

DEVELOPMENT AND EVALUATION OF A WEBSITE PLATFORM FOR HIGHER EDUCATION INSTITUTIONS

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Abstract

Many higher education websites use general-purpose platforms like Joomla and WordPress, but functionality and features were not specifically designed for such use. This study focuses on designing and developing a customized platform to cater to the needs of higher education institutions by having an interactive and content-rich website. This study aimed to provide the different offices with access and the ability to add and modify information about their respective offices, faculty deliverables, and an internal messaging solution. Further, it also aims to evaluate the developed online platform based on the ISO 25010 Software Quality Model and Quality in Use. The researcher used a descriptive-developmental research method and utilized the rapid prototyping methodology in developing the system. The system was developed using PHP as the scripting language and MySQL as the DBMS. Upon evaluation, it was found to be of good quality and usable, thus Implementation of the system was highly recommended.

Keywords: Website Platform, Higher Education Website, Customized Platform, Information System.

Introduction

We are now in a generation of computers called the "Information Age." The underlying principle of this generation is information sharing. In this generation, computers are connected to networks, and networks are connected to other networks - the Internet.

It is a must for every institution to be able to provide information to its clients when and if they need it. To do that, institutions rely on the Internet and websites. The main purpose of a website is to display information. Moreover, people visit websites to get the information they need. With the advancements in web technology, websites can become more than "websites," they can become "web information systems." Schools must be visible to the general public; therefore, websites for schools have become an essential component of school public communication [1].

Most school websites were built on "general-purpose" platforms like WordPress and Joomla [2]. These platforms are quite good, flexible, and fully featured, and they are prominent open-source CMS (content management systems) [10]. But these platforms were not designed to meet the needs of a higher education website. A much more flexible feature is needed for schools: a customized web information system for schools that will serve as an online platform for the school website. This is because interactivity on websites encourages a more favorable attitude among visitors [3]. Added to this, the overall design of the website also leads to greater usage intentions [4].

The researcher would like to bridge this gap by developing an online platform, generally, a web information system that can be considered a CMS, that is designed for college and university websites. This will allow centralization of maintenance but decentralization of use, content updates, and communication at the office level. This platform allows different offices to maintain their content visible on the school website. This includes, but is not limited to, posting announcements, events, office details, and articles specific to their office. This also provides an internal messaging solution that will allow different offices to send information to other offices.

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The primary objective of this study is to create a website platform for higher education institutions. Specifically, this study aims to: provide different offices and colleges with access and the ability to add and modify information about their respective offices; provide an internal messaging solution and submission of deliverables for the faculty; evaluate the created system in accordance with ISO 25010 Software Quality Model characteristics; and evaluate the created system using the ISO 25010 Quality in Use characteristics.

Methods

This study uses a descriptive-developmental design since its primary aim is to develop a system and determine its quality and usability. According to Ariola, descriptive research explains current events, and the research questions or challenges posed were founded on an understanding of current phenomena, events, or states of affairs. The descriptive method's goal is to describe "what is," or the current state of objects, people, and events, and developmental design pertains to the software development life cycle model. This design follows a well-defined and ordered set of activities in developing software [6].

This study was conducted at the Northern Negros State College of Science and Technology. The respondents to the study were the heads of the 19 offices of the mentioned institution. These offices play a significant role in the contents of the online platform.

The researcher used purposive sampling to determine its respondents. A purposive sample is someone who has the characteristic that is needed or relevant to the purpose of the data gathering [7]. In this way, the researcher focused on the responses of the selected respondents that are relevant to this study.

To determine the level of the developed system's quality, the researcher adopted the criteria from the ISO/IEC 25010 Software Quality Model. Moreover, to determine the quality of use of the developed system, the researcher adopted a criteria-based assessment based on the ISO/IEC 25010 Model of Software Quality in Use. And to assess the system's features, the researcher created a self-made instrument that was validated and tested for reliability.

Data Analysis Procedures

After the data were collected, the researcher then processed the data, which involves tallying, tabulating, and performing analysis of the data.

