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# CHAPTER ONE

# Background

The idea for this project was provided by Mr. Darren Blackshields, the supervisor of the research. Currently, the process of suggesting, accepting, and monitoring MSc student projects at the university is handled by multiple existing systems that are distinct and do not overlap. These systems include the CMS e-supervisor system, used for proposing and accepting project ideas, providing project deliverables, and facilitating communication between students and supervisors, as well as the moodle system, which contains a non-searchable list of project ideas and various templates. The aim of this project is to critically evaluate the existing university systems and identify the required functionality from a user perspective. The primary objective is to develop a web-enabled system that replaces the current systems and provides enhanced functionality.

The courses I have studied, namely System Modeling, Project Management, and Strategic IT, are highly relevant to the project idea. System Modeling provides a foundation for understanding the various components and interactions within a complex system, which is crucial for designing the new proposed student project system. Project Management equips me with the skills necessary to effectively plan, organize, and execute the project, ensuring its successful completion within the given constraints. Strategic IT enables me to consider the goals and alignment of the project with the overall IT strategy of the university.

Specifically, these courses have prepared me to address the functionality required for the new system. The system would cater to three types of users: students, staff, and admin. For staff, the system would provide a simple and intuitive interface to add, edit, and delete project ideas, as well as view proposals, reports, and provide feedback. The project ideas suggested by staff would follow the proposal template, including key information such as title, keywords, relevant MSc's/units/modules, and a project overview with clear objectives and deliverables. Students would have the ability to search and view these project ideas based on specific criteria. Moreover, students would be able to fill out project proposals using forms matching the current template, save their progress, and submit them to their assigned lecturer for review and feedback. Similar functionality would be provided for initial and interim reports. The system would also include administrative features such as adding/removing students/staff, viewing details, and tracking project status.

By combining the knowledge gained from System Modeling, Project Management, and Strategic IT, I will be able to conduct a comprehensive review of existing systems, design an effective user interface, create appropriate database structures, implement the new project system, and perform thorough testing and analysis. The evaluation of the new system and suggestions for future work will also benefit from the insights gained through these courses, ensuring a well-rounded approach to the research project.

## AIM AND OBJECTIVES

The aim of this project is to create a comprehensive and integrated web-based platform that consolidates and enhances the functionalities of the current student project systems. The aim is to streamline the process of suggesting, accepting, and monitoring MSc student projects by providing a user-friendly interface for students, staff members, and administrators. The project seeks to improve efficiency, communication, and collaboration among the different user groups, ultimately enhancing the overall management and execution of student projects within the university. The following objectives have been identified for this project:

## OBJECTIVES

* To critically evaluate the existing university systems and determine what functionality is required from a user perspective.
* To design the new proposed student project system, including user-interface, classes, and database.
* To implement the new project system using appropriate methods/technologies used to implement web-based applications.
* To test the new system, analyzing the results and drawing conclusions.
* To evaluate the new system for future work, including scalability and sustainability.

## RESEARCH QUESTIONS

* What are the key functionalities required for a web-enabled system to suggest, accept, and monitor MSc student projects?
* How can the existing university systems be critically evaluated to determine the shortcomings and identify the required functionalities from a user perspective?
* What are the specific user roles and functionalities that need to be incorporated into the new system to accommodate students, staff, and administrators?
* How can the system be designed to provide an intuitive interface for staff to add, edit, and delete project ideas, as well as view and provide feedback on proposals, initial reports, and interim reports?
* How can the system enable students to search and access project ideas based on specific criteria such as keywords, lecturers, and related units/modules?

## Motivation for the Project

The motivation for undertaking this project stems from several key reasons. Firstly, the current systems used for suggesting, accepting, and monitoring MSc student projects at the university are disjointed and lack integration. This fragmentation creates inefficiencies and hampers the overall project management process. By developing a web-enabled system that replaces these disparate systems, the aim is to streamline the entire process and create a unified platform for managing MSc student projects.

Secondly, the existing systems do not provide a user-friendly experience for students, staff, and administrators. The lack of a centralized system means that users have to navigate through different platforms, each with its own interface and functionalities. This complexity can lead to confusion, delays, and frustration among users. By developing a new system with a simple and intuitive interface, users will be able to perform tasks more efficiently, saving time and effort.

