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DEVELOPMENT OF AN INTEGRATED DATA-DRIVEN PORTALS AND DATA ANALYTICS: A UNIFIED FRAMEWORK FOR SCHOLARSHIP ANALYTICS PORTAL

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ABSTRACT
This research highlights how the social services office (SSFO) in Zamboanga Del Sur manually handles the paper-based scholarship processes inefficiently. These are the procedures that take a long time, human errors, and delays. To fix such problems, a web-based Scholarship Data Management System has been introduced to simplify application procedures, maintain data accuracy, give real-time updates, and automate the generation of reports. The system was developed using modern web technologies (HTML, CSS, JavaScript) and Google Firebase under an Agile methodology with a user-centered design approach, thus resulting in a secure, responsive, and easy-to-use platform with separate portals for students and administrators. Extensive tests confirmed that the system is a strong performer against ISO/IEC 25010 standards, scoring very highly in reliability (93.66%), security (94.25%), usability (94.5%), performance efficiency (95%), and functional compatibility (94%). As well as a great deal of administrative efficiency and user satisfaction have been achieved through the system, the present operation of the system depends on internet connectivity, and it does not have an integrated fund disbursement feature. The coming improvements will be wireless functionalities, SMS notifications, and banking systems integration to facilitate accessibility and service coverage.

Keywords:
Scholarship Management System, Web-Based Portal, Agile Methodology, User-Centered Design, Firebase, Web Technologies, Automation, Administrative Efficiency, SSFO, Data Accuracy, Real-Time Updates, ISO/IEC 25010, Paper-based System.

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INTRODUCTION

Digital transformation has become a critical driver in reshaping administrative and instructional processes within the global education sector. While many institutions worldwide have adopted digital tools to enhance operation efficiency, numerous organizations, particularly in developing regions, still rely heavily on manual paper-based systems (Klave & Cane, 2024). In this context, the Philippines has made significant strides toward digitalization through initiatives such as Basic Education Development Plan (BEDP) 2030, which prioritizes digitally enabled schools and improved governance a key goal for national development (Department of Education, 2022). Locally, the government level has been grappling with a "digital divide" that has been resistant to changes such as those mentioned above. This is an area where essential services are still being heavily affected by manual processes (Nagrama et al., 2024).

One of the prominent examples of these local issues is the scholarship management process at the Social Service Facilitator's Office (SSFO) in Zamboanga Del Sur. It is reported that the SSFO is operating under a manual, paper-based scheme that has led to many slowdowns in application processing, human errors, and lack of transparency which affects both applicants and administrative staff, thus, resulting in them having limited access to information and trust (Bueno, 2023; Nagrama et al., 2024). The inefficiencies that are highlighted in the SSFO are not only the inefficiencies that are present in the SSFO but are a manifestation of inter alia those inefficiencies that are present in various government offices, especially where handling physical files delays access to information and decision-making.

Research done all over the world has pointed out the various benefits that come with the change from traditional management systems to web-based ones, such as the improved accessibility, transparency, and engagement, which at the same time ensure that selection processes are conducted in a fair manner (CommunityForce, 2024). Automated platforms, thus, are the means through which stagnation in administration is broken by allowing for real-time tracking and centralized data management, thus accuracy and operational speed are greatly enhanced (Klave & Cane, 2024). On the other hand, it is difficult for existing systems in the Philippines to synergize with the fragmented infrastructure and user design issues without affecting the local government units' constraints that are already existing in the LGU (Espiritu et al., 2023). A significant point to ponder is that there is a gap in the research regarding the development of an integrated system that not only blends modern cloud-native architectures but is also agile and user-focused, thereby being suitable for resource-constrained provincial offices like the SSFO.

To address these issues, this study proposes the development of a web-based Scholarship Data Management System specifically designed for the SSFO in Zamboanga Del Sur. The objective of the system is to revamp the entire cycle of the scholarship life through the implementation of a centralized database that will bring about data accuracy, giving the applicants the status of their applications in real-time, and providing the administrative staff with the automated reporting tools. Using an Agile development methodology and taking advantage of cloud-native technologies like Google Firebase, the project intends to phase out the manual workflows with a simplified, user-friendly digital platform. This approach balances technological sophistication with usability and resource considerations, thereby improving the speed, clarity, and accountability of scholarship distribution in the region.

LITERATURE REVIEW AND THEORETICAL FRAMEWORK

Overview of the Studies

So, looking at the research, a few important ideas stand out for what we're doing. Research consistently shows that handling data by hand is a major bottleneck. It makes everything slower, make it more costly, and frustrating for the staff and students relying on it. The apparent solution is to move these operations online, which will make the system faster, more efficient, and easier for everyone to use (Falolo et al., 2022).

Current State of Studies

So, looking at the research, a few important ideas stand out for what we're doing. Basically, everyone agrees that getting computers to handle the repetitive stuff is the way to go. This means fewer errors, a much faster process, and it lets the staff do more meaningful work, like judging the applications themselves (Doe & Roe, 2020).

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You can see two big tech changes helping schools get up to speed. For administrative staff, the implementation of dashboards and centralized data has yielded substantial improvements in operational visibility and efficiency. Instead of digging through spreadsheets, they can just glance at a dashboard to see which scholarships are most popular or which towns have the most applicants. All this is powered by cloud services, which act as a flexible, off-site IT department. This means schools don't have to worry about maintaining their own pricey servers, saving both money and headaches (Chen et al., 2020).

Relevant Systems and Precedents

After the success of earlier systems, which is HRIS at Saint Columban College (Vics et al., 2021), as a great model for this project. The researcher proved that a custom web system is more than capable of organizing messy institutional records. This is a game-changer because, as national reports point out, most scholarship programs suffer from scattered data. The researcher aligned with Ablen et al. (2025) in advocating a single, integrated system that shows an applicant status from initial submission through final decision. In addition, consistent with recent usability research, researchers treated user friendliness as essential, regardless of how technically powerful the system might be. For both students (who are often on their phones) and administrators, as an intuitive interface is what makes or breaks its adoption and effective use (Jones et.al, 2021).

