CHAPTER IV
Methodology

A. Development Methodology

The Iterative model is an incremental approach to software development. Each iteration focuses on refining and enhancing the product based on feedback and evaluations. Progress is cyclical, allowing for adjustments and improvements in each cycle. This ensures flexibility and adaptability throughout the development process.

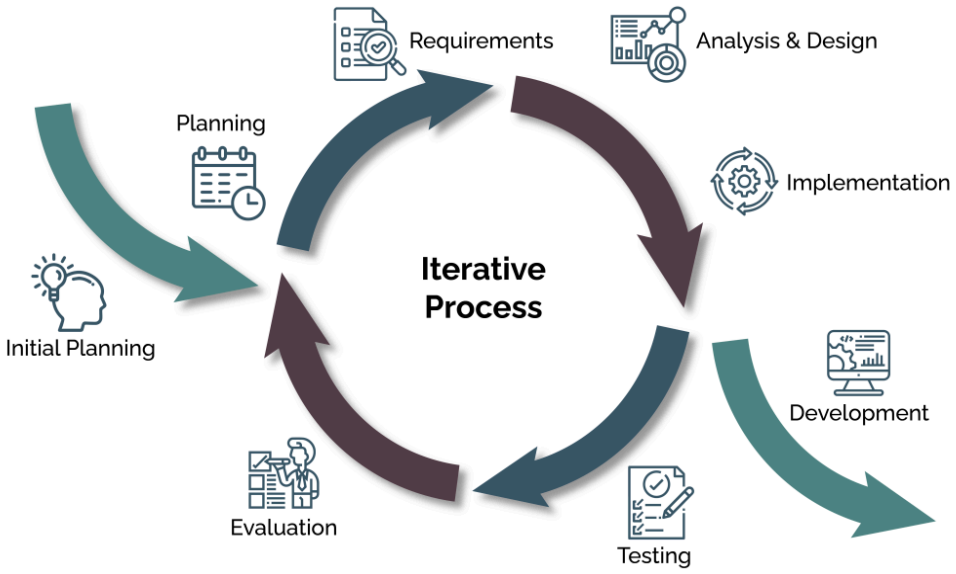

Figure 4
The Iterative Model

Initial Planning

This phase establishes the foundation of the project by defining its purpose, goals, and scope. Preliminary tasks, resources, and timelines are outlined to provide a clear direction. This stage ensures alignment with user's expectations and the project's objectives.

Planning

During this phase, the project details are organized into a structured plan. Timelines are finalized, tasks are assigned, and risks are identified and addressed. A comprehensive roadmap is created to guide the project, ensuring that roles and responsibilities are clearly understood.

Requirements

This stage involves identifying and documenting the system's requirements in detail. Through discussions with users, the needs and expectations are clarified to prevent misunderstandings. A detailed requirements' document is produced to guide subsequent phases.

Analysis and Design

In this phase, the requirements are analyzed to identify the most efficient and practical approaches to development. A detailed system design is created, including technical specifications, workflows, data models, and the selection of tools and technologies. This structured plan ensures the system is aligned with the documented requirements.

Implementation

This stage involves translating the design into actual system components. The code is written and each part of the system is built, adhering to the designed specifications to ensure consistency. The focus is on constructing functional modules of the system.

Development

The developed components are refined, integrated, and enhanced during this stage. Iterative adjustments are made to resolve issues and address any gap. The system undergoes continuous improvements to meet the expected performance and functionality.

Testing

This phase ensures the system's quality and reliability. Various types of testing, including unit tests, system tests, and user acceptance tests, are conducted to identify and resolve any issues. Testing is performed iteratively to ensure that the system meets its requirements and performs as intended.

Evaluation

After testing, the system is thoroughly evaluated to determine its effectiveness, reliability, and alignment with the project goals. Feedback from users is gathered and analyzed, identifying areas for improvement. This phase ensures that the system satisfies user expectations and is ready for deployment.

B. System Development Life Cycle Model

During the study, the proponents used an iterative model and a structured approach to outline the stages of their system's development.

1. Initial Planning

In this phase, the focus is on defining the main objectives of the system and determining its scope. This is when the proponents evaluate whether the project is possible, whether it can be done within the available time, resources, and budget. The goal is to gather initial insights, set clear goals, and make sure the system will meet both the users' needs and the organization's expectations.

2. Planning

A detailed roadmap is created to guide the project from initiation to completion. The proponents define the timeline, allocate resources, set the budget, and identify key targets and deliverables. This plan ensures the project stays on track, aligns with its objectives, and is completed on time. It helps manage expectations, track progress, and avoid any deviations from the schedule or budget. Proper preparation is crucial for smooth execution and successful completion.

3. Requirements

At this stage, the proponents gather all the essential information about the system's features and functionalities. By collaborating closely with users and decision-makers, they determine exactly what the system is required to

perform. They also identify any constraints or limitations that need to be addressed. All these requirements are carefully documented to provide clear guidelines for the following phases.

4. Analysis and Design

The aim of the analysis and design phases is to thoroughly plan and structure the system to meet user's needs effectively. This involves gathering detailed information about data entities, their relationships, and attributes in using these insights to develop comprehensive specifications. During the design phase, the proponents create the system architecture, data models, and workflows that define how each component integrates and functions cohesively. This framework ensures that the system's development remains aligned with the requirements and is implemented within the given constraints, leading to a reliable and efficient solution.

5. Implementation

At this point, the system is constructed according to the designed specifications. This process includes coding, configuring, and integrating all system components. The proponents ensure that all technical and functional requirements are fulfilled by building the software and organizing the system's structure. The main objective is to convert the design into a fully functioning system.

