime and ensuring scalability for future enhancements and features. This combination of technologies ensures that the GAD LMS is scalable, secure, and interactive, meeting the needs of admins, staff, and learners.

Compared to Design B, which includes SQLite as its database, Design C offers a more scalable solution for managing multiple concurrent learners, handling large

amounts of data like PAP registrations, evaluations, and e-certificates, and generating detailed reports on the effectiveness of GAD initiatives. SQLite, being lightweight, would be less suited for the data-intensive needs of this LMS.

In conclusion, Design A is better suited for the GAD LMS because it aligns with the long-term goals of creating a scalable, secure, and interactive platform. It ensures efficient data management, easy content modification for staff, and a comprehensive view of learner progress, meeting the needs of both the admin and the learners within the system.

Multiple Attributes

This section involves considering and evaluating various criteria or dimensions relevant to the problem or situation at hand. These attributes provide a comprehensive framework for analysis and decision-making.

Table 3-6. Server-Side Scripting Languages

Design Constraints	PHP	JavaScript	Java
Performance	8	9	8
Reliability	8	8	8
Security	8	8	9
Dependability	8	8	8

Design Constraints	PHP	JavaScript	Java
Performance	8	9	8
Reliability	8	8	8
Usability	9	9	7
Availability	9	9	9

After a thorough assessment, PHP and JavaScript excel in specific scenarios compared to Java. PHP's performance is optimized for web server scripting, making it well-suited for generating dynamic web pages. JavaScript, with its modern engines like V8, has become highly performant, especially for web browser applications and server-side development with Node.js. Additionally, PHP and JavaScript are often praised for their usability, particularly for web development tasks. PHP's simplicity and integration with web servers like Apache make it easy to get started with server-side scripting. JavaScript's lightweight syntax and versatility in both client and server environments contribute to its usability. Java, on the other hand, is for mobile applications which may have a steeper learning curve due to its strict object-oriented nature.

Table 3-7. Databases

Design Constraints	MySQL	SQLite	PostgreSQL
Performance	9	7	9
Reliability	9	7	9
Security	9	8	9
Dependability	9	9	8
Usability	9	8	9
Availability	9	7	8

After a thorough assessment, MySQL reigns supreme for websites due to its well-rounded strengths. It is known for being user-friendly, making development faster. It prioritizes performance and reliability that is crucial for a website that should always be up and running. Although SQLite is portable and PostgreSQL is powerful, MySQL hits the sweet spot between ease of use, performance, and usability, perfectly suited for the needs of most websites.

Table 3-8. Testing Tools

Design Constraints	XAMPP	MAMP	WAMP
Performance	8	8	8
Reliability	9	8	8
Security	8	8	8

Dependability	8	8	7
Usability	9	8	8
Availability	9	7	7

After a thorough assessment, all three (XAMPP, MAMP, WAMP) are popular options for local web development, however, XAMPP holds some advantages for user-friendliness and usability as it offers a single package containing Apache, MySQL, PHP, and Perl, simplifying installation and configuration. Its cross-platform nature (Windows, macOS, Linux) makes it a versatile choice for different operating systems. While MAMP and WAMP might cater to specific user bases (Mac and Windows respectively), XAMPP's broader usability opens it up to a wider range of users, making it a popular choice for setting up a local development environment for a website.

b. Development

This portion includes the most important phase as it is where the conceptual framework of Analytic Insights with EquaLearn: A Web System for BatStateU's Gender and Development Office turns to life.

i.   Software Development Tools (STATUS: MODIFIED)

This section outlines the various tools and technologies employed in the development of the Gender and Development Learning Management System (GAD LMS), detailing their specific roles in the project.

Web Platform

The GAD LMS is built on a comprehensive web platform using HTML, CSS, JavaScript, PHP, MariaDB, and XAMPP.

- **HTML** was used to create the foundational structure of the web pages, ensuring an organized layout that is accessible to a wide range of users, including students, staff, and community members.
- **CSS** played a vital role in enhancing the user interface, implementing responsive design elements that adjust seamlessly across various devices such as desktops, tablets, and smartphones, thus ensuring an optimal learning experience.
- **JavaScript** was integrated to facilitate interactivity and dynamic content. This included real-time validation for assessments, interactive buttons, and

feedback mechanisms, all of which significantly enhance user engagement and responsiveness within the system.

- **PHP** served as the server-side scripting language, handling essential functions such as learner registration, program management, pre- and post-assessments, content updates, and facilitating communication between the front-end and the database.

- The choice of **MariaDB** as the database management system was driven by its scalability and ability to effectively manage learner data. It adeptly handles large volumes of information, including user credentials, assessment results, and tracking learner progress. Moreover, it supports the organization of Programs, Activities, and Projects (PAPs), enabling administrators and staff to manage educational content efficiently and monitor learner outcomes.

- **XAMPP** provided a flexible local development environment, allowing developers to test the application easily during the development phase. This setup facilitated smoother development cycles, quicker bug fixes, and simplified integration between PHP and MariaDB, streamlining the overall development process.

Integrated Development Environment

The development team opted for **Visual Studio Code** as their Integrated Development Environment (IDE). This choice was influenced by its lightweight nature and powerful editing capabilities, which enabled efficient workflow on both high-end and low-end machines. Visual Studio Code launches quickly and utilizes minimal system resources, making it an ideal choice. Additionally, it offers a variety of extensions and tools that optimize workflows, from debugging to version control, contributing to the team's productivity.

Databases

For data storage and management within the GAD LMS, **MariaDB** was selected as the database system. Known for its reliability and scalability, MariaDB efficiently handles extensive datasets, addressing the system's need to store significant amounts of learner data, track their progress, and manage complex relationships, such as program registrations and e-certificates. The database capabilities also extend to report generation, providing valuable insights into the effectiveness of GAD initiatives, thus assisting administrators in informed decision-making and content planning.