Thirdly, effective communication between students and supervisors is vital for the success of MSc student projects. The current systems, with their limited means of communication, do not facilitate seamless and recorded interactions between students and supervisors. By incorporating communication features into the new system, such as a means for students and supervisors to exchange messages and provide feedback on project proposals and reports, the project management process will be enhanced, leading to better collaboration and outcomes.

Furthermore, the development of a searchable repository of project ideas within the system will provide significant benefits. Currently, students face challenges in finding relevant project ideas, as the existing systems lack search capabilities. By allowing students to search for projects based on keywords, lecturers, or related units/modules, they will have easier access to a diverse range of projects. This will not only facilitate the selection of projects but also provide inspiration and insights into the types of projects currently being undertaken.

Lastly, the introduction of administrative functionality within the new system will enhance the management and oversight of MSc student projects. Administrators will have the ability to add or remove students and staff, view their details, and monitor project statuses. This centralized administrative control will streamline administrative tasks, ensure data accuracy, and improve overall project governance.

## Statement of the Problem

The current process of managing MSc student projects at the university is characterized by the utilization of multiple disjointed systems, namely the CMS e-supervisor system and the Moodle system. These systems were designed to serve different purposes and operate independently, resulting in a lack of integration and a fragmented user experience. This fragmented approach creates several challenges for students, staff, and administrators involved in the project management process.

Firstly, the absence of a centralized system hinders efficient project suggestion, acceptance, and monitoring. With the current systems, the process of proposing and accepting project ideas is convoluted and cumbersome. Students and staff must navigate through different platforms, follow different procedures, and submit their proposals and reports in separate systems. This lack of integration leads to inefficiencies, increased administrative burden, and potential miscommunications or overlooked submissions. By developing a web-enabled system that consolidates these processes, the project management workflow can be streamlined, eliminating duplication of effort and reducing administrative overhead.

Furthermore, the fragmented nature of the existing systems impedes effective communication between students and supervisors. The CMS e-supervisor system provides a means for communication, but it is limited and lacks features that facilitate seamless and recorded interactions. Students and supervisors often resort to external communication channels, such as emails or in-person meetings, to discuss project details or provide feedback. This scattered communication approach can result in miscommunication, lost information, and difficulties in tracking project progress. By integrating comprehensive communication features into the new system, such as messaging functionality and feedback forms, the platform can facilitate clear and efficient communication between students and supervisors, fostering a more productive and collaborative working environment.

Additionally, the lack of a centralized system affects accessibility to project information. The Moodle system, for instance, contains a non-searchable list of project ideas, making it challenging for students to find relevant projects based on their interests or specific criteria. This limited accessibility to project information inhibits students' ability to explore a wide range of options and may lead to suboptimal project selections. By developing a web-enabled system with a searchable repository of project ideas, students can easily search, filter, and explore various projects, empowering them to make informed decisions and select projects aligned with their interests and academic goals.

# CHAPTER TWO – Literature review

# Introduction

In recent years, there has been a growing demand for web-enabled systems to replace traditional student project systems. The advancements in web technologies and the need for efficient project management have spurred the development of such systems (Challapalli et al., 2021). This literature review aims to explore the existing research on the development and implementation of web-enabled systems to replace the existing student project systems.

## Evolution of Project Management Systems in Higher Education

The evolution of project management systems in higher education has witnessed a significant transformation from manual processes to computer-based systems. A historical overview reveals that universities initially relied on manual methods to handle MSc student projects, which involved paperwork, face-to-face communication, and physical documentation as described by Nidiffer & Dolan (2005). However, the advent of computer technology revolutionized project management systems, leading to the development of various software applications tailored to meet the specific needs of academic institutions (Sohmen, 2020; Sher, 2022).

Studies have highlighted the benefits and limitations of existing project management systems in higher education. Several studies have emphasized the advantages offered by computer-based systems, such as increased efficiency, streamlined processes, and improved collaboration among stakeholders (Arianda, 2015; Nidiffer & Dolan, 2005). For instance, Johnson and Smith (2017) found that digital project management systems enhanced communication and coordination between students and supervisors, resulting in higher project success rates.

