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College of Informatics and Computing Sciences

Code Red: Revolutionizing Learning with Productivity Fusion in LMS

A Research Study Presented to the

College of Informatics and Computing Sciences

Batangas State University – Lipa

In Partial Fulfillment of the Requirements for the Course

IT 222 – Advanced Database Management System

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TABLE OF CONTENTS

CHAPTER 1

INTRODUCTION

This chapter presents the background of the study, statement of the problem, statement of the objectives, significance and scope & limitations of the study.

1.1 Background of the Study

In our present situation, the learning management systems introduce us to making adjustments and to keep up with modern age technology. This learning management system is an online learning platform that revolutionizes the educational landscape. It is flexible and accessible for lecturers and students through the use of various learning tools such as lecturer materials, assignments, etc. This online platform is one of the solutions that addresses the needs of Batangas State University, especially within the context of hybrid teaching in BSU lipa campus which combines both face-to-face and online learning modalities. Through this online platform it helps the lecturer to easily share learning materials and activities and students can easily view the tasks given by the lecturers. This learning management system not only addresses contemporary issues but also the significant improvements in the overall learning process. With the change in the education landscape at BSU through this platform provides an adaptive promising for a richer dynamic future for e-learning.

In view of the existing challenges facing the university, we came up with a Code Red learning management systems LMS productivity tool. The implementation of such a system is intended to address these current issues and improve the educational experience of BSU. This

helps lecturers in administrative aspects while making it easier for students to access information. Through inadequate monitoring, inefficiencies in consultations scheduling and limited integration functionalities within the present LMS, several problems have been identified that necessitate a transformative approach in solving such multidimensional issues. To solve these multidimensional challenges, this study proposes the adoption of a new Code Red productivity tool system, which will be a step toward the educational journey for both students and lecturers.

In our research project, we develop a comprehensive solution to Batangas State University's Code Red Learning Management System (LMS). Our project aims at addressing these gaps to ensure that the learning process is more efficient for students and lecturers.

1.2 Statement of the Problem

The general problem for this research study is inadequacy of monitoring, inefficiency in consultation scheduling and limited integration capabilities. This may have several negative impacts on the overall effectiveness of the LMS system.

1.2.1 Specific Problem

- **Difficulty in tracking progress:** The lack of a centralized system for student's login and logout times makes it difficult to comprehensively follow up student activities. In this case, there might be no knowledge about their patterns of learning, which becomes challenging for both learners and teachers/lecturers to monitor academic development properly.

- **Inefficient appointment management:** Without a centralized system, the process of manually appointment can be time-consuming for students and lecturers. As a result, one may miss meetings or have overlapping schedules leading to inefficiencies and difficulties.
- **Limited integration capabilities:** The current LMS lacks seamless integration with external productivity tools, hindering educators' ability to optimize teaching methods.

The aforementioned specific problems highlight the critical need for the implementation of an innovative Learning Management System in productivity tools, aiming to address these issues and provide a comprehensive solution for advancing the education system at BSU.

1.3 Statement of the Objectives

Code Red aims to enhance the learning experience by seamlessly integrating productivity tools and personalized learning features into the LMS platform.

1.3.1 Specific Objectives

- **Develop a centralized logging mechanism:** Within LMS where all students' activities on login and logout across all courses and modules including their time stamps will be recorded.
- **User-friendly appointment platform:** Implement a user-friendly digital platform for appointment requests and approvals to have an organized scheduling and prevent overlapping appointments in LMS.

- **Integration of productivity tools:** Enhance teachers' productivity through the integration of productivity tools like calendars, task managers, collaboration platform among others.

By achieving these specific objectives, the implementation of Code Red aims to revolutionize the educational landscape at BSU, aligning the institution with the evolving trends and requirements of digital education.

1.4 Significance of the Study

It is a fact that every research was conducted not only for the reason that a problem exists, but also the consideration of its significance to particular individuals. The findings of the study may benefit the following:

School Administration. Through this study, school administration will improve communication, collaboration, and efficiency within the organization, resulting for better educational outcomes with regard to integrating productivity tools into their learning management systems.

IT Students. This study will enable the students to enhance collaboration through the effective utilization of productivity tools, ultimately improving their overall learning experience.

Instructors. This research may help lecturers improve their teaching methods by determining which productivity tools contained in the learning management system are most useful for student engagement and learning outcomes.

Future researchers. The result of this study will help them to have additional basis and knowledge about their own study or challenge them to conduct a better study. Also, it may help them to expand their study.