Subscription

Web Hosting is a much-needed service as it provides the foundation for deploying and making websites accessible on the internet. Subscription fees for

web hosting services help cover the costs associated with maintaining, supporting, securing, and scaling hosting infrastructure to provide users with reliable and feature-rich hosting solutions. Without web hosting, the website would not be accessible to anyone outside the local network.

Table 3-9. Subscription Fee

Software as a Service (SaaS)	Description	Estimated Cost
Hostinger	The hosting provider will make the website be accessible, functional, and secure on the internet	₱ 1, 308.00 per year

The table above outlined the subscription fee for the web hosting of the web system for GAD Office of Batangas State University. Hostinger's services will be utilized for reliable and easily accessible web hosting.

ii.   Hardware Development Tools

This section provides a detailed overview of the tangible tools and how these are utilized in the development of the system.

Table 3-10. Hardware Development Tools

Software as a Service (SaaS)	Description
Hard Drive	128 GB and above
Random Access Memory (RAM)	8 GIGABYTES
Processor	Quad-core (Intel i5)
Internet Connectivity	25 mbps

Overall, the specifications provided above suggest a computing system optimized for general-purpose use for researchers, including productivity tasks, multimedia consumption, and internet speed. The combination of a sizable hard drive, ample RAM, mid-range processor, and decent internet connectivity ensures a smooth and responsive computing experience for the researchers.

c. Testing and Evaluation

The testing and evaluation phase typically involves conducting comprehensive tests and assessments to validate the functionality, reliability, usability, and maintainability of the project's deliverables. Drawing from ISO/IEC 25010: 2011 standards, this phase is crucial for researchers in ensuring that the project meets its objectiv+es and requirements before finalizing its implementation. Below are the critical aspects:

Functional Suitability. Ensuring that the features and functionalities perform as intended and meet the specified requirements of the web system for GAD Office.

Performance Efficiency. Assessing the speed, responsiveness, scalability, and resource utilization of the system under various conditions and workloads.

Usability. Evaluating the ease of use, intuitiveness, and user-friendliness of the system's interface and interaction design.

Reliability. Ensuring that system's ability to consistently and predictably over time, without unexpected failures or disruptions.

Compatibility. Ensuring that the system is compatible with different platforms, devices, browsers, operating systems, and environments.

Security. Evaluating the project's ability to protect sensitive data, prevent unauthorized access, and mitigate security risks and vulnerabilities.

Portability. Ensures the system can be easily installed and used on different devices and platforms. It checks that users can access the system seamlessly from their preferred devices.

Maintainability. Evaluating how easy it is to update and improve the system over time. It ensures the system is built in a way that makes fixing issues or adding new features straightforward.

d. Deployment

System deployment is the stage where the finished system is rolled out for active use. It is when end users can start interacting with it and making the most out of its features. During deployment, the system is installed, configured, and fine- tuned to ensure it works smoothly in the real-world environment.

i. Sustainability and Maintenance Plan

To ensure the long-term success and impact of the project, a comprehensive Sustainability and Maintenance Plan has been established. The plan outlines the key strategies for deployment, training, turnover, and ongoing maintenance plan, guaranteeing the project's continued functionality and positive contribution for years to come. A comprehensive schedule that outlines the tools, staff, and particular actions needed for a successful implementation. System integration and hardware setup will be included. A comprehensive training program will be developed to equip stakeholders with the necessary knowledge and skills to operate and maintain the project effectively. The following strategy may make use

of a variety of techniques including workshops, online tutorials, user manuals, and it will be customized to different user groups operators. Additionally, a clear transition plan will be established, outlining the roles and responsibilities of different parties involved in the project's long-term management after its deployment. The plan will include a schedule for preventive maintenance activities, such as regular inspections and software updates. Additionally, the plan will address corrective maintenance procedures for troubleshooting and repairing any malfunctions that may arise. By implementing the aforementioned plan, we can ensure the system achieves its full potential and delivers lasting benefits well into the future.

Maintenance Plan

ii. Risk Management Plan

To ensure the successful development and deployment of our system, a proactive risk management strategy is crucial. The following will enable us to identify, evaluate, and mitigate any potential challenges that may arise throughout the creation and implementation process. Some of the key risks we will be focusing on include:

Network Disruptions. Requires dependable internet service to have smooth use of the system.

Human Errors. Mistakes or inaccuracies made by individuals while creating and implementing the system could affect the creation and implementation of the system for GAD.

System Downtime. A period when a computer system or network is unavailable or not functioning correctly. It could affect the learning management system as it interrupts access to other learning resources.

Data Security Breaches. The learning management system collects and stores sensitive data from both internal and external users. However, when unauthorized individuals access confidential information, it can result in identity theft, fraud, or other malicious activities.

Table 3-11. Risk Assessment Matrix

		SEVERITY			
		ACCEPTABLE (1)	TOLERABLE (2)	UNDESIRABLE (3)	INTOLERABLE (4)
P R O B A B	IMPROBABLE (1)	Low	Medium	Medium	High
	POSSIBLE (2)	Low	Medium	High	Extreme

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I L I T Y	PROBABLE (3)	Medium	High	High	Extreme

Table 3-11, Risk Assessment Matrix will serve as a preliminary assessment of the potential risks involved in deploying the LMS. The table categorizes risks by likelihood (improbable, possible, probable) and severity (acceptable, tolerable, undesirable, intolerable) with their corresponding descriptive terms (low, medium, high) that will be used within the assessment matrix to indicate the severity and probability of a particular risk.