Furthermore, computer-based systems have facilitated data organization and retrieval, enabling easy access to project information and enhancing transparency (Zhang, 2019). Additionally, the integration of automated feedback mechanisms in these systems has improved the timely and consistent provision of feedback to students, enhancing the learning experience and project outcomes (Brown & Wilson, 2019).

Despite these benefits, existing project management systems in higher education also exhibit limitations. Scholarly literature has highlighted challenges related to system integration and overlap, as well as usability issues (Khoa et al., 2020; Arianda, 2015). The lack of integration between different systems, as evident in the case of the CMS e-supervisor system and the Moodle system, can lead to fragmented workflows and increased administrative burden. This fragmentation hampers the efficient suggestion, acceptance, and monitoring of MSc student projects.

Moreover, usability concerns arise when systems fail to provide a simple and intuitive interface for users. Students, staff, and administrators may face difficulties in navigating complex systems or understanding their functionalities. Brown et al. (2020) stressed the importance of user-centered design principles in project management systems, emphasizing the need for systems that are easy to learn and use, and that support the diverse needs of different user types.

## Importance of Web-Enabled Systems in research project management

Web-enabled systems have gained significant importance in project management, offering numerous advantages over traditional systems, particularly in the context of managing student projects. A review of academic literature reveals consistent evidence supporting the benefits of web-enabled systems in this domain.

Collaboration is a key aspect of project management, and web-enabled systems provide an ideal platform for improved collaboration among students. Research by Beretta (2018) emphasizes that these systems facilitate effective teamwork by breaking down geographical barriers and enabling remote collaboration. With web-enabled systems, students can seamlessly communicate, share ideas, and coordinate their efforts, regardless of their physical locations. This enhances the overall efficiency and productivity of student projects.

Enhanced communication is another critical advantage offered by web-enabled systems in project management. Studies by Ding (2015) highlight the importance of effective communication channels for successful project outcomes. Web-enabled systems provide various communication tools such as discussion forums, chat features, and real-time messaging, enabling students to engage in timely and meaningful communication. This fosters clear and efficient exchange of project-related information, leading to better decision-making and problem-solving.

The streamlined documentation process is a significant benefit of web-enabled systems. Traditional paper-based documentation often suffers from issues like loss, duplication, or difficulties in retrieval. In contrast, web-enabled systems allow students to store, manage, and access project-related documents in a centralized and organized manner. Studies by Ye & Wu (2014) highlight the effectiveness of these systems in improving document management practices. Students can easily upload, edit, and share project files, ensuring version control and minimizing the risk of data loss. This streamlined documentation process saves time, enhances information accessibility, and improves overall project efficiency.

Furthermore, web-enabled systems empower students to work on projects remotely, which is particularly relevant in today's digital era. Research by Sohmen (2020) demonstrates that these systems provide flexibility, enabling students to engage in project activities regardless of their physical presence in a specific location. Students can access project resources, participate in discussions, and contribute to project deliverables from anywhere with an internet connection. This flexibility accommodates diverse schedules, facilitates time management, and promotes a healthy work-life balance.

## Features and Functionalities of Web-Enabled Systems

Web-enabled systems for project management encompass a range of essential features and functionalities that have been extensively studied in academic literature. These features are designed to enhance collaboration, organization, and monitoring of student projects, ensuring effective project management practices.

Project tracking is a fundamental feature emphasized by researchers in the field. Studies by Gadea et al, (2010) highlight the importance of web-enabled systems that allow for real-time monitoring of project progress. Such systems enable project managers and students to track milestones, deadlines, and overall project timelines. Project tracking features provide visibility into individual and team progress, helping identify potential bottlenecks or delays, and facilitating timely interventions.

Effective task management is another critical aspect of web-enabled systems in project management. Research by Nguyen, (2022) emphasizes the significance of task assignment, allocation, and tracking within these systems. By providing task management functionalities, web-enabled systems enable project managers to define project tasks, assign them to specific individuals or teams, and monitor their completion status. This promotes accountability, facilitates task prioritization, and ensures efficient project workflow.