1.5 Scope and Limitations

The aim of our study is to develop and implement productivity tools in the Code Red Learning Management System (LMS) at Batangas State University. The objective here is to tackle particular issues with the current LMS such as insufficient monitoring, lack of efficiency in making appointments and limited integration capabilities. Therefore, it is aimed to enhance learning for both students and teachers within BSU.

This proposed productivity tools under Code Red is to improve learning for both learners and educators by offering features that will be implemented such as central logging mechanisms for monitoring student activities, user friendly platforms for scheduling appointments, and smooth integration with external productivity tools like calendars. These enhancements are intended to minimize administrative chores while ensuring effective use of productivity tools as well as enhancing efficiency in an educational setting.

However, there are some limitations in this research scope that should be considered. This research is limited by its focus on the College of Informatics and Computing Sciences (CICS) department before broader university wide implementation within the BSU. Additionally, while this study is carried out some factors like time limitations, resource

availability or peculiarities of these productivity tools may affect its implementation or effectiveness.

Moreover, it is important to note that some unexpected drawbacks or obstacles in the way of their adoption may arise during the execution of these productivity tools because they were tailored to address specific problems within the current LMS. It is very important therefore to note such possibilities and take them into account when assessing the study's outcomes.

CHAPTER 2

This chapter includes a literature review that has significant relationships and similarities with the present study.

2.1 Review of Related Literature

This chapter presents the related literature and studies gathered by the researchers, which widened their insights on the problem under study. By exploring related literature studies, we aim to build a foundation for the proposed Code Red Learning Management System (LMS) productivity tools by finding relevant literature and studies so that we can gather information on what has been done before in this area or perhaps inform us on how best to do it in the present. This review serves to identify major findings, methodologies used, and innovative solutions adopted in a similar context, leading to an effective formulation of a solution.

• **Learning Management System (LMS).** Teaching and learning have evolved and no longer the same as they were in the past because LMS indisputably provides a platform where teaching and learning take place, highlights the increasing adoption of LMS in educational institutions, that facilitates unified digital platforms for course delivery, content management, student engagement, and assessment (Smith & Jones, 2019).

In addition, learning management systems are platforms that provide integrated tools to deliver and manage online instructions. The majority of LMS are easy-to-use, flexible, accessible, and user-friendly, whether they are open source or commercial (Kasim & Khalid, 2016).

However, according to Lee (2021), who investigates how LMS integration affects teacher professional development, it can be seen from this study that LMS could be used as essential tools for delivering training modules to teachers while also serving for sharing resources among educators, fostering continuous learning processes among them, and improving hence their modes of instruction in class.

• **Centralized Logging Mechanism.** Pattichis (2016) defines that the use of logs to track students activities in LMS could allow for the tracking of attendance, time management, punctuality as well as provide an insight into patterns of productivity and distractions. By analyzing this data student accountability among students can improve their focus too. However, it is difficult to be sure of whether learners are really engaged in course materials just by looking at when they logged in/out due to the dynamic nature of web environments where people log in but may not engage actively. Websites like Runestone Academy also have features that enable instructors to monitor progress such as page views, code edits, videos played among others. These are powerful tools that can be used by educators to see how well students are engaging with the content and progressing through it.

Ahn & Shin (2018) also stated that improving learning analytics through centralized logging mechanisms in learning management systems points out how important centralized logging mechanisms within LMS platforms are as it pertains to enhancing learning analytics. By recording student login and logout activities across courses and modules, instructors can tell

students who are struggling; thus, they can align with the goal of developing a centralized logging mechanism inside Code Red LMS.

• **Appointment Management.** According to a study by Parchment and Sankaranarayanan (2021), the scheduling of availability of lecturers is a challenge to students and lecturers in institutions of higher learning leading to manual appointment scheduling procedures which are boring and time consuming. Consequently, appointment management entails use of different computer systems such as reminders, calendars, emails, and web applications. In previous studies, researchers have used techniques like fuzzy logic, decision trees and agents to make appointment management more efficient. Therefore, their research proposes the integration of multi-agents in order to support the process of appointment scheduling in institutions of higher education as well as an autonomous approach that will streamline it. Multi-agents operate independently within a system where each agent manages and schedules appointments thus enabling effective coordination between students and lecturers. Hence it is possible to employ multi-agents technology to automate these tasks has been affirmed by several previous inquiries indicating that integrating autonomous agent-based solutions could replace manual appointment scheduling systems using multi-agent paradigm.

