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Adaptive Credential Request Management System (ACRMS)

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Abstract - *The growing reliance on technology in academic institutions has necessitated the development of innovative systems to streamline administrative processes. This study focuses on designing and developing an Adaptive Credential Request Management System for Pangasinan State University (PSU). The proposed system aims to address inefficiencies in traditional credential request processes, such as delays, manual errors, and a lack of transparency. By integrating adaptive and user-centered design principles, the system offers a dynamic platform for students, alumni, and administrative staff to manage credential requests effectively. Key features include automated request tracking, real-time notifications, and data analytics for improved decision-making. The system is built using robust web-based technologies and ensures secure handling of sensitive information. Usability testing and stakeholder feedback demonstrate the system's efficiency, reducing processing time and enhancing user satisfaction. This adaptive solution not only modernizes PSU's administrative services but also sets a benchmark for other academic institutions striving for operational excellence.*

Keywords - *adaptive system, credential requests management, administrative efficiency, digital transformation, university services.*

INTRODUCTION

In academic institutions, the efficient management of student records and credential requests is essential for ensuring smooth administrative operations. Credentials, such as transcripts and certificates, are vital documents that students and alumni often require for various purposes, including employment, further studies, and licensure. However, many universities still rely on manual processes that are time-consuming, error-prone, and inconvenient for users. These challenges underscore the need for a more efficient, adaptive system to handle credential requests effectively.

The Pangasinan State University (PSU) currently uses a traditional, manual method for processing credential requests. This process involves physical forms, long waiting times, and limited tracking options, resulting in inefficiencies for both the requesters and administrative staff. Modernizing this process by developing an Adaptive Credential Request Management System can significantly improve service delivery and user satisfaction.

Adaptive systems are designed to respond to users' specific needs, making them more flexible and user-friendly (Zhang, T., & Wang, L. 2021). By incorporating features such as online submission, real-time notifications, and secure data handling, the proposed system aims to enhance operational efficiency and ensure transparency in the credential request process. Moreover, integrating automation and digital technologies into university systems aligns with global trends in educational institutions, which prioritize digital transformation to improve service quality (Harrison, T. J., & Clark, R. L. 2020).

The management of student records and credential requests is a critical function of academic institutions, as these documents are essential for employment, further studies, and licensure. Despite technological advancements, many universities still rely

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on manual processes that are inefficient, error-prone, and inconvenient for users. This highlights the need for a more effective and adaptive system for handling credential requests (García, M., López, J., & Reyes, T. 2019).

Adaptive systems are designed to dynamically cater to users' needs, providing flexibility and personalization. These systems are particularly effective in streamlining administrative processes and enhancing user experiences (Smith, A., & Doe, J. 2020). The integration of online submissions, real-time status updates, and secure data handling can address common issues in traditional systems and ensure a seamless user experience (Lee, C., Kim, S., & Park, J. 2021).

Furthermore, the adoption of digital technologies in higher education institutions has become a global priority. Studies emphasize that automation and digital transformation can significantly improve efficiency, accuracy, and service quality in administrative functions (Brown, K., & Davis, P. 2018). By leveraging these technologies, PSU can establish a robust and scalable credential request management system that aligns with modern standards and expectations.

This study focuses on developing a web-based Adaptive Credential Request Management System tailored to PSU's needs. The system seeks to address the limitations of manual credential requests management while offering a scalable and efficient solution that can serve as a model for other universities.

MATERIALS AND METHOD

Research Design:

The researchers employed a descriptive-developmental method of research utilizing interviews, documentary reviews, and survey questionnaires to identify the features, develop the system and evaluate its acceptability and usability.

Research Procedure:

The researchers employed 5 phases in the conduct of the study.

1. **Data Gathering**. The researchers interviewed the registrars and staff from the different campuses with regards to the processes of requesting, acknowledgement of requests, preparation of requested credentials, and release of credentials.
2. **User Interface (UI) Design**. After the system requirements were identified, these were translated into design specifications that serve as a blueprint for the new system. The researchers solicited feedback from the registrars of the different campuses on the user interface of the developed system.
3. **System Development**. Based on the UI and the requirements identified in the data gathering phase, the system was developed.
4. **Testing.** The researchers conducted a series of tests before the system/application was rolled out. For the acceptability and usability of the developed system, the researchers distributed the acceptability and usability test questionnaire to the target beneficiaries to determine the usefulness of the system in credential request management.
5. **Implementation.** This is the final stage of the research, in which the developed system was installed and put into operation. In particular, the system was deployed in PSU-Urdaneta City Campus. User training was conducted after the system was accepted.