Digital Transformation in Education

Digital transformation in education is the main factor, which changes the way the administrative and instructional processes are done all over the world. The governments and educational institutions are willing to take the advantage of digital tools to enhance the efficiency, accessibility, and data accuracy (Garcia & Patel, 2022; Theodoria, 2024). The change is a result of the necessity to move beyond the constraints of manual, paper-based systems, which frequently cause inefficiencies, errors, and delays (Jones & Brown, 2021). Besides technology adoption, digital transformation also refers to organizational and cultural changes of an organization, which focuses more on user-centered and stakeholder engagement as a way to get their implementation success (Ochieng, 2024; Hinderks et al., 2022). Speaking about the Philippines, local government units and educational bodies have begun the integration of digital platforms to make their operations more efficient but problems such as internet connectivity and lack of resources are still there (Decena & De Guzman, 2021; Espiritu et al., 2023).

Cloud Computing Adoption in Government Agencies

By leveraging cloud computing, governmental agencies utilizing the latter as scalable, cost-effective, and secure IT infrastructures without putting heavy resources on premise, gain a strategic advantage (Sarker, 2021). The use of cloud services enhances public sector work with real-time data access, collaboration, and an offsite backup that can quickly be restored in case of an emergency (Ciancarini et al., 2024). ccording to the research, such a move has brought about an overall improvement in the provision of services and management of data that, in turn, have been the major factors for the rise of transparency and the decision making to a higher level in education-related government offices (G & Donald, 2023). Nevertheless, these kinds of worries about data privacy, security, and regulatory compliance still constitute the most significant barriers against the adoption of cloud computing that has been spoken of by the majority of the concerned sectors (KR, 2024). Therefore, it is quite necessary that they be accompanied by very strong authentication as well as encryption methods if they are to be effective (Alhayan & Abuhassna, 2024; Ariani et al., 2025). Google Firebase, a cloud backend platform, is a good example of a contemporary solution that brings together the management of a real-time database, authentication, and service hosting, which are features that are specially designed for responsive web applications (Google, 2024).

Comparative Studies on Scholarship Management Systems Globally

Scholarship management systems worldwide exhibit diverse architectures and functionalities, reflecting varying institutional needs and technological maturity. Many systems prioritize automations of application processing, status tracking, and reporting to reduce administrative burdens and enchance transparency (Ablen et al., 2025; Mercado, 2023). Comparative analyses reveal that integrated, user-friendly platforms significantly improve applicant satisfaction and institutional efficiency (Falolo et al., 2022; Imtihan & Rodi, 2024). Nevertheless, gaps exist in addressing localized challenges such as intermittent internet access, multi stakeholder coordination, and fund disbursement integration (Tornatore, 2021). Few systems fully leverage Agile development methodologies

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or cloud-native architectures like Firebase, which limit adaptability and scalability in dynamic educational environments (Vics et al., 2021; Ciancarini et al., 2024).

Critical Analysis of Gaps and Unique Contributions of the Current System

Most existing scholarship management systems have not been able to effectively integrate flexible development methods. It is almost like the majority of them are still stuck in their traditional waterfall models, which make them less responsive to user feedback and changing requirements (Rihar & Kus, 2020). Moreover, in some instances, the shift to the cloud is just a matter of the front side, where there is a lack of the implementation of comprehensive security features and real-time data synchronization (Alhayan & Abuhassna, 2024). By using the Agile methodology, this project closes those holes, thus enabling the iterative development with the continuous involvement of the users, which ensures that the system changes according to actual needs rather than to assumed ones (Al-saqqa et al., 2020.; Hron & Obwegeser, 2022.). The integration of Google Firebase provides a robust backend that supports scalability, real-time updates, and secure authentication without complex server management (Google, 2024). This combination results in a scholarship management system uniquely tailored to the SSFO's operational environment, balancing technological sophistication with usability and resource constraints.

CONCEPTUAL FRAMEWORK

The conceptual framework for this study is adapted to show a logical flow from the problem identification stage to the delivery of a tested and working system. It provides the theoretical and procedural steps that are used in the development and evaluation of the Scholarship Data Management System (SDMS) for the Social Service Facilitator's Office (SSFO).

1. User Centered Digital Transformation: Focused on stakeholders' involvement and continuous feedback to ensure that the system meets the users' work and challenges (Hinderks et al., 2022; Shania et al., 2023).
2. Cloud Native Infrastructure: Using Google Firebase's cloud services to offer scalable, secure, and real-time data management which makes easy access and collaboration between students and administrators (Ariani et al., 2025; Google, 2024).
3. Agile Development Methodology: Agile methods were used to handle development in short, incremental sprints, thus the team can quickly adjust to new requirements and ensure quality continuously (Hron & Obwegeser, 2022.; Rihar & Kus, 2020).

By converging these domains, scholarship management is transformed to the next level by the elimination of inefficient manual processes that are replaced with an integrated, automated, and user-friendly platform. The system enhances the accuracy of data, shortens the processing time and helps decision-making through up-to-the-minute analytics and reporting. This framework shows how technology adoption, process reengineering, and organizational readiness are intertwined, thus, the system is seen as a paradigm of similar educational administrative transformations.

METHODOLOGY

Research Methodology

The researchers chose to apply the Agile approach for this project. In short, it is a flexible approach of working that puts user feedback first in the cycle and makes it easy to change as researchers learn more with the project (Hron & Obwegeser, 2020). The researcher, instead of building the entire system in one go, researchers developed it in smaller, manageable pieces for us to manage even a tiny flaw of the system. Instead, researchers worked in short, targeted cycles called sprints. With each sprint resulted in the delivery of a new, fully functional piece of software, which enabled us to make improvements and adjustments as researchers progressed the system, like a puzzle (Al-saqqa et al., 2020.).