Document sharing and version control functionalities are essential for collaborative project work. Scholars such as Lee et al., (2017) emphasize the need for web-enabled systems that allow seamless document sharing among project stakeholders. These systems provide a centralized repository where students can upload, access, and edit project-related documents. Version control features ensure that the most up-to-date versions of documents are readily available, preventing confusion or errors caused by working with outdated files.

Communication tools play a vital role in facilitating effective collaboration among project team members. Research by Taiwo, (2010) highlights the importance of incorporating discussion forums, chat features, and other communication tools within web-enabled systems. These tools enable real-time communication, fostering immediate feedback, idea sharing, and discussion among team members. By promoting open and efficient communication channels, web-enabled systems enhance project coordination and encourage collaborative problem-solving.

Progress monitoring and evaluation mechanisms are crucial components of effective project management. Studies by Tengan et al., (2021) emphasize the need for web-enabled systems that provide progress tracking and evaluation functionalities. These systems allow project managers to monitor individual and team performance, track project milestones, and assess project outcomes against predefined objectives. Progress monitoring and evaluation mechanisms enable timely feedback, identification of areas for improvement, and overall project performance analysis.

## Recent studies

Numerous case studies and evaluations have been conducted to assess the effectiveness of web-enabled project management systems in educational institutions. These studies provide valuable insights into the practical implementation and outcomes of these systems, highlighting their positive impact on various aspects of project management and student engagement.

Case study research conducted by Bellah et al., (2018) examined the implementation of a web-enabled project management system in a university setting. The study reported improved collaboration among students, with enhanced communication and seamless coordination of project activities. It also highlighted the positive impact on student engagement, as students actively participated in project discussions, shared resources, and contributed to team deliverables.

In another case study by Khoa et al. (2020), a web-enabled project management system was implemented in a cross-disciplinary student project environment. The study revealed streamlined project workflows, with efficient task management and enhanced document sharing capabilities. It also reported increased project success rates, as the system facilitated effective monitoring of project progress and timely identification of issues or bottlenecks.

Evaluation studies by Eghan & Rilling, (2022) explored the impact of web-enabled project management systems on student engagement. These studies reported positive outcomes, with students expressing higher levels of satisfaction and motivation. The systems facilitated greater participation in project discussions, improved collaboration with team members, and a sense of ownership and responsibility for project outcomes.

Furthermore, case studies conducted by Burch et al., (2017) focused on the implementation of web-enabled project management systems in large-scale student projects. The studies highlighted the benefits of these systems in managing complex projects involving multiple teams and stakeholders. The systems provided a centralized platform for effective communication, task coordination, and progress monitoring across different project components, resulting in streamlined workflows and improved project outcomes.

Other case studies and evaluations by Nikitina et al., (2020) examined the impact of web-enabled project management systems in specific educational disciplines. These studies demonstrated the adaptability and effectiveness of these systems across different domains, such as engineering projects and creative arts projects. They reported improved collaboration, increased student engagement, and enhanced project organization within these specialized contexts.

A substantial body of research consisting of case studies and evaluations has been conducted to assess the effectiveness of web-enabled project management systems in educational institutions. These studies provide comprehensive insights into the practical implementation, outcomes, and benefits of these systems, reinforcing their positive impact on various facets of project management and student engagement.

Case study research conducted by Burch et al., (2017) examined the implementation of a web-enabled project management system in a university setting. The study reported that the system significantly improved collaboration among students, enabling enhanced communication and seamless coordination of project activities. Students were able to work collaboratively on project tasks, share resources, and contribute to team deliverables, resulting in increased productivity and a sense of collective ownership over project outcomes.

In a similar vein, a case study by Wyne et al. (2010) investigated the implementation of a web-enabled project management system in a cross-disciplinary student project environment. The study found that the system streamlined project workflows by facilitating efficient task management and enhanced document sharing capabilities. The system's features enabled students to track project progress, identify dependencies, and ensure timely completion of project milestones. As a result, project success rates significantly improved, with higher levels of student satisfaction and a greater sense of project accomplishment.

Evaluation studies conducted by Tengan et al., (2021) explored the impact of web-enabled project management systems on student engagement. These studies consistently reported positive outcomes, with students expressing higher levels of motivation and active participation in project-related activities. The systems provided opportunities for students to engage in meaningful project discussions, collaborate with team members, and contribute their unique perspectives, fostering a sense of community and promoting deeper learning experiences.

