**CHAPTER III**

**TECHNICAL BACKGROUND**

This chapter discusses the methodology employed in developing the system, including the technical resources required, the involvement of stakeholders, project constraints, and the chosen development approach.

**Resources**

To implement the proposed system, the researcher leveraged a range of resources, including their commitment and involvement. The development of the Gamified Android Learning Application necessitated the use of specific hardware and software resources to ensure its effective execution.

**Table 3.1.**

**Hardware Requirements**

|  |  |
| --- | --- |
| **Required Hardware** | **Recommended Hardware Specifications** |
| Processor/Storage | Quad-core 1.4 GHz or Higher CPU 2GB or Higher RAM 16GB or Higher ROM |
| Network | Wi-Fi or Cellular Network |
| Display | LCD with a resolution of 720p |

**Table 3.1** presents the recommended hardware specifications necessary for the optimal operation of the Gamified Android Learning Application. The device should be equipped with a quad-core CPU running at 1.4 GHz or higher to efficiently handle the application’s processing requirements. A minimum of 2 GB RAM is recommended to support smooth multitasking and ensure responsive performance. Additionally, at least 16 GB of internal storage (ROM) is required to install the application and store user data. For connectivity, the device should support either Wi-Fi or a cellular network to enable access to all online features. Lastly, an LCD display with a resolution of at least 720p is recommended to provide a clear and engaging visual experience for users.

**Table 3.2.**

**Software Requirements**

|  |  |
| --- | --- |
| **Particulars** | **Recommended Specifications** |
| Operating System | Android, 9.0 or Higher |
| Programming language | Python |
| Database | SQLite |
| Framework | Django |

**Table 3.2** outlines the software requirements for the development and deployment of the Gamified Android Learning Application. The application targets Android devices running version 9.0 (Pie) or higher, ensuring compatibility with modern Android systems. The core programming language used is Python, while the application is built using the Django framework, which provides a robust backend structure suitable for scalable systems. For data persistence, the application utilizes SQLite, a lightweight relational database that is ideal for mobile applications. These choices ensure an efficient, and scalable development process, aligned with best practices in Android application development.  
  
**Stakeholders**

The researcher identified key stakeholders crucial to the effective operation and success of the system. These stakeholders include individuals and groups directly engaged in the development, implementation, and management of the Gamified Android Learning Application. To ensure the system's full potential is realized, ongoing monitoring and maintenance are essential. This involves not only overseeing the technical functionality of the system but also addressing any issues promptly to ensure its smooth operation and continual improvement.

**Table 3.3.**

**Stakeholders**

|  |  |  |
| --- | --- | --- |
| **Stakeholders** | | **Description** |
| **Osmeña Colleges BSCS Administration** | |  | | --- | | The application enhances the learning experience by incorporating gamification, improving student engagement, and supporting the institution’s digital education initiatives. It also reflects the college’s commitment to innovative learning strategies. |  |  | | --- | |  | | |
| |  | | --- | | **Instructors / Professors** |  |  | | --- | |  | | | |  | | --- | | The system provides an interactive way to reinforce course materials through quizzes, lessons and exams. It enables instructors to track student progress and performance efficiently. |  |  | | --- | |  | |
| |  | | --- | | **College Students** |  |  | | --- | |  | | | |  |  |  |  |  | | --- | --- | --- | --- | --- | | |  |  |  | | --- | --- | --- | | |  | | --- | | The app enhances learning by making learning more engaging and interactive. Gamification elements like scores, leaderboards and achievements that increase motivation and knowledge retention. |  |  | | --- | |  | |  |  | | --- | |  | |  |  | | --- | |  | |
| |  | | --- | | **IT Department / Developers** |  |  | | --- | |  | | |  | | --- | | Responsible for maintaining system functionality, ensuring data security, and troubleshooting issues. The project also offers valuable experience in mobile app development and gamification principles. |  |  | | --- | |  | | |
| **Researchers** | | |  | | --- | | The application serves as a reference for future studies on gamified learning, mobile education, and user engagement strategies. |  |  | | --- | |  | |

**Table 3.3** outlines the key stakeholders involved in the Gamified Android Learning Application for Osmeña Colleges Students and their respective roles. The Osmeña Colleges Administration is responsible for supporting the integration of the application into the institution’s learning framework, ensuring it aligns with academic goals and technological advancements. The Instructors / Professors oversee the academic content, utilizing the system to enhance student engagement and track learning progress effectively. The College Students serve as the primary users, benefiting from interactive learning experiences designed to improve knowledge retention and motivation. The IT Department / Developers ensure the application's functionality, security, and maintenance, providing technical support as needed. Lastly, Researchers can use the system as a foundation for future studies on gamified learning and its impact on student performance. Each stakeholder plays a crucial role in ensuring the system operates efficiently and fulfills its educational purpose.

**Constraints**

Every proposed system has inherent constraints. To ensure the practicality and effectiveness of the **Gamified Android Learning Application**, the researchers have identified key challenges that must be addressed throughout its development. Addressing these limitations is crucial to delivering a functional and impactful learning tool for students.

**Time**

To ensure the success of this study, it is crucial to have a well-structured schedule for key activities, including planning, designing, development, testing, evaluation, and implementation. A Gantt chart will serve as an essential tool for managing and visualizing these phases, allowing for efficient tracking of progress, resource allocation, and adherence to deadlines. By utilizing this tool, the project can be systematically coordinated, ensuring that all tasks are completed on time and in an organized manner for the development of the Gamified Android Learning Application.