• **Integration of Productivity Tools.** Alam (2020), the integration of Learning Management Systems (LMS) in education has transformed teaching and learning processes. The study "Optimizing Education: Building Blended Learning Curricula with LMS" shows the importance of using LMS logs to boost eLearning design and support. Through analyzing the user activity

logs, schools can determine how effective their online learning materials are, as well as ascertain right choices throughout decision-making processes. According to an analysis of productivity app strengths conducted in (2021), these productivity tools have become essential in various areas such as education, research and career advancement. These tools provide a structured way for monitoring progress, reduce gathering unbiased data about some research questions. As a result, the authors emphasize on the need for using screening tools that enhance proper data collection.

2.2 Summary

A review of related literature shows how important learning management systems (LMS) are in today's education as platforms that transform teaching and learning processes. These systems have a simple design, which allows people to adapt them for use across different educational institutions. LMS use has grown widespread, with these systems being adopted by most educational institutions to facilitate course delivery, content management and student engagement. The integration of LMS also enables teacher's professional development and provides a means for seamless resource sharing thereby improving classroom instruction. Additionally, with the help of centralized logging mechanisms inside LMS it is possible to track and monitor student's activities. However, due to the dynamic nature of web environments, accurately assessing student engagement solely through login/logout activities poses challenges. On top of this manual appointment scheduling procedures within higher education institutions has its share of challenges but all can be solved by integrating multi-

agent technology offering an autonomous approach in streamlining appointment management itself. This will improve coordination between students and lecturers themselves. Moreover, incorporation of tools for enhancing productivity within LMS is pointed out to be critical in order to optimize the eLearning design and decision-making process and improve teaching as well as learning experiences across various sector.

CHAPTER 3

METHODOLOGY OF THE STUDY

This chapter shows the requirements, analysis and database design including the waterfall model approach, entity relationship diagram and normalization.

3.1. Requirements

The researchers allotted time and effort in developing their survey questionnaire so as to serve its intended respondents. The survey questionnaire was divided into three parts which were related to the features of the Learning Management System the researchers will Implement in Batangas State University TNEU - Lipa specifically for the CICS department. The questionnaire is submitted to our research project adviser for comments, suggestions, and correction for validation. This is done to ensure that each statement is clear. In the questionnaire, Likert scale was used to determine if the students agreed or disagreed in each statement.

After the researcher's instructor and the dean of their department approved the request to conduct a survey, questions will be distributed through the use of google forms. But before the researchers distributed the google forms they first asked the participants for permission to participate in the study. After respondents completed the distributed survey questionnaires, their responses were collected, tallied, and evaluated. The researcher ensured that the information gathered was kept private.

3.2 Analysis

The primary goal of this study was to assess the impact of integrating Code Red Productivity Tools into the learning management system (LMS) at Batangas State University. A descriptive research design was employed for the purpose of examining the effectiveness of integration and gaining insights from students' and teachers' experiences. Descriptive research design as defined by McCombes (2020), is suitable for identifying characteristics, frequencies, trends, categories that can describe a population, situation or phenomenon. The data for this study were collected using Google Forms which help in obtaining data in a well-organized and structured manner on how productivity tools integration with LMS has impacted and what are their perceptions about it. This information shall aim at understanding and interpreting the results recorded, contributing to the wholesome absorption of knowledge within Batangas State University concerning these tools' usefulness in enhancing education at various levels.

Year and Section	Number of Students
1st - 1201	41
1st - 1202	42
1st - 1203	40
1st - 1204	39
1st - 1205	41
2nd - 2201	41

2nd - 2202	41
2nd - 2203	38
2nd - 2204	43
2nd - 2205	37
3rd - SM 3101	39
3rd - BA 3101	42
3rd - BA 3102	45
3rd - NT 3101	36
3rd - NT 3102	29
4th - CS 4101	24
Professor	10
Total:	628

Table 1: List of Respondents

The Likert scale is a tool that allows respondents to express their satisfaction levels towards integrating productivity tools into the Learning Management System (LMS). The questionnaire consisted of items that were scored on a scale ranging from 1 to 5, with the highest score being five and the lowest being one. The same was also accompanied by equal descriptive words.

Scale	Numerical Rating	Description
5	4.01 - 5.00	Strongly Agree

4	3.26 - 4.00	Agree
3	2.51 - 3.25	Neutral
2	1.76 - 2.50	Disagree
1	1.00 - 1.75	Strongly Disagree

Table 2: Scoring of Responses

Upon analyzing the survey responses from both the CICS department and the selected professors at Batangas State University (TNEU-Lipa), it is evident that integration of productivity tools into the Learning Management System (LMS) has received feedback across different areas. The average score for the questionnaire calculated based on values assigned to Likert scale responses is around 4.03%. This high average indicates a consensus among participants regarding the effects of these productivity tools. This highlights how these tools significantly enhance the learning experience, positively impact performance, and promote better collaboration between students and teachers. Participants also show optimism about the advantages of Code Red LMS productivity tools and their capability to tackle specific challenges within the Batangas State University educational framework. The average score of 4.03% emphasizes the outlook observed across all survey aspects, demonstrating strong support for the features implemented within the CICS department. This collective feedback offers insights for enhancing developments in the learning management system, reinforcing its role in enriching educational experiences.