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Figure 1. Agile Methodology

The diagram illustrates the cyclical nature of sprint planning, development, testing, review, and backlog refinement, highlighting the central role of user feedback in shaping the system's evolution.

This is how researchers brought the system to life, step by step:

Researcher's journey started where every good project should: with the people who would actually use it. Researchers resisted the urge to start coding immediately. Instead, researchers spent our first weeks just talking to students filling out applications and to the SSFO staff buried in paperwork. This was not a delay; it was key investment. By direct observing users of day-to-day challenges, researchers were able to shape our roadmap based on what they really need rather than assumptions (Hinderks et al., 2022).

So, researchers applied that same principle to development: work was organized into short sprints to maintain manageable scopes. This approach provided faster delivery, but its primary advantage was adaptability. Developers could pause to evaluate our progress and fix issues immediately when arises, rather than letting them derail the timeline later on (Arnyndiasari et al., 2022).

With the project in progress, our next focus was the underlying structure of the system. Researchers outline the architecture (Figure 2) and selecting tools that could operate smoothly with minimal maintenance and constant attention. For the interface, developers used HTML, CSS, and JavaScript to ensure the experience remained intuitive and responsive. On the other hand, on the backend, the developers use Google Firebase handle the heavy lifting to save us from setting up complex servers. It gave us a foundation that could easily handle growth without forcing us to build complex server infrastructure from scratch.

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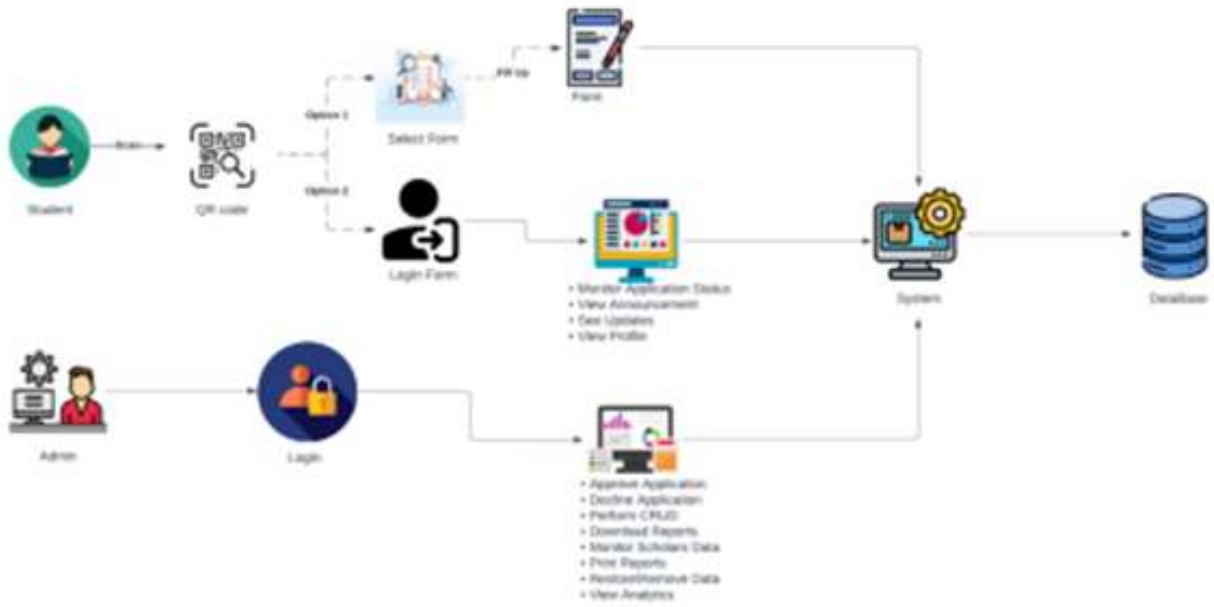

Figure 2. Product Perspective

Researchers always tested every single feature as soon as it was built, which helped us squash bugs before they piled up. More importantly, developers didn't build like a vacuum. The researchers actively used client feedback to guide our next steps, ensuring the system evolved to fit their actual needs rather than just sticking to a rigid plan (Rihar & Kus, 2020). Furthermore, there are challenges and mitigation strategies to further prevent major failure. Initial user requirements evolved as stakeholder gained better understanding of system capabilities. The flexible Agile frameworks of the team allowed them to accommodate these changes without disturbing the overall timeline. Firebase integration raised issues concerning authentication protocols and real-time data synchronization. They solved these issues by using Firebase's detailed documentation and community resources, along with iterative testing to ensure stability. Making the system intuitive for non-technical users took several rounds of usability testing and interface changes. The application of user-centered design principles and the involvement of stakeholders helped to eliminate resistance and increase acceptance. Also, the dependence on internet connectivity was considered as a limitation in the very beginning. Although offline functionality is a plan for the next stages of development, the team has optimized performance and error handling to lessen the inconvenience of the intermittent network access.

TECHNICAL DETAILS AND SYSTEM ARCHITECTURE

Technical Stack

The Scholarship Data Management System was built with the help of front-end web technologies and a cloud-native backend to keep it responsive, scalable, and maintainable. The front-end interface makes use of HTML, CSS, and JavaScript, which were selected for their worldwide availability, adaptability, and capability of producing responsive, cross-platform web applications that can be used on desktops, tablets, and mobile devices. With these technologies, easy user experiences are possible for students and administrators, who may have different levels of technical skills.

Security Measures

Several security layers are in place to protect confidential data of scholarship applicants and to keep the system safe. Secure login procedures are handled by Firebase Authentication, which also implements role-based access control, thus distinguishing between students and administrators. Any data exchanged between the clients and Firebase is done through HTTP/TLS and thus is secure, whereas data at rest is also secure through Firebase's own encryption methods. Rules for database security limit the reading and writing operations to those that are

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based on the roles of the users hence making sure that users can only have access to the data that is relevant to their privileges.