Table 3-12. Risk Management Plan

Risk	P	S	RE	Mitigation
Network Disruptions	3	3	4	Implement redundant network connections and have backup procedures for data transfer in case of outages. Utilize network monitoring tools to identify and troubleshoot issues promptly.
Human Errors	4	4	5	First, equip researchers with the knowledge needed through a comprehensive training program.

				Second, establish clear and consistent guidelines with standardized operating procedures.
System Downtime	4	4	4	Preventative measures like strong defenses and backups aim to stop outages from happening in the first place. Detection systems keep watch for trouble brewing, allowing for quick action. Finally, a disaster recovery plan ensures a smooth response to get things back up and running fast.
Data Security Breaches	3	4	4	Includes measures like access controls and strong defenses such as passwords and encryption, following with constant monitoring to reduce the likelihood of breaches.

A Risk Management Plan is a proactive approach to identifying, analyzing, and mitigating potential problems that could threaten the project's success. This will serve as a roadmap for anticipating challenges and developing strategies to deal with them effectively.

e. Proposed Graphical User Interface

The Proposed Graphical User Interface (GUI) section will serve as a roadmap to crafting an intuitive and user-friendly website. This section will translate the project's functionalities into a visual language that users can interact with.

User UI

Figure 3-9. User Home Page

Home Page will include the relevant announcements of events from GAD Office.
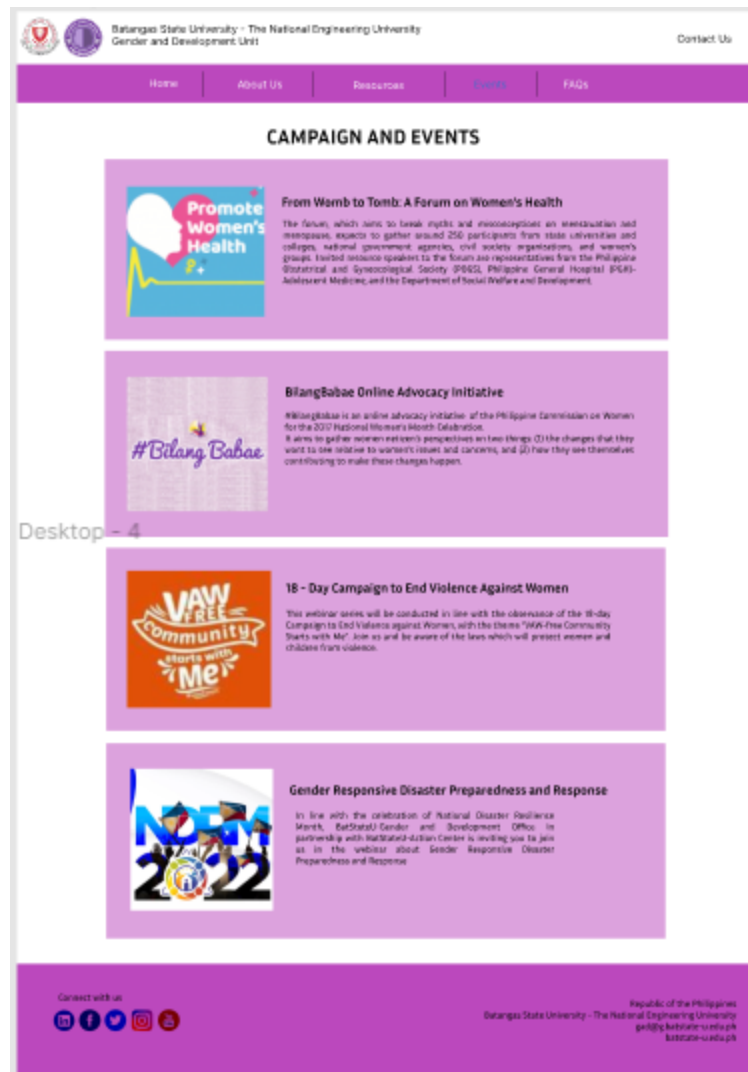
Figure 3-10. Event Browsing

Internal and external users can view the past and future events of GAD Office through browsing allowing users to easily find, explore, and empower them to discover and pre-register to the event that aligns with their interest.

Figure 3-11. Campaign Description

Once clicked the desired event, information will be shown afterwards such as its description, where and when the event will be held, and its link for pre-registration. This section will showcase the campaign description to raise awareness for a particular cause which gives users broader context for the event's purpose and its connection to a larger goal.