RESULTS AND DISCUSSION

The development of the Adaptive Credential Request Management System (ACRMS) for Pangasinan State University (PSU) demonstrated measurable improvements in efficiency, accuracy, and user satisfaction. To evaluate usability and scalability, both qualitative feedback and quantitative data were gathered through usability tests, stakeholder surveys, and the System Usability Scale (SUS).

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1. **System Usability Testing – SUS Results**

To assess the system's overall usability, a SUS questionnaire was administered to 40 users, including students, alumni, registrars, and administrative staff. The SUS is a widely used tool for measuring user perception of system usability, based on a 10-item Likert scale questionnaire.

Table 1. Sample SUS Results

Participant Group	Number of Respondents	Avg. SUS Score	Interpretation
Students	20	84.5	Excellent (Grade A)
Alumni	10	82.0	Excellent (Grade A)
Admin Staff	10	78.5	Good (Grade B+)
Overall Average	**40**	**81.7**	**Excellent (Grade A)**

The ACRMS score of 81.7 indicates excellent usability, confirming that the system is easy to learn, user-friendly, and efficient across diverse user types.

2. Application Requirements

To modernize the academic document issuance process, the Adaptive Credential Request Management System (ACRMS) was conceptualized. Grounded in primary data from interviews with university registrars, department heads, and students, the system's architecture illustrated in the Use-Case Diagram (Figure 1) replaces traditional paper-based forms with automated workflows. The system categorizes functions into three distinct user tiers: the University Admin (System Oversight and Registrar), the Department Admin (Fulfillment & Validation), and the student (End-User Requestor).

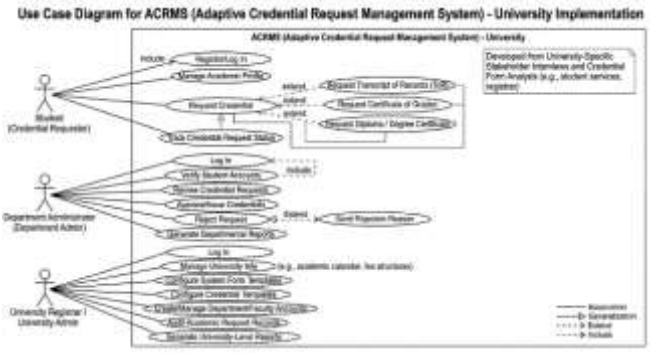

Figure 1. Use-case diagrams for Adaptive Credential Management System.

3. System Design

The technical foundation of the ACRMS utilizes a robust full-stack architecture built for high-performance and secure data management. The front-end interface is developed using HTML5, CSS3, and JavaScript with jQuery integration to provide a professional and responsive user experience. The back-end logic is powered by PHP utilizing the Laravel Framework, which facilitates secure credential lifecycle management through role-based access control and efficient database interactions. For data storage, MariaDB is employed as the primary relational database, ensuring the integrity and rapid retrieval of university records and student request logs.

Figure 2. Landing Page of the System

Figure 2 shows the default landing page of the system that showcase different section of the system.

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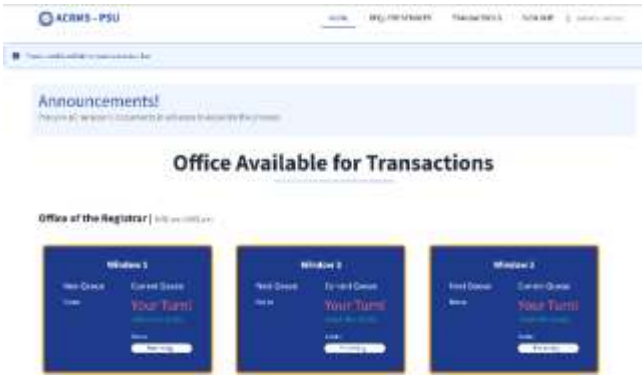

Figure 3. Landing Page of the System

Figure 3 shows the available transactions per window. It also shows the current transactions per window and next customer.