To measure the central tendency, the mean will be used by the researcher. Results were then interpreted based on the rating scale and interpretation. "The

mean makes the most sense when it is calculated with variables that convey quantities, such as ordinal-, interval-, or ratio-level variables" [9].

The Software Development Life Cycle

The researcher used the rapid prototyping model. This model is specifically designed for non-technical users of the system to be developed who do not know what they want or what they can have. It emphasizes requirement analysis and validation.

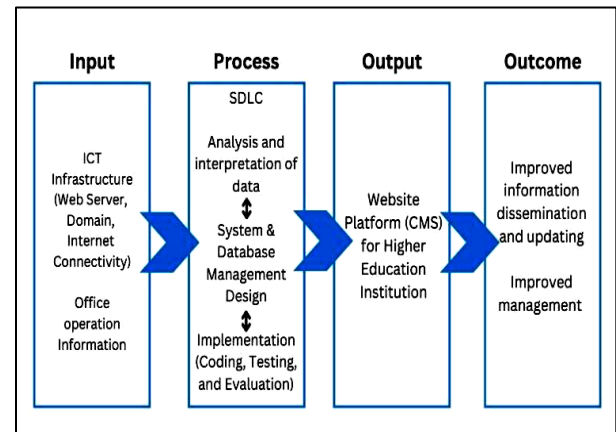


Figure 1: Framework

Figure 1 shows the framework of the website platform (CMS) for a higher education institution. It shows the process wherein different data and technology were used as input, and the Software Development Life Cycle Model was then applied, following the principles of database management and software engineering. This produces the output, which is the online platform, which will improve the process of information dissemination and management.

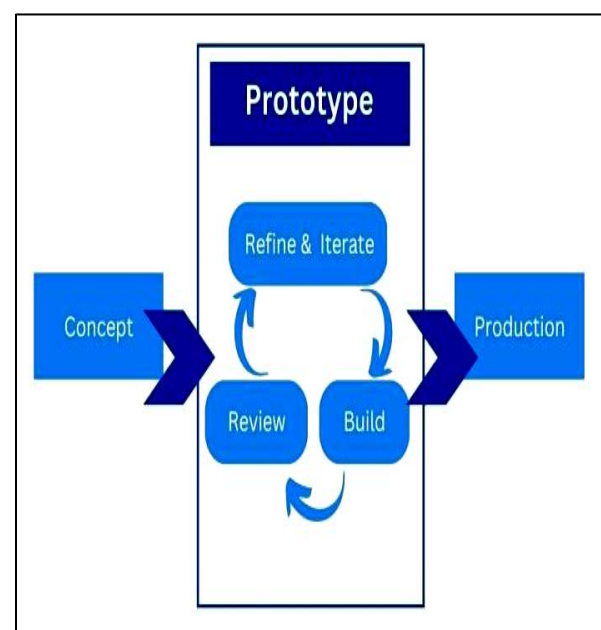


Figure 2: The Rapid Prototyping Model

The several stages of rapid prototyping are depicted in Figure 2. The concept phase is part of the requirement capture phase. The build, review, refine, and iterate phases make up the prototyping phase.

Concept Phase

In the concept phase, commonly known as the planning and analysis phase, the researcher will conduct an interview with different sources to determine the needed data to be included in the system.

Quick design includes the creation of the logical design and its physical design. In this phase, a data flow diagram, an entity-relationship diagram, a system architecture, and screen layouts were created.