Figure 3-12. User Event Registration Form

Users can easily register for events through a user-friendly online form. The form collects essential attendee information like name, age, gender, address, contact details, email address and user classification.
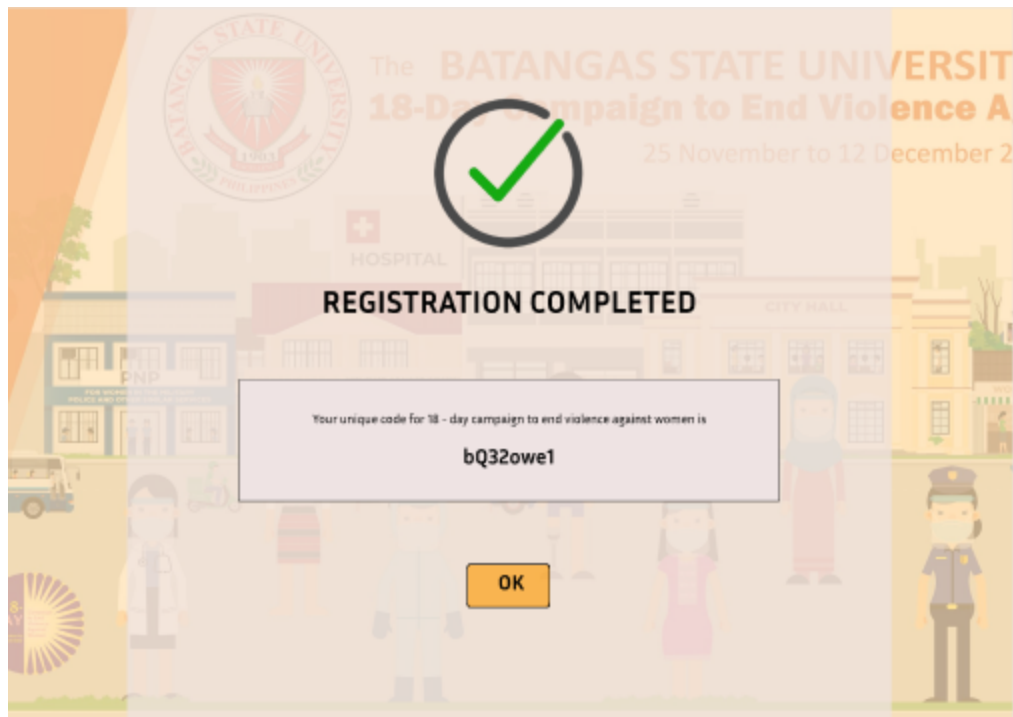
Figure 3-13. Registration Completed Prompt

There will be a unique code that the user has registered to ensure only one submission is recorded for that specific code to avoid duplication of entries.

Figure 3-14. User Event Evaluation

The event evaluation will be used to understand how well the event went, what aspects were successful, and where there's room for improvement in future events. The form typically asks attendees questions about the event contents, speakers, the quality and technical aspects, and the overall experience.

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Figure 3-15. Evaluation Completed Prompt

The evaluation for has been submitted and sent to the designated recipient(s) and is saved within the system.

Figure 3-16. User Attendance Form
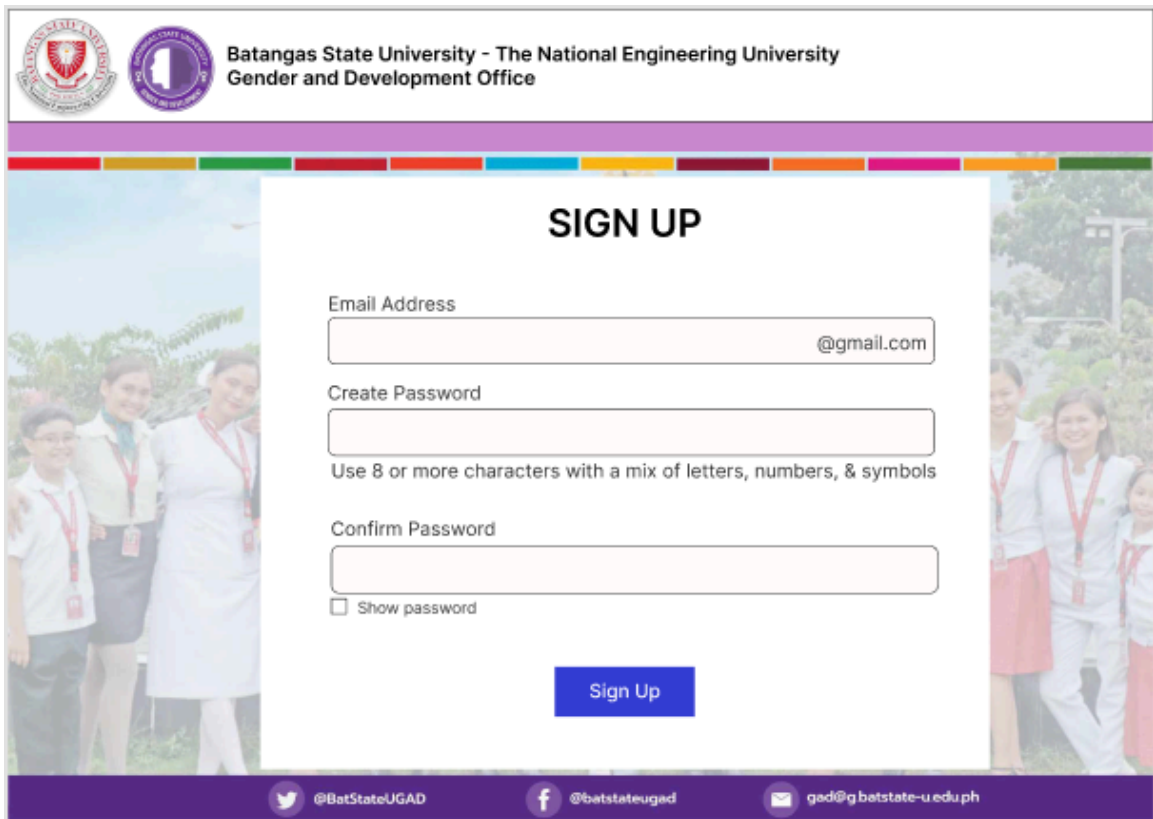
The attendance form will only require minimal information of the user together with their corresponding unique code from the event they have registered.

Admin UI

Figure 3-17. Admin Login

To log in to the admin area, administrators typically need to provide the username as a unique identifier for the administrator account and a password that is used to verify the identity of the administrator. There will be a sign up button allowing admins to create an account before accessing the admin homepage.