3.3. Database Design

3.3.1 Waterfall Model Approach

This section discusses the development steps for the project's application. The system's developers utilized the Waterfall Model Approach. This method is characterized by its six sequential distinct phases that must be completed to ensure the project's successful completion: Requirements, design, programming, testing, deployment, and maintenance.

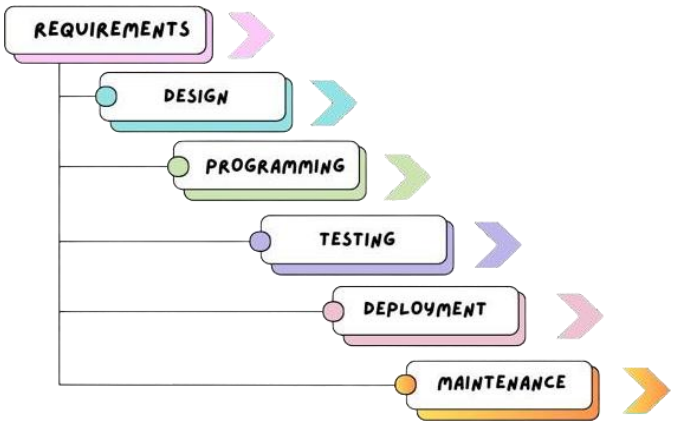

Figure 1. Waterfall Model Approach

• **Requirements.** The first step of the Waterfall model used for our LMS development was the identification of essential system requirements. This stage laid all the foundations which in turn established the LMS subject matter and objectives.

• **Design.** The second stage in the process was the creation of the technical diagram which is where we translated the collected information into design requirements. That is what will act as a foundation for our development of the LMS.

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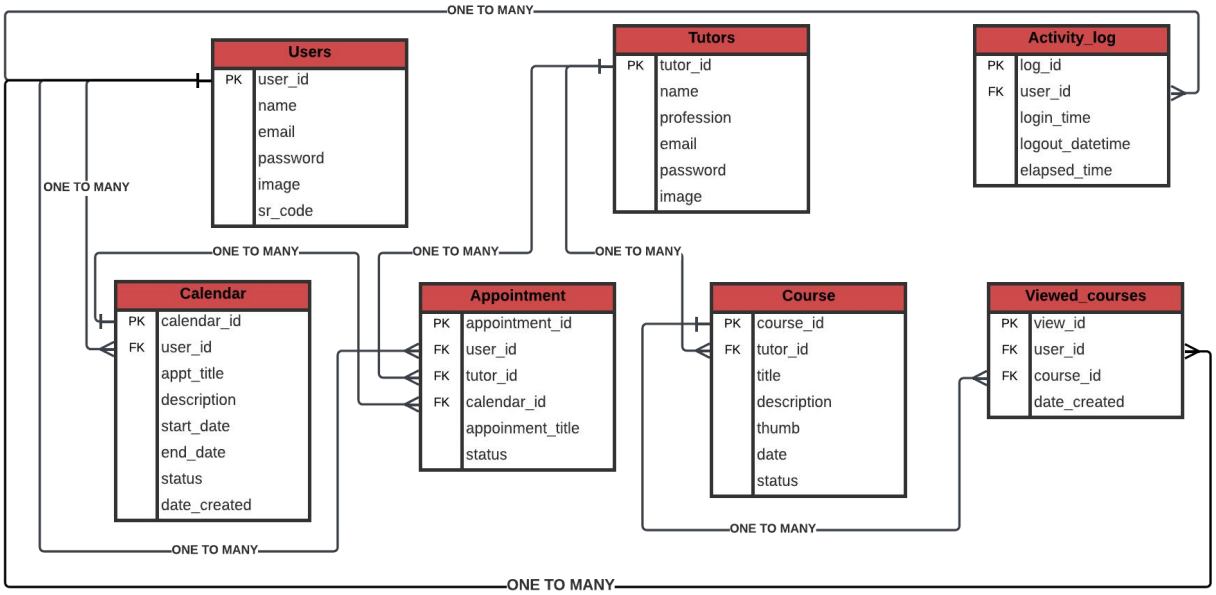
Entity-Relationship Diagram



The Entity Relationship Diagram (ERD) illustrates how a database is set up with tables that are linked to each other to show entities and their relationships. This tool is useful for database designers to visually represent how different parts of a system are related. The key components in this diagram are users_info, tutors_info, calendar, appointment, view_course, course and activity_log. These entities hold information about students, tutors as well as appointments and activity logs. The ERD uses primary keys and foreign key keys to represent these relationships giving an overview of how the database is organized.