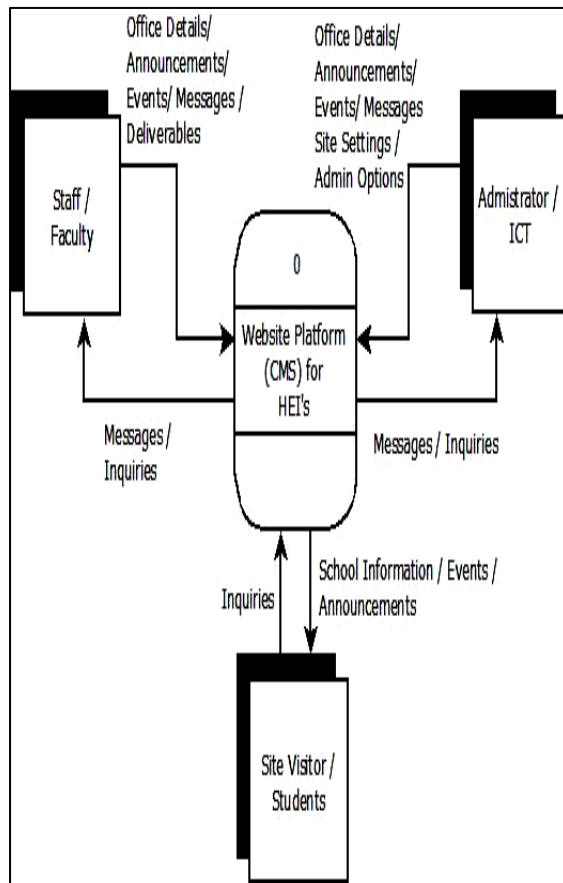


Figure 3: Context-Level Data Flow Diagram

Figure 3 shows the context-level data flow diagram of the developed system. The head of the office and the administrator add and modify different data on the online platform. This includes office details, announcements, events, and messages. The administrator may view and modify the contents of the online platform. Guests and visitors to the website may view and send inquiries through the platform.

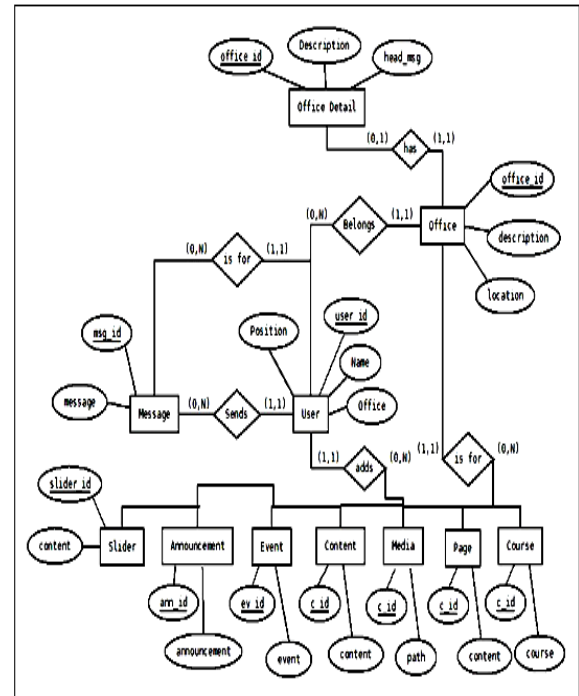


Figure 4: Entity-Relationship Diagram

Figure 4 is the entity-relationship diagram of the website platform for HEIs. This figure shows the relationship between the different entities used by the system. Primary keys and foreign keys are used in conjunction to connect these entities.

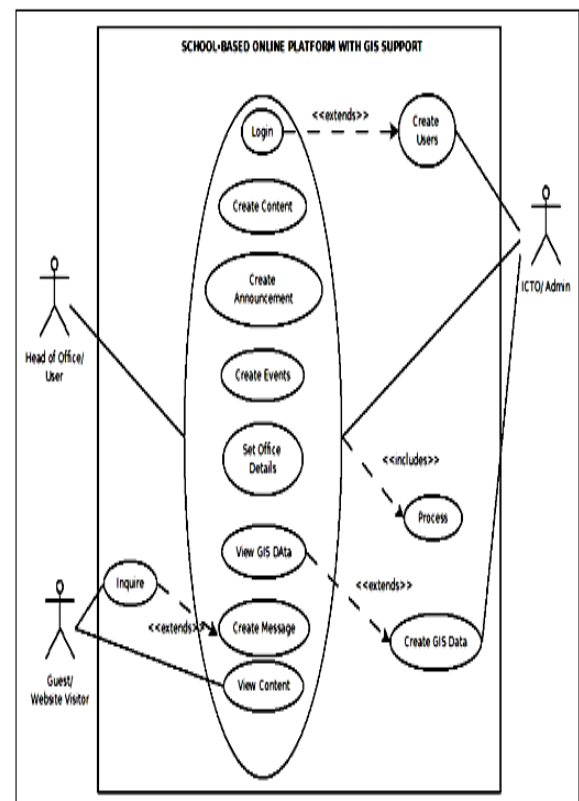


Figure 5: Use-Case Diagram

Figure 5 shows the use-case diagram of the developed system. Use case diagrams - also called behavior diagrams - are used to show a set of actions that a system or group of systems should or could do in collaboration with one or more users of the system [10].