Figure 3-18. Sign Up

Allows admins in creating a new account that allows you to access certain features or functionalities.
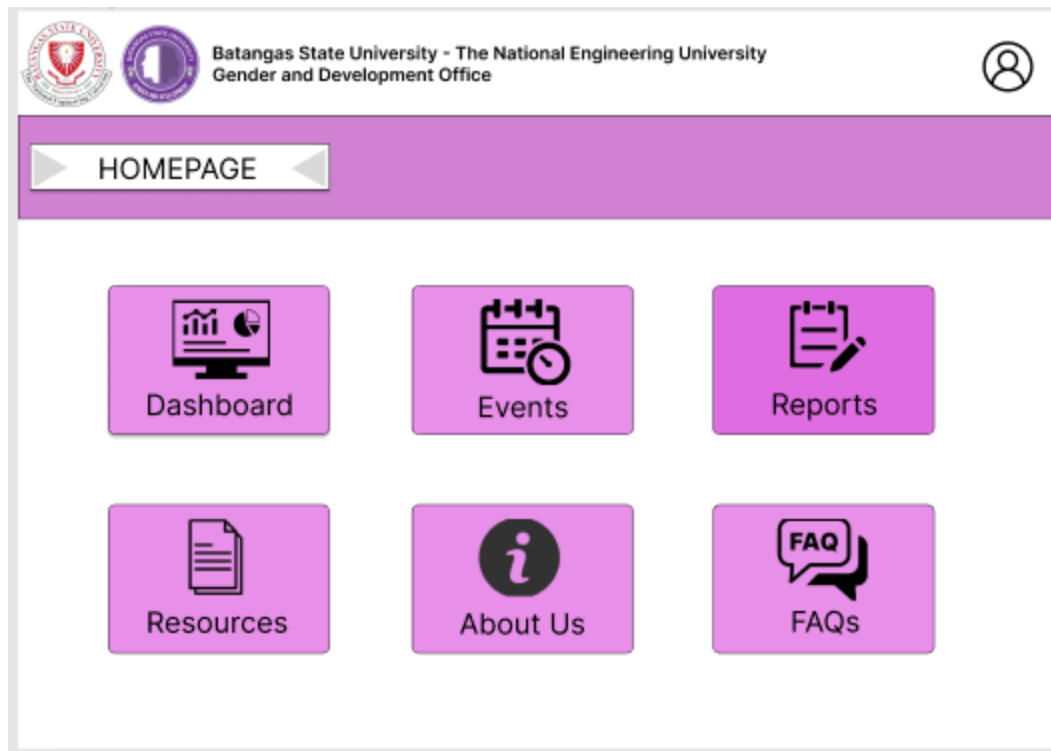
Figure 3-18. Admin Home Page