Additionally, the Gantt chart will offer a clear representation of task deadlines and dependencies, helping to identify potential obstacles early in the process. Regular updates to the chart will enable the researcher to stay flexible and make necessary adjustments in response to unexpected challenges. This structured project management approach promotes accountability, facilitates effective communication between the researcher and end-users, and ultimately supports the successful completion of the system.

**Table 3.4.**

**Gamified Android Learning Application (Gantt chart)**

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **ACTIVITIES** | **Months** | | | | | | | | | | |
| JAN | | FEB | | MAR | | APRIL | MAY | | | JUNE |
| Plan |  | |  | |  | |  |  | | |  |
| Requirements |  |  | |  |  | |  |  | | |  |
| Design |  | |  | | |  |  |  | | |  |
| Development |  | |  | |  | | | |  | |  |
| Testing |  | |  | |  | |  |  |  |  |  |
| Deployment |  | |  | |  | |  |  | |  |  |

**Table 3.4** presents the System Development Time Frame (Gantt Chart) for the Gamified Android Learning Application, outlining a structured five-month schedule covering the key phases: Planning, Requirements, Design, Development, Testing, and Deployment.

The Planning phase is scheduled for January, establishing the project's scope and objectives. Simultaneously, Requirements Gathering takes place in the latter part of January through February to identify the necessary system specifications.

The Design phase is carried out during the month of February to first week of March, focusing on interface layouts, system architecture, and user experience planning.

Development begins in March and continues through April and May, concentrating on building the application’s functionalities, integrating gamified features, and managing data structures.

Testing is scheduled for May, allowing sufficient time to evaluate functionality, identify bugs, and implement improvements. Finally, the Deployment phase occurs in second half of May, representing the official release and implementation of the application.

This timeline provides a well-paced and organized approach to development, ensuring adequate time for each phase and a smooth transition from planning to deployment.

**Financial**

Financial resources are considered in the development of the system. It also needs a proper management to meet the needed amount and avoid unnecessary expenses.

**Table 3.5.**

**Estimated Cost of the Proposed System**

|  |  |
| --- | --- |
| **Particulars** | **Cost** |
| Electricity | 1,000.00 |
| Documentation | 1,000.00 |
| Other Expenses | 1,000.00 |
| **Total** | 3,000.00 |

**Table 3.5** presents the projected expenses for developing the Gamified Android Learning Application, providing a detailed breakdown of costs, with a total estimated amount of ₱3,000.00.

The electricity expense is estimated at ₱1,000.00, accounting for the power consumption necessary during system development and testing. Documentation costs, also estimated at ₱1,000.00, cover expenses related to printing and binding project documents. Additionally, Other Expenses, estimated at ₱1,000.00, include miscellaneous costs not specified under the other categories.

The total estimated budget of ₱3,000.00 ensures that all essential expenses required for the effective development and deployment of the system are adequately covered.

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**Project Development Methodology**

The researchers adopted the Agile Development Methodology (ADM) for the development of the Gamified Android Learning Application. This approach divides the project into iterative phases, allowing continuous development, testing, and refinement. Agile promotes regular collaboration with stakeholders through cycles of planning, execution, and review, ensuring the system adapts to evolving user requirements. By implementing this methodology, the project minimizes risks by maintaining flexibility in development while ensuring active user engagement throughout the process.

In Agile, development follows an iterative approach through sprints, where each cycle encompasses design, development, testing, and deployment within a defined scope. The project begins with the Project Planning phase, which involves defining the scope, estimating development efforts, setting a timeline, and determining the required resources. This phase ensures a well-structured foundation for the project.

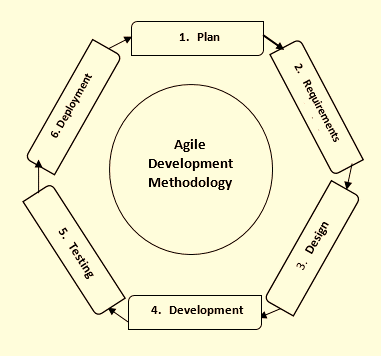
The next phase, Project Requirements, focuses on identifying and specifying the system's functionalities, features, and user roles. This step provides a detailed outline of the gamification mechanics, learning modules, and user interaction requirements, forming the basis for subsequent development stages.

During the Project Design phase, the documented requirements are translated into system architecture, user interface designs, and component structures. This phase establishes the essential tools, frameworks, and technologies needed for development. For the Gamified Android Learning Application, this includes designing the game-based learning structure, user interface layouts, and interactive elements to enhance engagement.

The Project Development phase follows an iterative process, beginning with an initial setup phase where development environments and tools are configured. Continuous integration and testing are performed within each iteration to ensure a stable and functional system.

The Project Testing phase plays a crucial role in validating the system’s performance, usability, and functionality. Various testing approaches, including unit testing, usability testing, and performance evaluation, are conducted to ensure the application meets the defined requirements. For the Gamified Android Learning Application, this involves assessing the effectiveness of gamified elements, user engagement, and learning outcomes while identifying and addressing any issues.

Finally, in the Project Deployment phase, the application is officially launched for its intended users. This phase involves deploying the system, monitoring real-world usage, and addressing any post-deployment concerns. Continuous updates and improvements may be implemented based on user feedback to enhance system performance and ensure a seamless learning experience.

By following this structured Agile approach, the Gamified Android Learning Application ensures a well-organized development process, adaptability to changes, and a user-centered design, ultimately contributing to the system’s successful implementation and usability.

**Figure 3.1 – Agile Development Methodology**

**Notes**

Wrike.com; The Agile Software Development Life Cycle; year published: 2020; date accessed: September 20, 2022; https://www.wrike.com/agile-guide/agile-development-life-cycle/