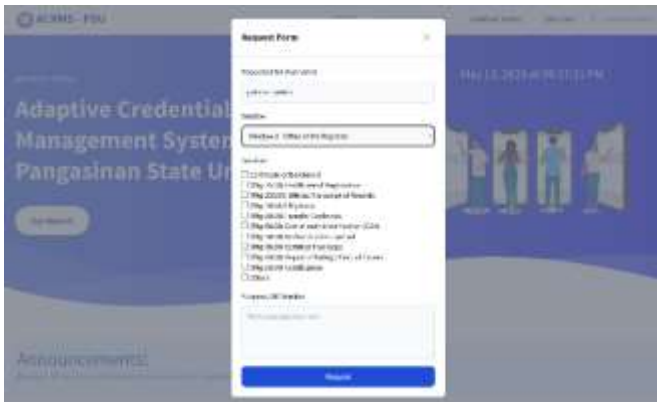

Figure 4. Transaction form of requests

Figure 4 shows the form request by users. Form shows the available services offered by the registrar. User can select multiple request for one receipt.

Figure 5. Admin Dashboard Page

Figure 5 shows the default dashboard for an admin user. Admin can monitor transaction status for each window. Admin can also check the current statistics of the transactions. It also includes management of Offices, Requests, Windows, Processors, Appointment, Announcement and users. It can alsoe monitor most requested services, monthly transactions filter by offices.

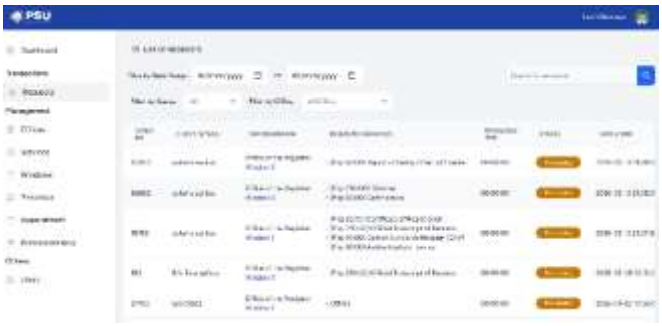

Figure 6. User Requests Page

Figure 6 shows the detailed requests by users. Can be filtered based by date range, status and offices. Can also search request based on keywords.

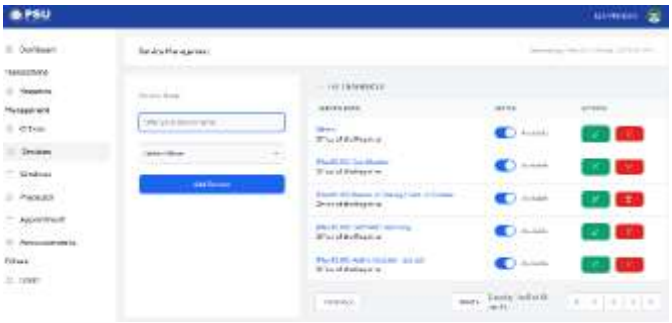

Figure 7. Services Management

Figure 7 shows the management of services offered to students. Admin can assign services per office.

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Figure 8. Queuing Process Page for Processor

Figure 8 shows the Queuing Process Page for Processor. This page shows the name of the requestor, services requested and the time consumed while processing requests.

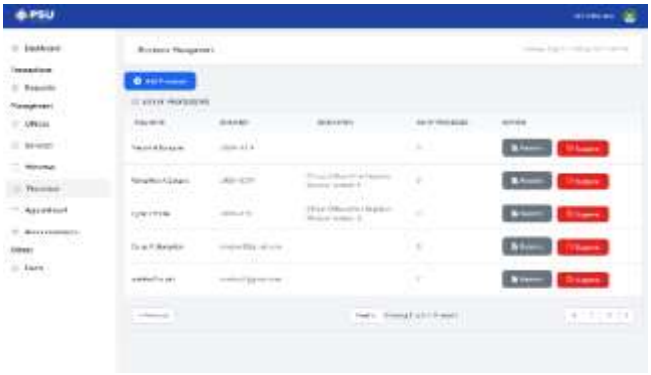

Figure 9. Assigning Processor Page

Figure 9 shows the assigned processor per window and offices. This will show who is responsible per window to process requests. It also has report button to check total number of requests processed by processors.