Serve as the main landing page administrators see after successfully logging in to the admin area of the system to effectively manage and maintain the systems under their control.
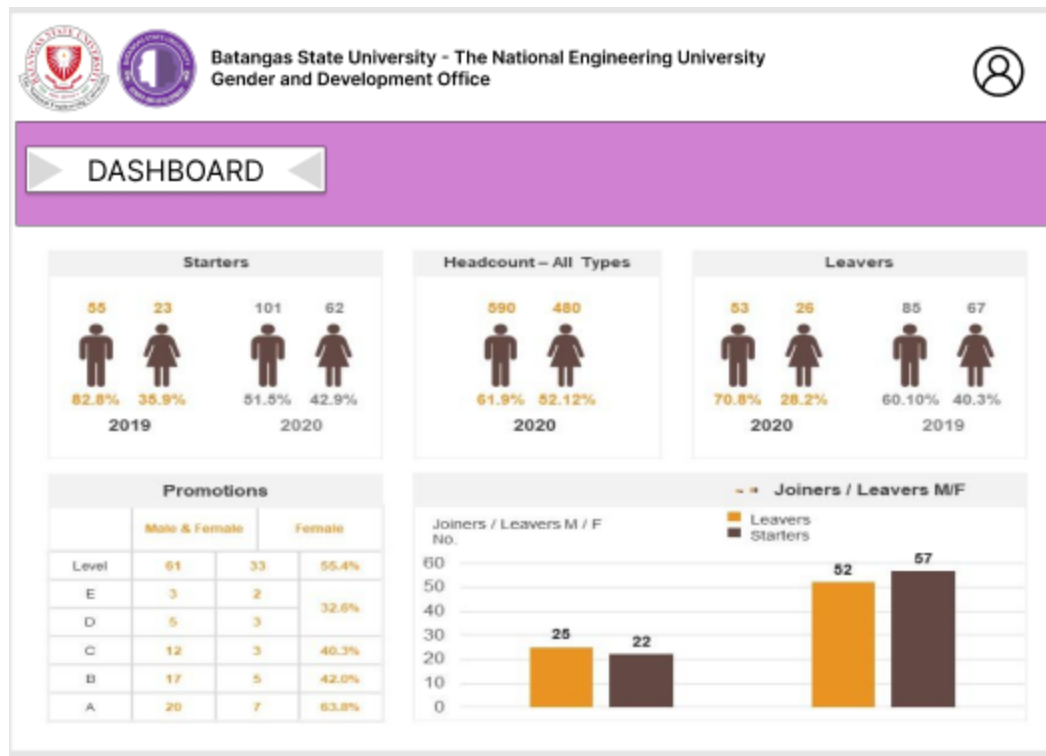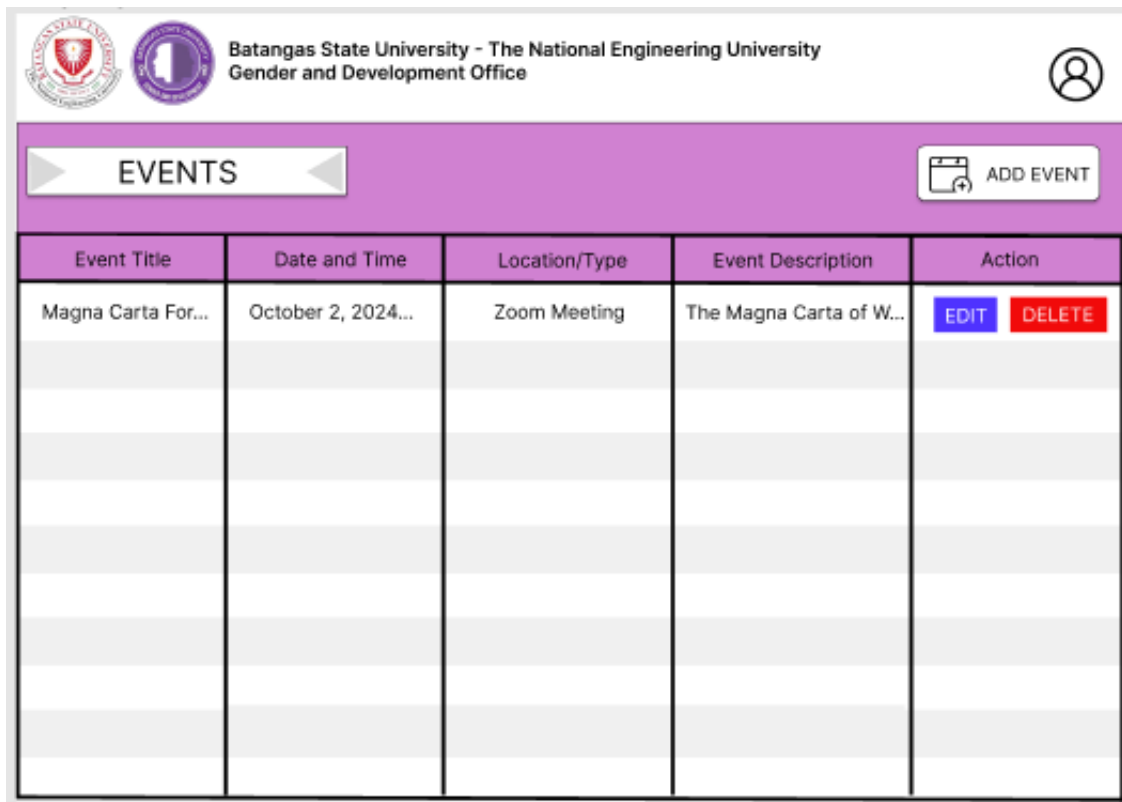
Figure 3-19. Admin Dashboard
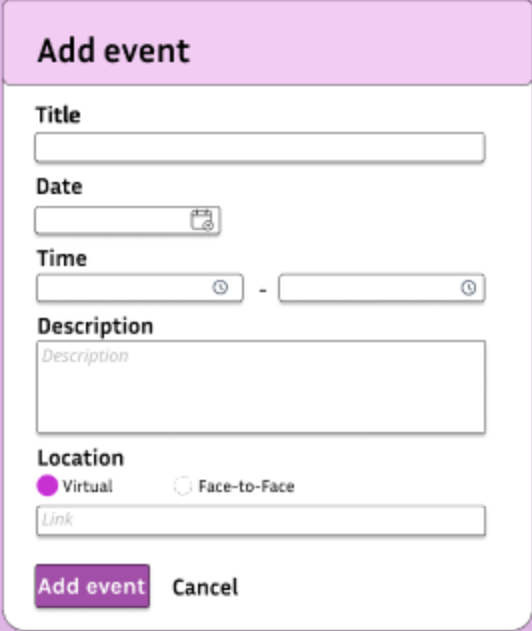
The dashboard provides a comprehensive overview of the system's health like key metrics and statistics, easy access to management tools, and other important functionalities for administrators.

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Figure 3-20. Add, Edit, Delete

This section allows the admin to create new events within the system, to modify the details of an existing system, and permanently remove an event from the system.

Figure 3-21. Add Event

Allows admins in creating new events that require information about the event. Once filled with the necessary details, the system will save the event information and typically add it to a calendar or list of upcoming events. This section allows admins to manage and track the events in one place.

4   RESULT AND DISCUSSION

This chapter discussed how the objectives of the study were achieved, that includes the elaboration of results from the testing methods that were discussed in the previous chapter.

Survey Result

The evaluation of the system was conducted following the ISO/IEC 25010: 2011 quality criteria, focusing on fundamental characteristics such as functionality, usability, reliability, security, portability, and performance efficiency. These assessment criteria were carefully selected to provide a thorough analysis of the system's quality attributes, where a 5-point Likert scale was employed to gather user feedback. The results were analyzed and interpreted based on weighted means and indicated verbal interpretations. The following tables presented the detailed findings for each quality characteristic.

Table 4-1. Functional Sustainability

Criteria	Weighted Mean	Verbal Interpretation
The system provides all the necessary features to support effective participation in or management of GAD programs.	4.3	
Tools and information needed to complete tasks are easy to locate	4.2	

within the system.