Database Schema and Data Flow

The data design revolves around the main entities that are Users, Students, Programs, Schools, and Applications, as depicted in the Entity-Relationship Diagram (ERD). Comprehensive data dictionaries describe the framework and the characteristics of the entities, thus ensuring uniform data input and output. Moreover, the platform is equipped with complete CRUD (Create, Read, Update, Delete) functionalities, which allow the administrators to handle the scholarship records in a time-saving manner.

Figure 3. Entity Relationship Diagram

Data flows have been set up to mirror the scholarship lifecycle. Applicants fill out forms via the online portal, which are saved in Firebase and displayed in real-time on the administrative dashboards. Administrators examine, authorize, or reject the applications, thereby updating the statuses and sending emails to inform the applicants. The handling of records that have been archived and deleted is through specific modules like Recycle Bin and Archives Hub, which provide the functionalities of data recovery and storage for a long time.

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Figure 4. Archiving Scholarship Application

System Architecture Overview

The system is designed to be modular, as shown in the communication diagram (Figure 5) that illustrates the interactions among students, administrators, the application system, and the Firebase database. The front-end modules such as dashboards, application forms, and management portals interact with the Firebase service through secure APIs. This separation of concerns not only makes the system easier to maintain but also permits scalable enhancements to be made in the future without any issue. Real-time synchronization makes it possible for all users to be updated with the latest data, thus enabling decision-making to be transparent and timely.

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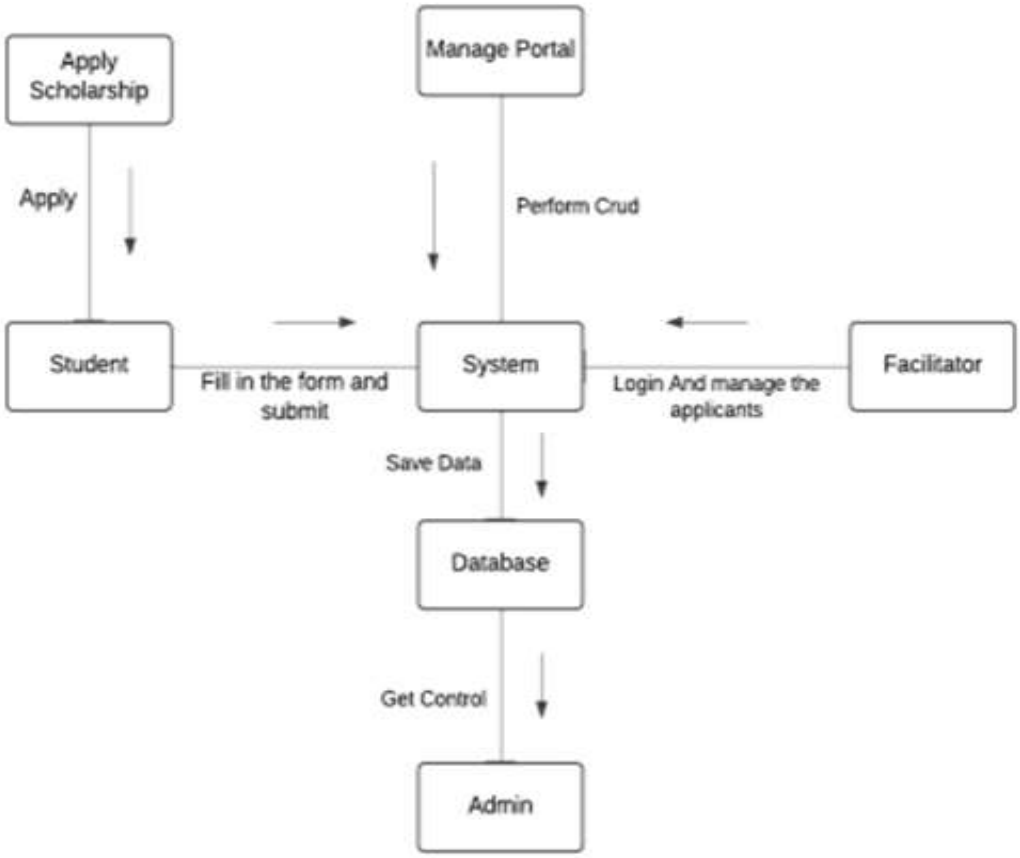

Figure 5. Communication Diagram

USER EXPERIENCE AND INTERFACE DESIGN

The Scholarship Data Management System was built using a user-centered design (UCD) approach to guarantee that it would be an efficient tool for the main users - students and SSFO administrators. The design process kicked off with understanding the users via interviews and observation sessions of both groups to figure out the difficulties of the current manual system and to collect detailed requirements for the digital solution. These first findings became the system's design roadmap, featuring the simplifications of the workflows like scholarship application submission, status tracking, and report generation as the top priorities.

The team frequently asked for user input on the product through sprint demos and usability testing sessions. Users were given a chance to try out the prototypes and share their thoughts regarding features, navigation, and visual presentation. Such a regular feedback circuit allowed the team to pinpoint the changes needed for example they could make the forms easier to understand, buttons more visible and shorten multi-step processes. Employing UCD helped gaining the support of stakeholders and lessening their opposition as the system was constantly adjusted according to users' needs and actual work processes (Hinderks et al., 2022; Shania et al., 2023).

The system is made up of two different web portals, each created specifically for the needs of students and administrators:

Student Portal: The student interface, which was created with responsiveness as a main feature in order to support the use of the device be it a desktop, tablet or a smartphone, is characterized by the simple navigation for the submission of scholarship applications and the update of the status in real time. Some of the usability features are standardly named form fields, progress indicators during the multi-step application, and easily accessible help prompts. The responsive design guarantees the same performance and accessibility to users with different levels of technical skills on different device screen sizes (Jones et al., 2021).