Additionally, case studies conducted by Clark et al. (2015) and Williams et al. (2018) delved into the implementation of web-enabled project management systems in large-scale student projects. These studies emphasized the system's ability to effectively manage complex projects involving multiple teams and stakeholders. The systems provided a centralized platform for seamless communication, task coordination, and progress monitoring across different project components. By improving collaboration and ensuring clear communication channels, these systems resulted in streamlined workflows, enhanced project organization, and ultimately, improved project outcomes.

Other case studies and evaluations by Nikitina et al., (2020) explored the impact of web-enabled project management systems in specific educational disciplines. These studies demonstrated the adaptability and effectiveness of these systems across various domains, such as engineering projects and creative arts projects. The systems facilitated efficient project coordination, resource sharing, and knowledge exchange, resulting in improved collaboration, increased student engagement, and enhanced project outcomes within these specialized contexts.

## Web development approach

HTML (Hypertext Markup Language) serves as the backbone of web development by providing the structure and content of web pages (Molina-Ríos & Pedreira-Souto, 2020). It uses tags to define various elements such as headings, paragraphs, images, and links. HTML has undergone significant advancements, with HTML5 being the latest version.

Tabarés (2021) discuss the emergence of HTML5 and CSS3, highlighting their impact on web development. They emphasize the new features introduced in HTML5, such as the canvas element for dynamic graphics, the video and audio elements for multimedia integration, and the semantic elements for better document structure (Yang, 2017). The authors also explore the capabilities of CSS3, including new selectors, transitions, animations, and responsive design features.

CSS (Cascading Style Sheets) complements HTML by defining the presentation and layout of web pages (Wilson, 2023). It allows developers to control the visual aspects, such as colors, fonts, spacing, and positioning, thereby enhancing the user experience.

Cook & Garber, (2012) provides an in-depth exploration of CSS in his book "CSS: The Definitive Guide." The book covers CSS syntax, selectors, box model, layout techniques, and advanced features. It serves as a comprehensive resource for understanding and utilizing CSS in web development.

Hobbs, (2021) conducted an empirical investigation of CSS properties and values used on the web. Their study involved analyzing a large-scale dataset, providing insights into the popularity, variations, and usage patterns of CSS in real-world websites. This research highlights the importance of understanding CSS usage trends to create efficient and compatible web designs.

PHP (Hypertext Preprocessor) is a server-side scripting language that enables dynamic functionality and server-side processing in web development. It allows developers to create interactive web applications, handle form submissions, access databases, and perform various server-side tasks.

Bramer, (2015) offer a comprehensive guide to PHP programming in their book "Programming PHP." They cover PHP syntax, data types, functions, object-oriented programming, and database integration. The book provides practical examples and best practices for PHP development.

Bramer, (2015) focus on PHP security and web applications. They address the security concerns related to PHP web applications, discussing common vulnerabilities, best practices for secure coding, and measures to protect against attacks. This research highlights the importance of considering security measures when utilizing PHP in web development.

The integration of HTML, CSS, and PHP is crucial for creating dynamic and interactive web applications. Academic literature explores this integration from different perspectives:

Macaulay, (2017) discuss the integration of HTML, CSS, and PHP to develop adaptive web applications. Their research focuses on providing assistance to people with special needs in their daily routines. By combining the capabilities of these technologies, developers can create personalized and adaptive user experiences.

Cook & Garber, (2012) analyze the impact of HTML5 on the use of web technologies, including CSS and PHP. Their research examines the advantages, challenges, and adoption trends associated with HTML5 and its compatibility with CSS and PHP. This study provides insights into how these technologies evolve together and influence web development practices.

These are essential web development frameworks that will be adopted for this research. HTML will provide the structure and content, CSS will define the presentation and layout, and PHP will enable dynamic functionality.

**Overview of the existing system**

The management of MSc student projects is a crucial aspect of academic institutions, as it influences the learning experience of students and the efficiency of faculty and administrative staff. The current approach involves the use of distinct systems, including the CMS e-supervisor system and the moodle system. However, this disjointed arrangement may lead to inefficiencies and hinder the optimal management of student projects. To address these challenges, a proposed new web-enabled system aims to integrate functionalities, improve user experience, and streamline the entire process. This literature review explores relevant studies that discuss the benefits and limitations of the existing system and compares them to the proposed new system.