The system's functionalities meet the specific needs for GAD program management or participation.	4.3

Table 4-2. Performance Efficiency

Criteria	Weighted Mean	Verbal Interpretation
High volumes of data and user activity are handled effectively by the system without noticeable performance issues.	4.3	
Delays or interruptions in system performance are rare, even during high user activity.	4.2	
The system performs consistently without slowing down when handling multiple tasks simultaneously.	4.4	

Table 4-3. Usability

Criteria	Weighted Mean	Verbal Interpretation
The system's design and layout make it easy to learn and use.	4.3	
Instructions or tooltips within the system are helpful and enhance ease of use.	4.2	
Information is organized in a way that makes it easy to locate needed resources.	4.2	

Table 4-4. Reliability

Criteria	Weighted Mean	Verbal Interpretation
The system consistently functions as expected without frequent crashes or errors.	4.3	

Table 4-5. Compatibility

Criteria	Weighted Mean	Verbal Interpretation
The system performs well across different devices, including desktops, tablets, and mobile phones.	4.3	
The system's layout and formatting remain consistent across different devices and browsers.	4.3	
System updates do not affect compatibility or cause issues with different device types or browsers.	4.3	

Table 4-6. Security

Criteria	Weighted Mean	Verbal Interpretation
Password requirements and security settings are sufficient to prevent unauthorized access.	4.3	
Regular security updates are performed, ensuring the system is safeguarded against potential threats.	4.3	
Users are informed of security policies and best practices to ensure safe system use.	4.3	

Table 4-7. Portability

Criteria	Weighted Mean	Verbal Interpretation
System maintenance can be performed without significant downtime or disruption to users.	4.3	
Switching between devices does not affect the ability of the system effectively.	4.3	

Table 4-8. Maintainability

Criteria	Weighted Mean	Verbal Interpretation
Errors or bugs in the system are easy to identify and resolve without affecting overall functionality.	4.4	
The system can be easily updated to meet new requirements or incorporate additional features.	4.3	

5   SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

This chapter sums up the results, conclusions, and suggestions gathered through the data analysis done using the web system the researcher developed. It summarizes the main findings and conclusions derived from the research.

Summary of Findings

The Gender and Development (GAD) Learning Management System (LMS) project at Batangas State University was initiated to address several operational challenges within the GAD Office. Traditionally, the office relied on manual processes for managing gender equality initiatives, including tasks such as reporting, registration, attendance tracking, and evaluation. These manual methods were not only time-consuming but also prone to errors, leading to inefficiencies that hindered the office's ability to effectively promote gender and development programs.

To overcome these challenges, the project team developed a web-based system featuring distinct interfaces tailored for administrators, staff, and learners. This design ensured that each user group could access functionalities specific to their roles, thereby streamlining operations. Key processes such as registration, attendance, evaluation, and content

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moderation were automated, significantly reducing the administrative burden on staff and minimizing the likelihood of human error.

A notable feature of the system is its dynamic content management capability, which allows staff to add and manage programs, courses, and seminars in real-time. These updates are instantly reflected on the learner's interface, ensuring that participants have access to the most current information. Additionally, the system provides centralized data dashboards for administrators, enabling them to monitor key metrics, analyze performance, and generate comprehensive reports. This data-driven approach facilitates informed decision-making and enhances the overall effectiveness of GAD initiatives.

The implementation of the GAD LMS has produced several positive outcomes. The automation of workflows has led to significant reductions in processing times for various tasks, thereby improving operational efficiency. The system's user-friendly design has received favorable feedback from stakeholders, who appreciate the intuitive interfaces and enhanced accessibility to GAD resources. Moreover, the centralized data analytics

feature has empowered the GAD Office to evaluate program impacts more effectively and prioritize initiatives based on empirical evidence.

Conclusions

The project's development led to the following conclusions, affirming that the system effectively incorporates essential features:

1. The system centralizes all Gender and Development (GAD) programs, activities, and resources into a unified platform. This ensures that learners and staff can seamlessly access and manage relevant information, streamlining the learning process and enhancing accessibility to educational materials and program information.

2. The system automates key processes such as attendee registration, attendance tracking, evaluation, and reporting. This automation reduces administrative tasks, minimizes human errors, and allows staff to focus on content creation and program improvement. Additionally, learners benefit

from an efficient and user-friendly process when engaging with programs and activities.

3. The system delivers actionable insights through evaluation results and participation metrics. This enables the GAD Office to assess program effectiveness, identify areas for improvement, and make data-driven decisions for developing new Projects, Activities, and Programs (PAPs). By leveraging analytics, the office can prioritize impactful initiatives and foster continuous improvement in its offerings.

Recommendations

1. **Expansion to All Campuses**

    Extend the system's implementation to all extension campuses of Batangas State University, ensuring that students, employees, teaching and non-teaching personnel, and partnered communities across all campuses can benefit from the system. This will promote equal access and uniformity in learning management and PAPs implementations across the university.

2. **Enhanced Assessment Features**

    Diversify the assessment methods by including other question formats such as short answers, essays, matching types, and interactive quizzes in addition

to multiple-choice questions. This will allow for a more comprehensive evaluation of learners' understanding and improve engagement.

3. **Automated E-Certificate Generation**

Develop a feature that enables the system to automatically generate e-certificates for learners who complete courses and comply with registration, attendance, and evaluation requirements. This will reduce the reliance on administrators for manual certificate uploads and improve efficiency.

4. **Regular System Updates and Maintenance**

Schedule regular updates and maintenance to address potential implementation problems, ensure compatibility with evolving technologies, and introduce new features based on user feedback.

5. .**Notifications and Reminders**

Add automated notification systems (email or SMS) to remind users about upcoming programs, deadlines for assessments, or incomplete registration requirements.