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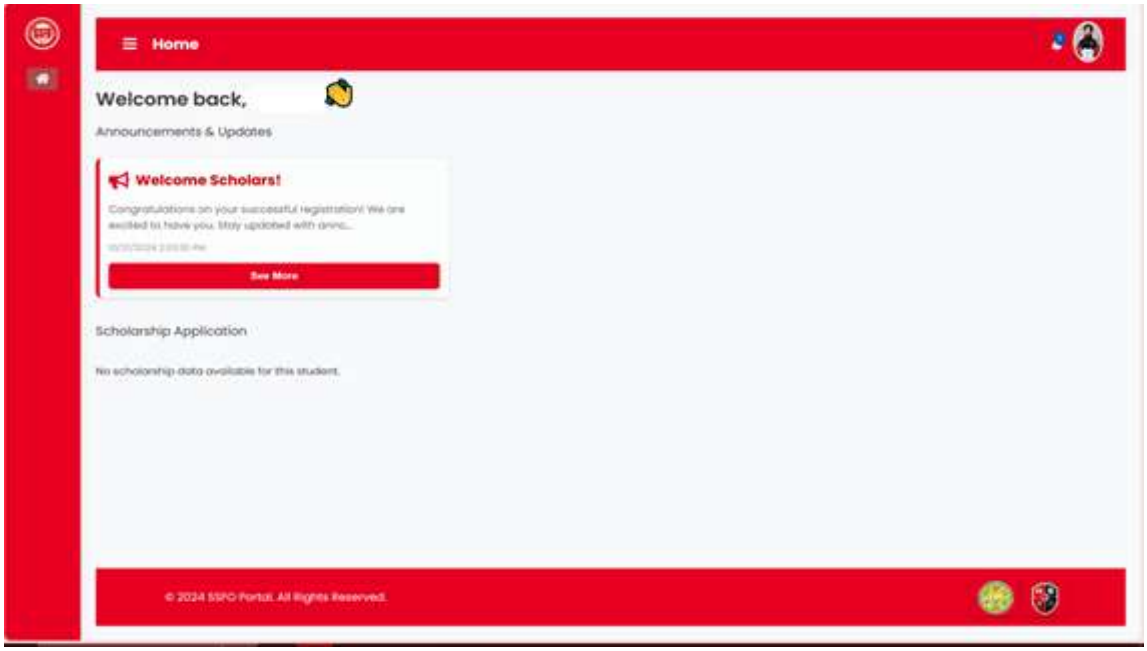

Figure 6. Applicant Dashboard

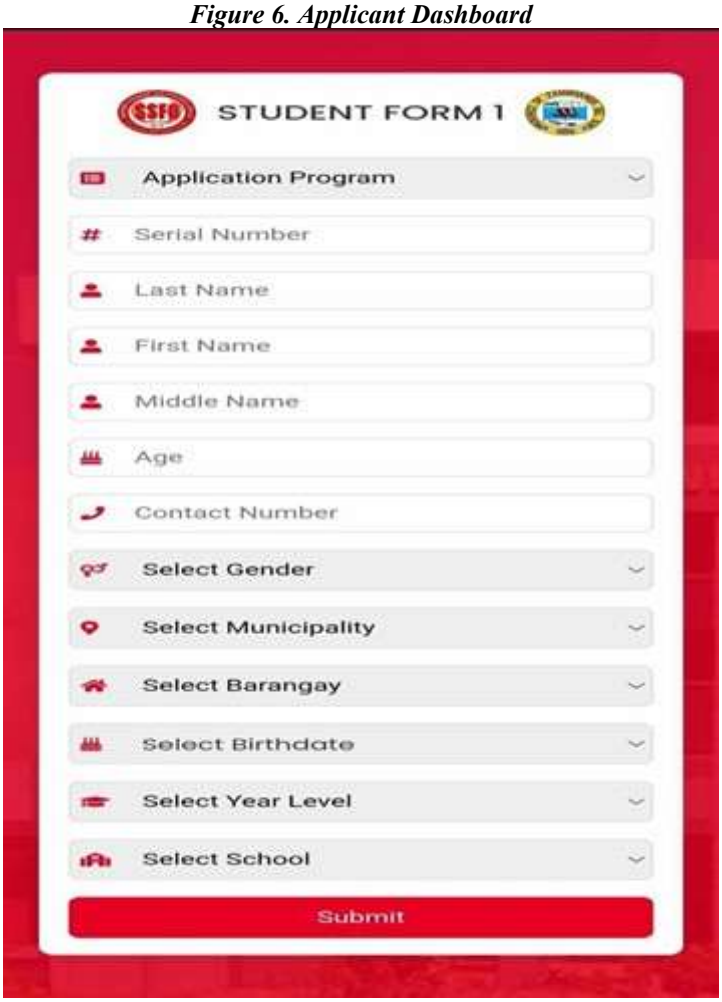

Figure 7. Application Form

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Administrator Portal: This portal equips SSFO personnel with the means to peruse applications, handle scholarship information, and create reports. Some of the major features for usability are the dashboard summaries, sortable application lists, and easy-to-use filters for fast recognition of the tasks that are waiting. The interface is designed with the purpose of helping the administrative staff to carry out their workflows in a clear and efficient manner, thus not loading the users with too much information, and making it possible for the staff to concentrate on decision-making rather than on data management (Falolo et al., 2022).