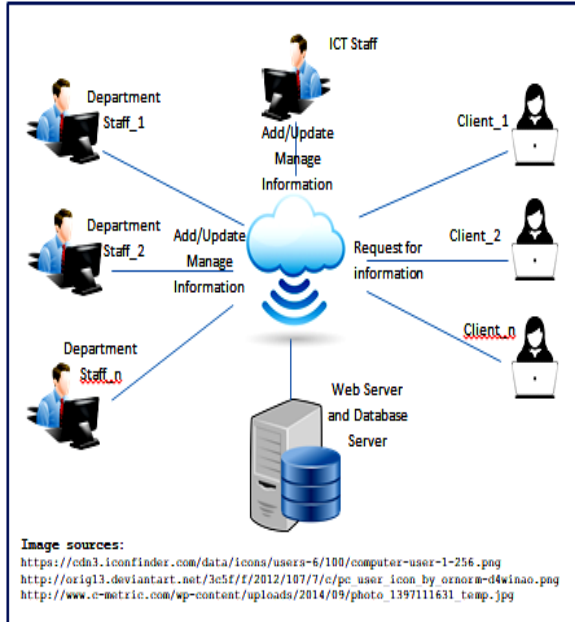


Figure 6: System Architecture

Figure 6 shows the system architecture of the developed system. The diagram shows how different users access the system via the internet. All data is stored on the web server and its database management system.

Building of Prototype

In this phase, a prototype will be developed based on the concepts of the researcher and the initial information gathered. The system was developed using PHP as the scripting language, HTML5, CSS3 for its layout and design, and MySQL for its database management system.

This platform was developed using a pure object-oriented style of programming. This also partly mimicked the concept of MVC - the model-view-content architecture - to provide better flexibility in terms of restructuring.

To secure the platform, the researcher used the latest method for securing passwords in PHP. All inputs are sanitized to make sure no erroneous inputs are entered.

Each module was tested independently using white box testing. The researcher conducted thorough testing on each module to ensure the efficiency and accuracy of each action.

Table 1: Minimum Software and Hardware Specification

Software	Hardware
CentOS 7 Operating System	1Core 3GHz
Webmin / Control Web Panel	2GB RAM
PHP (latest version)	25GB Storage
MySQL (latest version)	(Preferably Cloud-based)
Apache, Nginx WebServer	
ModSecurity	
Fail2ban / CSF (Config	
Server Security and Firewall)	

Table 1 shows the software and hardware needed for the implementation of the developed system. CentOS was chosen by the researcher due to its stability and popularity in the web hosting industry. The college has the option to use the free software Webmin as a web-based server admin panel, though a paid option like Plesk is far more user-friendly. As for the web server, Apache and NGINX are recommended since they're free and reliable. To secure the server, ModSecurity, a web application firewall, and Fail2ban, an IP address banning software, are recommended to harden the server.