College of Informatics and Computing Sciences

Final Normalization

Final normalization is an essential concept in database design as it helps to eliminate data redundancy and improve data consistency. In the case of "Code Red Learning Management System" includes normalization as an important component. By breaking down the data, large tables are divided into smaller ones that also relate with one another, hence eliminating repetition and inconsistency thereby ensuring a high level of accuracy and efficiency in recording information.

Users

user_id	name	email	password	image	sr-code

Tutors

tutor_id	name	profession	email	password	image

Calendar

calendar_ id	user_ id	appt_ title	descripton	start_ date	end_ date	status	date_ created

Appointment

appointment_id	user_id	tutor_id	calendar_id	appointment_title	status

Course

course_id	tutor_id	title	description	thumb	date	status

Viewed_courses

view_id	user_id	course_id	date_created

Activity_log

log_id	user_id	login_datetime	logout_datetime	elapsed_time

In our final normalization, we do several steps of normalization until we reach third normal form (3NF). At first, we organize the database normalization where every column on a table has distinct indivisible values.Next, in order to satisfy the second normal form (2NF), we ensure that there are no partial dependencies and non-key attributes are fully functionally dependent on the primary key. Lastly, Third Normal Form (3NF) is achieved by removing transitive dependencies where no non-key attribute depends on another non-key attribute. These guidelines result into a final normalized schema represented through different tables such as users, tutors, calendars, appointments and activity logs with each table structured around only one logical entity having no redundant or transitive relationships among them. This version of schema increases integrity of data, simplifies its management, as well as improve speed when searching or updating records.

• **Programming**. We conducted this phase, turning design into working code, by coding. All of the members of the team made extensive efforts to verify that the code represented the design, and that the LMS operated as anticipated.

• **Testing**. The last part was to get LMS ready for runtime by testing the system for errors or crashes. Without this phase our system would not have been robust and reliable; so it was consequently critical.

• **Deployment.** The final stage in the implementation process saw the deployment of LMS from the development environment to the production environment. This step was critical because it represented an important milestone in the project.

• **Maintenance.** Concluding phase carries out monitoring LMS constantly. Based on the user feedback, adequate changes will be carried out and updates will be done in order to maintain the level of reliability and usability of the system.

This method will serve as a guide for the project proponents to successfully complete the functionality requirements of the system.

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College of Informatics and Computing Sciences

Code Red: Revolutionizing Learning with Productivity Fusion in LMS

Survey Questionnaire:

Name(Optional):

Course:

Questions:	**5**	**4**	**3**	**2**	**1**
1.Did the integration of productivity tools into the LMS contribute significantly to enhancing the overall learning experience at Batangas State University?					
2. Did the implementation of productivity tools in the LMS positively influence your academic performance?					
3. To what extent do you agree that the seamless integration with external productivity tools (e.g., calendars, task managers) has significantly improved the functionality of the LMS?					
4. In a centralized logging mechanism within the LMS do you agree that tracking student activities and progress is essential?					

College of Informatics and Computing Sciences

5. Do you perceive that the present LMS productivity tools foster better collaboration among lecturers and students compared to the previous LMS?					
6. Do you think your participation in training sessions aimed at effectively utilizing new productivity tools integrated into the LMS contribute to your understanding and proficiency?					
7. In the integration of productivity tools into the LMS, do you believe it has a positive impact on student engagement and learning outcomes?					
8. Do you agree that the implementation of Code Red LMS Productivity Tools has streamlined administrative tasks within Batangas State University?					
9. To what extent do you agree that you were optimistic about the potential benefits of implementing Code Red LMS Productivity Tools for enhancing the educational experience at BSU?					

College of Informatics and Computing Sciences

10. I am confident that the proposed Code Red LMS Productivity Tools will effectively address the specific challenges identified in the current LMS at BSU based on the criteria of Educational Impact, Current Practices, System Evaluation, and Feedback for Improvement?					

Legends:

5 - Strongly agree
4 - Agree
3 - Neutral
2 - Disagree
1 - Strongly Disagree