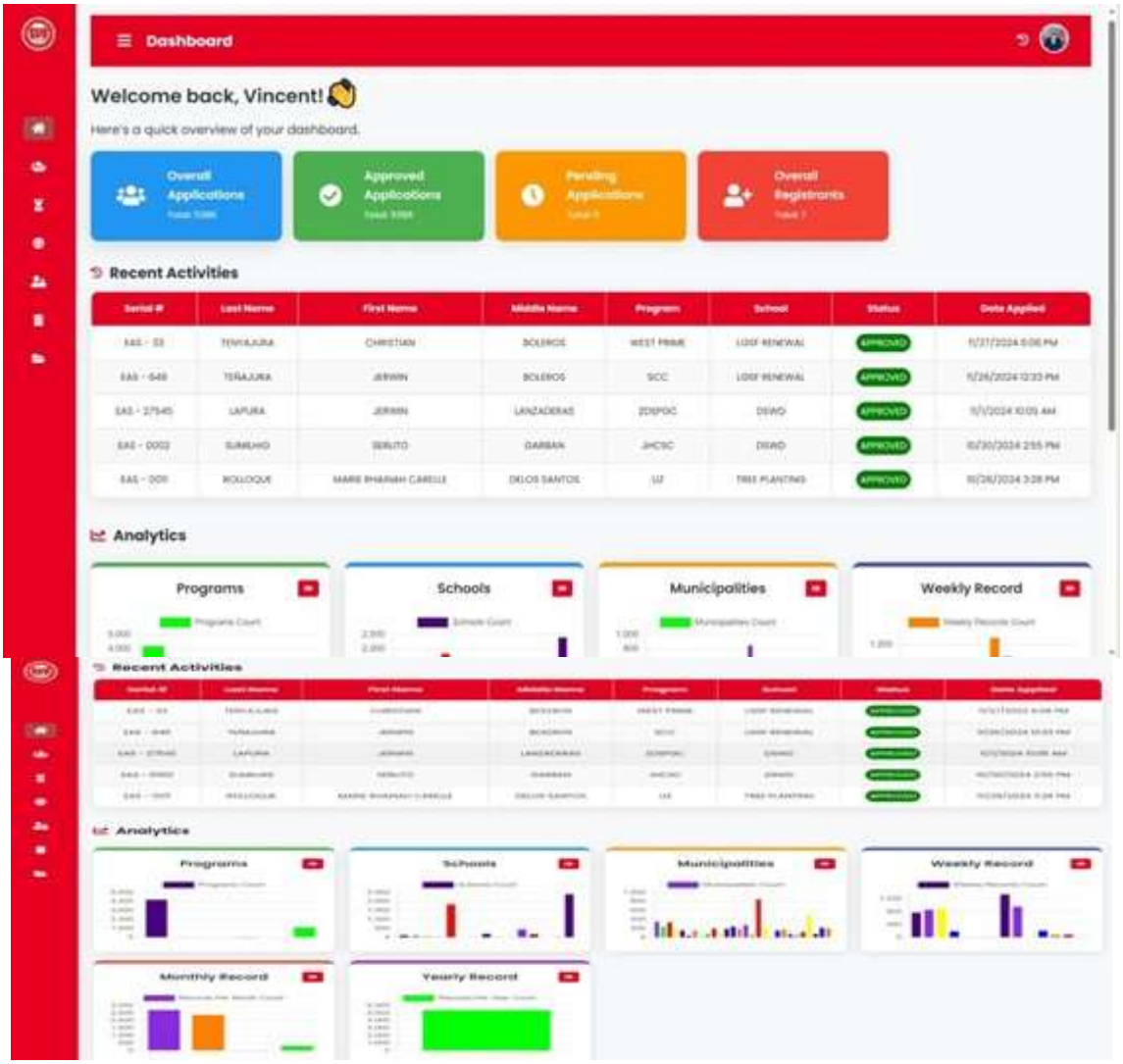

Figure 8. Administrator Dashboard

Accessibility features were thoughtfully planned and implemented in the platform to support users with different needs. The platform uses semantic HTML elements, maintains good color contrast, and is operable via the keyboard to users with visual or motor impairments. These basic accessibility features are in line with the standard best practices, which means that the platform can be used by a large number of people (Afzal et al., 2024).

The further improvements are to carry out formal accessibility audits and to add more features like screen reader compatibility, resizable fonts, and multilingual support to get more users included. On top of that, there are also plans to provide offline access and to use other means of communication like sending SMS notifications to remove the inconvenience caused by lack of connection and thus make the accessibility and user experience better for those who are in different contexts (G & Donald, 2023).

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RESULTS AND DISCUSSION

We've successfully replaced the SSFO's manual, paper-based system with a digital platform that is efficient, secure, and user focused. Its readiness for launch is backed by rigorous testing that validating its quality and reliability.

Deployed Digital Platform

The new SSFO Scholarship Data Management System successfully replace the old method of paper-heavy process into an efficient, secure, and user-friendly digital solution. Thorough testing has proven the system's reliability, demonstrating a robust platform ready for immediate use. The developers implemented a dual-portal system. One side allows students to apply and track their progress without hassle. The other side gives administrators the tools they need to oversee the entire workflow and generate reports from a single screen. This means that they can now see data trends at a glance and create detailed reports. Behind the scenes, a Google Firebase backend brings all this data together securely. This ends the era of messy filing cabinets and error-prone spreadsheets, achieving the key goal of a unified and trustworthy data hub.

Functional and Non-Functional Performance

The system proved itself under pressure. When researchers put it through its paces, every single core function like user logins, submitting applications, generating reports, all are passed with flying colors. We're looking at a perfect 100% score on functionality.

But where we were really pleased was how it handled the real-world demands. The researchers even stress tested it by simulating an entire office of over 100 people clicking and using the system at the same time. Even when many users were very active at once, the system stayed fast and responsive. This steady behavior is reflected in its reliability score of 93.66%. On the security front, the authentication protocols scored a 94.25%, which means applicant data is well-protected. And the best part? When researchers sat down with actual non-technical users, the usability tests came back at 94.5%. It's not just a powerful system; it's one that people find intuitive and easy to use.