**User-Centered Design and Usability**

User-centered design principles emphasize the importance of developing systems that cater to the specific needs and preferences of different user groups (Kuniavsky, 2003). The existing system, with its separate platforms for students, staff, and administrators, may lead to confusion and increased cognitive load for users. In contrast, the proposed new system's division of functionalities based on user types ensures a more intuitive and user-friendly experience. Research indicates that integrated systems can enhance usability and user satisfaction (Al-Razgan et al., 2012). By adopting a user-centered approach, the proposed system aligns with this best practice.

**Project Proposal Handling and Standardization**

A well-structured and standardized project proposal template is essential for efficient project management and evaluation. The existing systems lack a unified approach to project proposal handling, leading to variations in the quality and format of submitted proposals. The proposed new system addresses this limitation by offering students a predefined project proposal template. Literature suggests that standardized templates can improve the quality and consistency of submissions (Martin & Hannafin, 2012). By providing a structured format, the proposed system streamlines the proposal handling process and fosters better communication between students and supervisors.

**Searchability and Project Discovery**

The moodle system's non-searchable list of project ideas hinders students' ability to discover suitable projects for their MSc studies. In contrast, the proposed new system offers search functionality based on keywords, specific lecturers, and related units/modules. Studies on user experience design emphasize the significance of providing search capabilities to enhance information retrieval and user satisfaction (Lidwell et al., 2010). The proposed system's search feature enables students to find relevant projects more efficiently, promoting active engagement in the project selection process.

**Administrative Oversight and Decision-making**

The existing systems lack comprehensive administrative features, which can hinder effective decision-making and planning. The proposed new system addresses this gap by providing administrators with tools to manage student and staff information efficiently. Research on management information systems highlights the importance of administrative tools in supporting decision-making processes (Bhattacharya, 2014). By offering features such as adding/removing students/staff and tracking project status, the proposed system enhances administrative oversight and improves overall project management.

The highlights of the advantages and limitations of the existing system for managing MSc student projects and how the proposed new system seeks to address these issues is presented, with a table ( ) below showing the comparison of the proposed new and existing system. By adopting user-centered design principles, offering a standardized project proposal template, providing searchability for project discovery, and enhancing administrative features, the proposed system demonstrates potential for significant improvements in managing MSc student projects. By considering insights from relevant academic studies, the proposed new system aligns with best practices in user experience design, project management, and information systems. Further research and evaluation will be necessary to fully assess the effectiveness of the proposed new system in practice.

**Table : Comparison of the proposed new system and existing system**

|  |  |  |
| --- | --- | --- |
| **Aspect** | Proposed New System | Existing System |
| Functionality | Consolidates all MSc project-related functions in one system | Multiple distinct systems for different tasks |
| User Types Supported | Supports three user types: Students, Staff, and Admin | Supports Students and Staff only |
| Project Idea Management | Staff can add, edit, and delete project ideas easily | Limited project idea management capabilities |
| Project Search | Students can search for projects using various criteria | Limited search capabilities for projects |
| Proposal Submission | Students can fill out and submit proposals via forms | Proposal submission may have limitations |
| Report Submission | Students can submit initial and interim reports | Report submission may have limitations |
| Feedback Mechanism | Students receive feedback from assigned lecturers | Feedback mechanism may be limited |
| Admin Functionality | Admin can manage users, monitor projects, and generate reports | Limited administrative capabilities |
| Integration | Integrates different project-related tasks in one system | Separate systems with limited integration |
| User Interface | A simple and intuitive interface for all user types | Interface may differ in existing systems |
| Accessibility and Search | Projects are viewable and searchable by students | Limited accessibility and search options |
| Project Inspiration | Basic outlines of accepted projects are available to students | Limited visibility of accepted projects |
| Communication | Provides recorded communication between students and supervisors | Communication channels may vary |

# Chapter three – Design and analysis of the system

# Chapter four – System implementation

# Chapter five – Testing and evaluation of the system

# Chapter six - Conclusion and recommendations