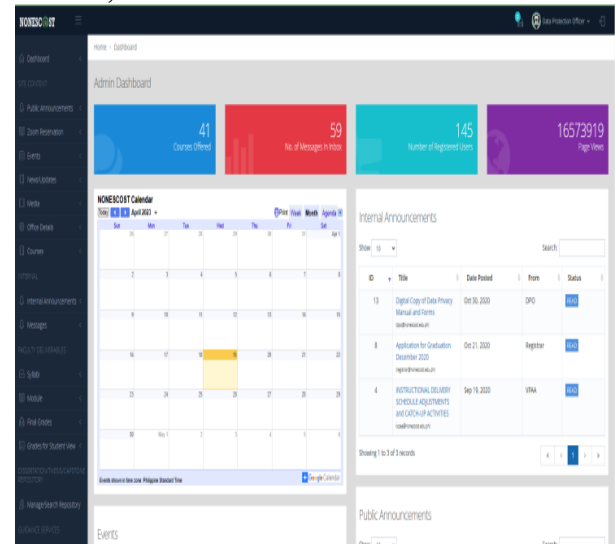


Figure 7: The Admin Panel Dashboard

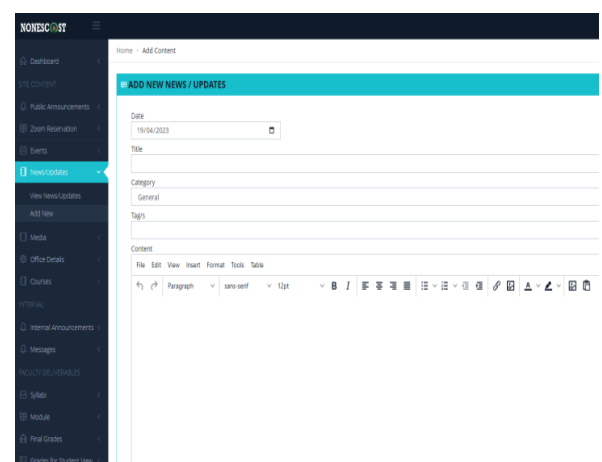


Figure 8: Adding of News and Updates Feature

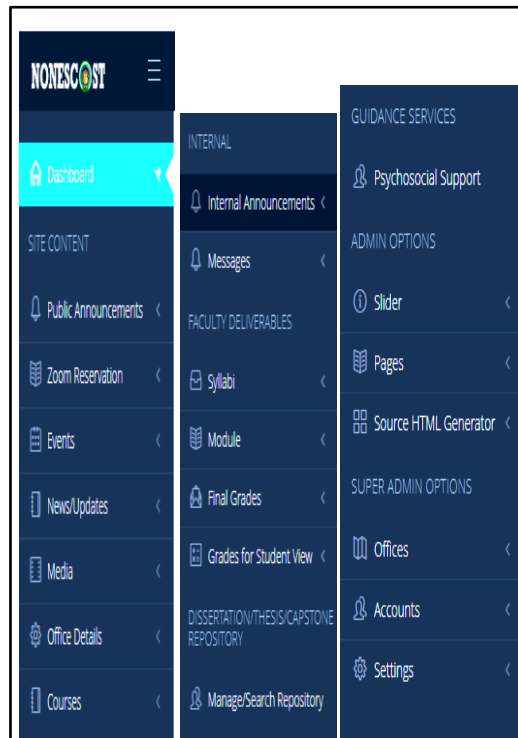


Figure 9: List of Menu Items

Figure 7 shows the dashboard of the system, figure 8 shows the form where users can add news and updates, and figure 9 shows the list of menu items, which corresponds also to the different back-end features of the system such as posting of public announcements, events, news and updates, uploading of media, reservations, internal announcements, messages, faculty deliverables like module and syllabi submission, student research repository, guidance services, slider, website pages, offices, accounts, and the administrator settings.

Customer Evaluation of Prototype

After the prototype is developed, the system will be evaluated by five (5) different information technology experts using the ISO/IEC 25010 Software Quality Model. After the expert's testing, it was then evaluated by its respondents using the ISO/IEC 25010 Quality in Use and the self-made instrument.

Final Product

The engineering of the final product will only occur after repetitive evaluation and redesign of the prototype until the prototype meets the customer's needs.

Results and Discussion

Upon subjecting the developed online platform to expert testing and usability testing from different experts and respondents, the following are the results of the evaluation:

Table 2: The Quality of the Developed System Using ISO/IEC 25010 Software Quality Model

Criteria	Mean	Interpretation
Functional Suitability	4.7	Very Good
Performance efficiency	4.7	Very Good
Compatibility	4.7	Very Good
Usability	4.8	Very Good
Reliability	4.7	Very Good
Security	4.8	Very Good
Maintainability	4.8	Very Good
Portability	4.9	Very Good
Grand Mean	4.8	Very Good

Table 2 shows the level of quality of the developed system based on the ISO/IEC 25010 Software Quality Model. The functional sustainability, performance efficiency, compatibility, and reliability of the system received a mean rating of 4.7, which is considered to be very good. In terms of usability, security, and maintainability, the system received a mean rating of 4.8, which is interpreted as very good. In terms of portability, the system received a mean rating of 4.9, which is also interpreted as very good. The system has a grand mean of 4.8, which has the same interpretation as very good.