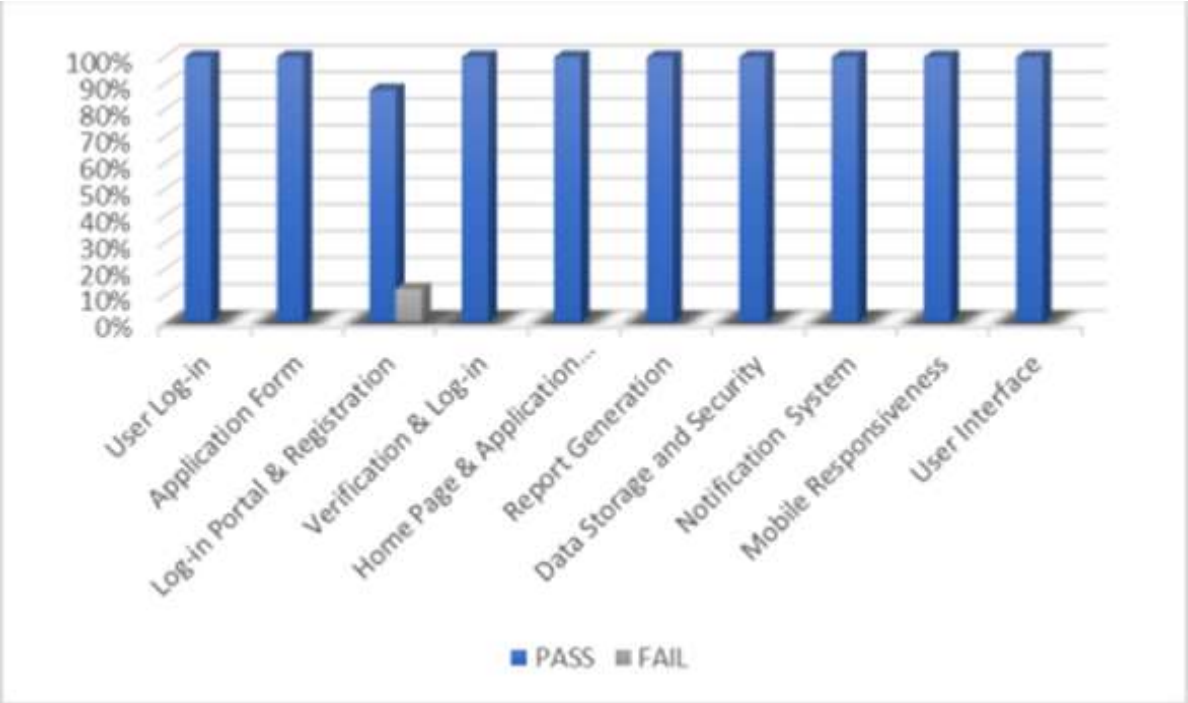

Figure 9. Functional Test Summary Report

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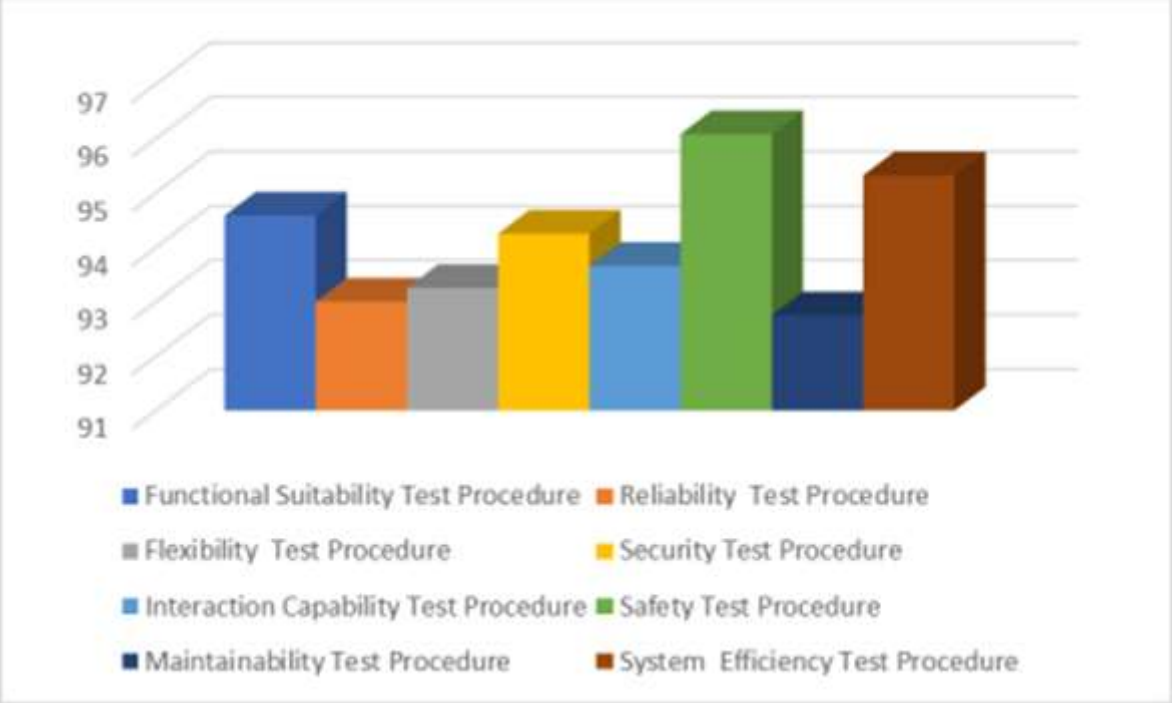

Figure 10. Non-Functional Test Summary Report

Validation Against International Quality Standards

So, what does the ISO/IEC 25010 validation actually tell us? Researchers used this framework because we wanted a clear, external benchmark—not just our own opinion. Scores of 95% for Performance Efficiency and 94% for Functional Suitability was gratifying. What more important, it confirmed something crucial: developers didn't just build a system that works. The researchers built one that holds up under a recognized international lens. The 93% in Security, paired with those other high marks, gives us confidence that the platform is truly robust, not just on paper, but in its fundamental design and user experience.

DISCUSSION AND IMPLICATIONS

The introduction of the Scholarship Data Management System is a major step forward in solving the problems and inefficiencies that the SSFO had in their manual, paper-based processes. The shift to an online system has been a great factor in achieving the effective, accurate, and user-friendly management of scholarships which are evident from the qualitative and quantitative data.