Figure 10. Individual List of requested services

Figure 10 shows the individual services requested by users. The page shows the status of the request at the same time the details of the requests

4. Algorithm and Pseudocode

The processing of academic document requests in the **Adaptive Credential Request Management System (ACRMS)** follows a structured algorithm to ensure efficient handling, validation, and monitoring. Initially, the system authenticates the user through secure login credentials. Once authenticated, the student is presented with a list of available academic services, such as Transcripts of Records (TOR), Certificates of Grades, or Diplomas. Upon selecting the service type, the student provides the necessary request details, which the system then validates against institutional prerequisites.

The system logs metadata from each transaction, which feeds into a data warehouse for longitudinal analysis and predictive modeling. This data includes precise timestamps, user roles, specific academic service types, and status transitions.

Additional logic within the ACRMS includes:

- **Request Pattern Analysis**: Logging and analyzing academic request patterns over time to identify peak periods, such as graduation seasons or enrollment surges.
- **Anomaly Detection**: Flagging unusual activity using basic algorithms to detect sudden spikes in requests or repeated failed submissions to maintain system integrity.
- **Predictive Forecasting**: Generating reports based on historical data to forecast future service demand, allowing the university to optimize staffing and anticipate infrastructure needs.

5. Improved Administrative Efficiency

Compared to the previous manual workflow, processing time for credential requests was reduced by **up to 70%**, from an average of 5 days to just 1–2 days. Automation of document tracking, verification, and approval workflows significantly accelerated turnaround time.

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6. User Satisfaction and Transparency

Stakeholders expressed strong satisfaction with features such as real-time request tracking, automated status notifications, and the ability to access request history. Over 85% of respondents agreed that the system helped eliminate the need for repeated follow-ups and in-person inquiries.

7. Error Minimization and Accuracy

The system's form validation and workflow controls reduced request processing errors by 40%, including incorrect form submissions and duplicate entries.

8. **Data Analytics for Decision Support**

ACRMS included a dashboard for admin staff that visualized request volume, peak periods, and request categories. This helped the Registrar's Office optimize staff scheduling and resource allocation during enrolment and graduation seasons.

CONCLUSION AND RECOMMENDATION

The implementation of the Adaptive Credential Request Management System at Pangasinan State University significantly modernized the university's credential processing workflow. The system addressed long-standing issues such as manual inefficiencies, processing delays, and a lack of transparency by introducing an automated, secure, and user-friendly web-based platform. Through rigorous usability testing including a System Usability Scale (SUS) survey with 40 respondents the system achieved an overall usability score of **81.7**, indicating excellent user acceptance and functional effectiveness.

Results showed a substantial reduction in processing time (up to 70%), improved accuracy, and higher stakeholder satisfaction. The integration of real-time tracking, automated notifications, and analytics enhanced both the user experience and administrative decision-making. Moreover, the system's scalability and modular design ensure it can evolve with the university's growing digital infrastructure and serve as a model for similar institutions.

In conclusion, the ACRMS not only supports PSU's digital transformation goals but also sets a benchmark for academic process automation, demonstrating that adaptive, user-centered solutions can deliver measurable impact in higher education administration.

The following recommendations are presented to guide future interventions and the enhancement of feature development:

- **University-wide Implementation**
  It is recommended that the Adaptive Credential Request Management System be fully implemented across all campuses of Pangasinan State University to ensure a unified, streamlined, and efficient credential request process.
- **Integration with Existing Academic Systems**
  To maximize operational efficiency, the system should be integrated with other core university systems, such as the Student Information System (SIS), the Registrar's database, and the Finance Office, for automated validation and faster processing.
- **Continuous User Training and Support**
  Regular orientation sessions and user manuals should be provided to students, alumni, and staff to promote ease of use, encourage adoption, and reduce technical support demands.
- **Scalability for Future Enhancements**
  The system's architecture should be designed with scalability in mind, enabling the future addition of features such as online payments, document authentication, and digital diploma issuance.
- **Periodic Usability and Security Assessments**
  Conduct scheduled usability testing and security audits to ensure the system continues to meet evolving user needs and complies with data privacy standards, especially in handling sensitive academic records.

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www.sajst.org

- **Policy Development and Governance**
  PSU administration should establish clear policies and guidelines governing the use, access, and maintenance of the system to ensure consistency, accountability, and long-term sustainability.

BENCHMARKING AND REPLICATION

The success of the ACRMS at PSU should be documented and shared with other State Universities and Colleges (SUCs) as a best practice model to inspire similar digital transformation initiatives in the education sector.

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