Table 3: The Quality in Use of The Developed System Based on ISO/IEC 25010 Quality in Use Characteristics

Criteria	Mean	Interpretation
Effectiveness	4.3	Very Good
Efficiency	4.4	Very Good
Satisfaction	4.5	Very Good
Safety	4.4	Very Good
Usability	4.6	Very Good
Grand Mean	4.4	Very Good

Table 3 shows the level of quality in use of the developed system using ISO/IEC 25010. In terms of usability, the system received a mean rating of 4.6, which is interpreted as very good. In terms of satisfaction, the system received a mean rating of 4.5, which is interpreted as very good. In terms of efficiency and safety, the system received a mean rating of 4.4, which is also interpreted as very good. Lastly, in terms of system effectiveness, the system received a mean rating of 4.3, which is interpreted as very good. The system has a grand mean of 4.4, which is also interpreted as very good.

Table 4: In Terms of Access & Ability to Add & Modify Information About Their Respective Offices

Statement	Mean	Interpretation
The developed system allows users from different offices to add information about their office	4.8	Strongly Agree

The developed system allows users from different offices to modify added information about their office	4.8	Strongly Agree
The developed system allows users from different offices to add events	4.8	Strongly Agree
The developed system allows users from different offices to add announcements	4.7	Strongly Agree
The developed system appears to be user-friendly	4.6	Strongly Agree
Grand Mean	4.7	Strongly Agree

Table 4 shows that in terms of allowing users from different offices to add information about their office, modifying added information, and adding events, the respondents rated the system with a mean of 4.8, which is interpreted as "strongly agree." In terms of adding announcements, the respondents gave it a rating of 4.7. And lastly, in terms of user-friendliness, the respondent rated the system 4.6, which is also interpreted as "strongly agree."

Table 5: In Terms of Providing Internal Messaging Solution

Statement	Mean	Interpretation
The developed system provides an internal messaging solution and deliverable submission	4.8	Strongly Agree
The internal messaging solution allows college officials/users to send messages to different offices	4.8	Strongly Agree
Guests/visitors of the NONESCOST website may submit a message/inquiry to the internal messaging system	4.4	Strongly Agree
Grand Mean	4.7	Strongly Agree

Table 6 shows that the respondents rated the system with a 4.8 in terms of the internal messaging solution and the sending of messages to different offices, which is interpreted as strongly agree. In terms of the guest's ability to send an inquiry, the respondents rated the system with a 4.4, which is also interpreted as strongly agree.

Conclusion and Future Scope

The following conclusions were drawn in light of the findings of this study:

1. The system has features that allow the heads of the different offices the ability to add and modify information from their respective offices. Such a feature will generally improve the contents of the website by having the latest information from an office posted directly on the specific page of the office;

2. The system has an internal messaging solution that allows heads from different offices to send messages, memoranda, or any form of communication internally and allows faculty to submit deliverables. This will speed up the process of sending communications between offices;
3. The system is of good quality, so its installation and use are safe and secure;
4. The system is highly usable based on the perception of the users, which means it is useful, it provides satisfaction to the user, and it is easy to use.

On the bases of the foregoing findings and conclusions, the following recommendations are submitted: Higher Educational Institutions (HEI) may consider using the developed website platform to improve the website and content delivery of every office to its clients; Upon implementation, HEI may consider upgrading the internet speed of the different offices to allow its heads and/or users to utilize the different functionalities of the developed online platform; the HEI may consider using at least a Virtual Private Server (VPS) in serving the developed platform to ensure secure and reliable web server for its online content – such upgrade may be useful also to implement other online systems for the institution. Further, it is also recommended that a similar study be conducted to improve the design and development of the platform and the effectiveness of the presented solution.

Conflict of Interest

There is no conflict of interest by the authors in this manuscript.

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