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APPENDICES

Appendix A: Schedule and Timeline

A structured development schedule and timeline are essential in web and application projects to manage tasks efficiently, ensure resource alignment, and meet delivery deadlines, supporting a smooth progression from initial planning through final deployment.
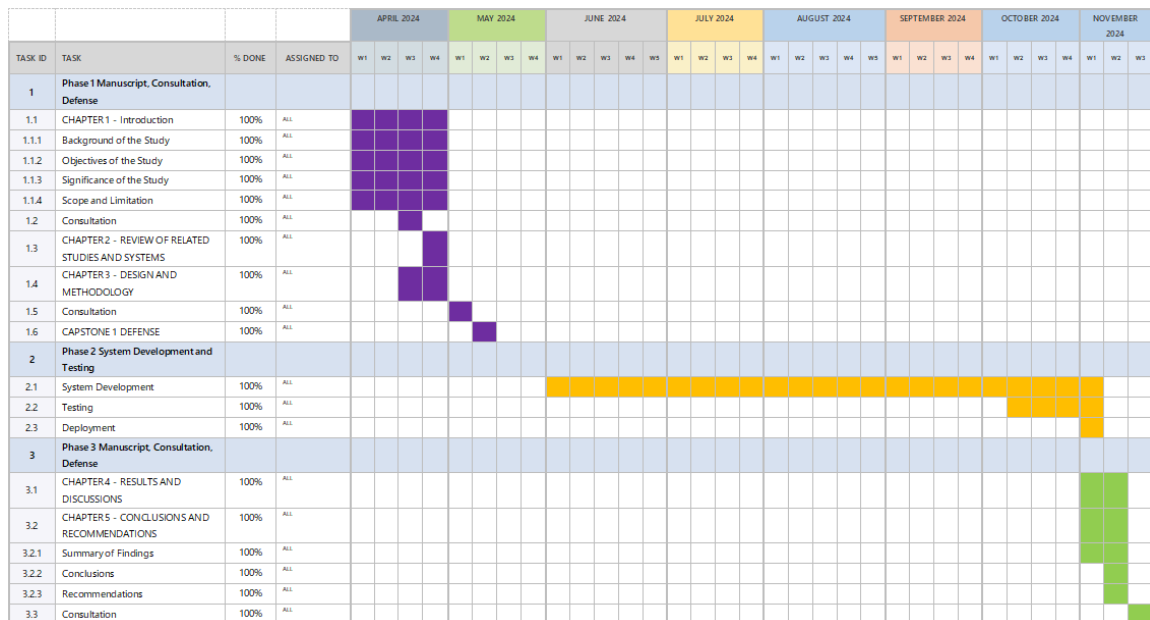

Figure 1. Gantt chart

Appendix B: Project Teams and Responsibilities

Project Roles and Responsibilities Table 1 outlines the team's involvement across the project phases. This structure enabled the team to work efficiently on each aspect, with each member contributing specialized knowledge and unique skills to support the project's successful completion.

Project Team	Responsibilities	Contact Details
Marc Kenshin I. Cabrera	UI Designer Document Writer	Contact Number 0963-020-8746 Email Address: 21-06038@g.batstate-u.edu.ph
Riazel A. Lipata	Team Leader Lead Programmer UI Designer Document Writer	Contact Number 0997-729-4396 Email Address: 21-02830@g.batstate-u.edu.ph
Jhustine Renz M. Magsombol	UI Designer Document Writer	Contact Number 0999-531-6504 Email Address: 21-04882@g.batstate-u.edu.ph

Appendix C: Usability Survey Result

Mean Range	Scale	Verbal Interpretation
4.50 - 5.00	4	Strong Agree
3.50 - 4.49	3	Agree
1.50 - 2.49	2	Disagree
1.00 - 1.49	1	Strongly Disagree

Result in Functional Sustainability Criterion

Functional Sustainability	Weighted Mean	Verbal Interpretation
a. The system provides all the necessary features to support effective participation in or management of GAD programs.		
b. Tools and information needed to complete tasks are easy to locate within the system.		
c. The system's functionalities meet the specific needs for GAD program management or participation.		

Result in Performance Efficiency Criterion

Performance Efficiency	Weighted Mean	Verbal Interpretation
a. High volumes of data and user activity are handled effectively by the system without noticeable performance issues.		
b. Delays or interruptions in system performance are rare, even during high user activity.		
c. The system performs consistently without slowing down when handling multiple tasks simultaneously.		

Result in Usability Criterion

Usability	Weighted Mean	Verbal Interpretation
a. The system's design and layout make it easy to learn and use.		
b. Instructions or tooltips within the system are helpful and enhance ease of use.		

c. Information is organized in a way that makes it easy to locate needed resources.

Result in Reliability Criterion

Reliability	Weighted Mean	Verbal Interpretation
a. The system consistently functions as expected without frequent crashes or errors.		
b. The system successfully handles high user traffic without loss of performance or data integrity.		
c. System downtime is minimal, and any maintenance is effectively communicated to users in advance.		

Result in Compatibility Criterion

Compatibility	Weighted Mean	Verbal Interpretation
a. The system performs well across different devices, including desktops, tablets, and mobile phones.		
b. The system's layout and		

formatting remain
consistent across different
devices and browsers.

c. System updates do not
affect compatibility or
cause issues with different
device types or browsers.

Result in Security Criterion

Security	Weighted Mean	Verbal Interpretation
a. Password requirements and security settings are sufficient to prevent unauthorized access.		
b. Regular security updates are performed, ensuring the system is safeguarded against potential threats.		
c. Users are informed of security policies and best practices to ensure safe system use.		

Result in Portability Criterion

Portability	Weighted Mean	Verbal Interpretation
a. The system can be accessed without difficulty from different locations or devices.		
b. System maintenance can be performed without significant downtime or disruption to users.		
c. Switching between devices does not affect the ability of the system effectively.		

Result in Maintainability Criterion

Maintainability	Weighted Mean	Verbal Interpretation
a. Errors or bugs in the system are easy to identify and resolve without affecting overall functionality.		
b. The system can accommodate changes in organizational needs or		

processes over time.

c. The system can be easily
updated to meet new
requirements or
incorporate additional
features.

Appendix D: Testing Procedure

Appendix E: Relevant Source Code

Appendix F: User Manual

Appendix G: Grammarian Certificate

Appendix H: Bionote

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