The phenomenal functionality pass rate of 100% coupled with the performance efficiency rating of 95% that is in conformity with the ISO/IEX 25010 standards is a clear indication that the platform is effectively automating the core processes such as application submission, status tracking, and report generation. The system's capacity to withstand a stress test of more than 100 concurrent users while at the same time maintaining a reliability score of 93.66% is a true testimony to the system's strength under the most demanding real-world scenarios and, therefore, the processing delays that are most times the manual systems have been significantly reduced. This is an efficiency gain that is transferred to faster decision-making and reduced administrative workload which is the case with SSFO staff who are thus enabled to focus on higher-value tasks.

Centralizing data in a Google Firebase real-time database for the Greater New York Gardener's Representative system significantly reduces the most common errors of manual record-keeping, which are lost or duplicated applications. The security measures of the system, as demonstrated by a security score of 94.25%, protect the sensitive applicant's information through encryption of data in transit, access control based on roles, and strict authentication mechanisms. These steps, in addition to ensuring data integrity, also create confidence in users which is a prerequisite for a long-term uptake and observance of the data privacy best practices.

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Excellent usability testing results show an impressive satisfaction score of 94.5%, which is a great testament for the effectiveness of a user-centered design process. The close interaction through the feedback loops have allowed the student and administrator portals to be not only user-friendly but also easily accessible and responsive to various devices thus catering to a wide range of user needs and skills in the use of technology. Through a focus on usability, the project is reducing the access barriers that users encounter when they use it, hence producing a positive user experience and leading to system use becoming a regular habit.

Unlike many existing scholarship management systems that rely on traditional waterfall development models (Rihar & Kus, 2020), this project's Agile methodology enabled continuous user involvement and iterative refinement, resulting in a platform closely aligned with stakeholder needs. By using Google Firebase as a cloud-native backend, the system is distinguished from other similar systems in the sense that it offers realtime synchronization, scalability, and less infrastructure complexity, which are the features that are usually missing in the comparable systems (Ciancarini et al., 2024; Vics et al., 2021). In addition, the previous researches have identified problems such as temporary internet access and data coordination (Abdulnaser et al., 2021), whereas the improvements of the offline mode and SMS notification of this system that are still under development, can not only solve the issues locally but also make the system a more flexible and comprehensive user-friendly solution.

This model can be extended to different educational institutions and government offices that are still depending on manual or partially digital processes. Its impressive impact on efficiency of operations, data accuracy, and user satisfaction serves as a proof to the power of Agile development combined with cloud-native technologies for public sector digital transformation. The focus of the project on involvement of stakeholders and implementation of user-centered design principles creates a feasible framework which can be used for technology acceptance in the same kind of environment.

Such a system stands as an example for other government agencies how cloud computing can be used to provide services in a cost-effective, secure, and transparent manner, thus being in line with the overall digital governance goals. However, the reliance on stable internet connectivity underscores the need for infrastructural investments and contingency planning, especially in regions with limited network access.

While the system is well-equipped, its heavy reliance on a continuous online connection is, without a doubt, the primary reason separating those with a strong internet connection from those with a weak one. Besides that, the absence of a feature that allows the platform to handle the flow of funds limits the platform's ability to offer the scholarship lifecycle entirely. Subsequent features such as an offline mode for writing applications, SMS-based communication, and bank integration for direct fund transfers will not only facilitate access and operational completeness but also will turn the system into a more stable and all-inclusive one.

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CONCLUSION AND RECOMMENDATION

Conclusion

The creation and the use of a Scholarship Data Management System for the Social Service Facilitator's Office (SSFO) in Zamboanga Del Sur have been a great way to solve problems and issues that were caused by the inefficient and difficult manual paper-based process. The system, which is developed using an Agile development methodology with a cloud-native backend via Google Firebase, offers a platform that is safe, expandable, and easy to operate for both students and administrators. The system was able to achieve its security (94.25%), reliability (93.66%), and usability (94.5%) goals with high scores, as well as excellent performance efficiency (95%) and functional suitability (94%) when measured by ISO/IEC 25010 standards. The platform is, therefore,

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capable of not only meeting the most critical quality requirements necessary for practical deployment but also going beyond them.

In addition, real-time data synchronization, role-based access control, and a centralized database have been integrated to significantly improve data accuracy and administrative efficiency. A user-centered design approach was employed to ensure that the system corresponds with the workflows of the stakeholders which thereby enhances the adoption and satisfaction levels. However, the dependence on internet connectivity, which is seemingly continuous, and the lack of a fund disbursement management feature are some of the drawbacks of the system's cloud-based design that offers scalability and ease of maintenance.

In sum, the undertaking is a model that shows how digital technologies can revolutionize the traditional administrative processes of the educational sector and make them leaner, more transparent, and efficient if user engagement is iterative and is done thoughtfully. It, thus, provides valuable insights as well as a tangible model to the other institutions intending to modernize scholarship management.

Recommendations

1. **Offline Mode for Scholarship Application Management**
   - The development of an offline mode will allow users to create and manage their scholarship applications locally on their devices, thereby not needing an internet connection at all times. The feature will greatly benefit users who live in areas that are poorly networked or have intermittent network coverage.
2. **Integrated SMS Notification System**
   - Besides email notifications, communication channels that are SMS-based should be utilized so that alerts are sent to the mobile phones of recipients. In this way, those who have access to the internet that is limited or not stable will be able to receive the updates they need in a timely manner.
3. **Develop a Fund Disbursement Management Module**
   - The system should be extended through the inclusion of direct integration with banking systems that are used for automated scholarship fund disbursement. This would make the management of the scholar's lifecycle possible from the very first stage to the very last stage, thus resulting in less administrative work and more transparency.

The SSFO Scholarship Data Management System will be able to transition into a more robust, all-encompassing, and user-focused platform by implementing these proposals. Moreover, it will substantially simplify the management of scholarships while being instrumental in achieving the broader digital transformation goals met by educational institutions.

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