6. Development

In the development phase, the proponents concentrate on building the system's core components, including software modules and the database. The system is then assembled, and all parts are integrated to ensure that the entire system functions as one. Development includes extensive coding, testing, and adjusting to ensure each part works seamlessly in coordination. The proponents utilized Firebase for the database, taking advantage of its real-time synchronization capabilities and scalability to meet the system’s requirements.

7. Testing

After development, the system is carefully tested to detect any issues or problems. This phase involves multiple types of testing, including functional testing to ensure all features work as planned, performance testing to evaluate the system’s efficiency under different conditions, and user acceptance testing to verify it meets users’ needs. Any identified issues are resolved before the project progresses.

8. Evaluation

Once the system is fully developed and tested, it is evaluated to determine how well it performs, how reliable it is, and whether it meets user expectations. Feedback from users and other concerned groups is gathered and analyzed. The evaluation helps identify areas for improvement and forms the basis for future updates or maintenance plans.

C. Theories Used in the Project

This section delves into the theoretical frameworks that guided the development and implementation of the project. It seeks to provide a thorough understanding of the core principles and concepts that underpinned the project's approach. By exploring these theories, it lays the groundwork for evaluating how the project aligns with established knowledge and practices.

Contextual Integrity Theory

According to **Malkin and Reddi (2023)**, this theory highlights that privacy norms are shaped by the specific academic environment, including the expectations of confidentiality and openness among peers. Academic platforms must balance the sharing of knowledge with protecting sensitive information, which can vary significantly across disciplines. While Contextual Integrity offers a robust framework for addressing privacy in academic communication platforms, it is essential to consider the broader implications of technological change. As technology evolves, so do the contexts and norms surrounding information sharing. Therefore, continuous evaluation and adaptation of these norms are necessary to maintain privacy and trust in academic settings.

This study is highly relevant to the current study as it underscores the need to balance knowledge sharing with safeguarding sensitive information in academic settings. The platform is designed to facilitate collaboration and communication among students and educators while prioritizing privacy. Features such as role-based access control and privacy settings ensure that sensitive information remains protected. Additionally, “WeConnect” acknowledges that privacy norms differ across academic disciplines and adapts its functionalities to meet these varied expectations. By fostering

trust through robust privacy measures and tailoring its design to users' specific needs, “WeConnect” creates a secure and productive environment for academic work.

KISS Principle (Keep It Simple, Stupid)

Effective communication, as emphasized by the KISS principle, relies on clear and concise tools that bridge gaps between students and faculty, ensuring important announcements are not overlooked **(Wu & Liu, 2023)**. Platforms should prioritize user experience by offering intuitive interfaces that minimize complexity. Features like discussion forums and peer messaging should be easily accessible to foster collaboration and engagement. Furthermore, **Al-Maatouk et. al (2020)** suggests that applying communication theories can enhance the effectiveness of social media platforms, leading to improved user satisfaction and academic performance. While the KISS Principle advocates for simplicity, it is essential to balance this with the need for comprehensive features that cater to diverse academic needs. Over-simplification may lead to lack of necessary functionalities, potentially hindering effective communication and collaboration.

The KISS principle is pivotal in the development of “WeConnect,” as it underscores the importance of simplicity in fostering clear and effective communication. By integrating intuitive design elements and user-friendly features, the platform streamlines interactions between students and educators, ensuring that accessing key information is straightforward and efficient. This approach aligns with the study's objective of creating an environment that prioritizes ease of use while maintaining the functionality needed to address diverse academic needs. By avoiding unnecessary complexity, the platform enhances user engagement, satisfaction, and

collaboration, ultimately supporting academic success through clear and accessible communication.

Media Richness Theory (MRT)

The integration of rich media in academic settings plays a pivotal role in enhancing communication and fostering student engagement. As **Al-Maatouk et al. (2020)** pointed out, this approach not only improves communication but also contributes to better academic performance and greater satisfaction among students. However, Media Richness Theory also emphasizes the need to consider potential drawbacks, such as information overload or miscommunication, which can arise from overly complex media environments. Therefore, balancing richness with clarity remains essential in academic communication.

In the context of digital learning environments, effective communication and collaboration are essential for student engagement and academic success. By incorporating rich media tools such as video calls, messaging, and file sharing; platforms can significantly enhance the interaction between students and educators. These tools foster dynamic communication, encourage meaningful engagement, and contribute to improved academic performance. However, to ensure the effectiveness of these tools, it is important to strike a balance between media richness and clarity. Intricate tools can be overwhelming for users which may lead to information overload or confusion, hindering a great user experience. Therefore, platforms must prioritize user-friendly designs that facilitate dynamic communication while preventing miscommunication and ensuring a clear and intuitive interface.

Self-Determination Theory (SDT)

As highlighted by **Salikhova et. al (2020),** online platforms can enhance autonomy by allowing flexible participation and self-paced learning, which is crucial in digital education. In addition, **Ojo et. al (2024)** emphasizes that competence is fostered through effective online communication, where students can practice and demonstrate their skills. While SDT offers valuable insights into enhancing online learning, it is essential to recognize that not all students may respond uniformly to these motivational strategies. Individual differences in learning preferences and external factors can also play a significant role in shaping student engagement.

The application of Self-Determination Theory (SDT) is central to the design and functionality of "WeConnect," as it incorporates features that enhance user autonomy and competence in online education. The platform's tools, such as flexible participation options, task management features, and personalized communication settings, empower users to tailor their engagement to their preferences and schedules, promoting autonomy. This focus on flexibility helps foster intrinsic motivation and supports academic success. Additionally, "WeConnect" enhances competence through communication tools like chat, video calls, and file sharing, which provide opportunities for students to demonstrate their abilities, collaborate with peers, and receive feedback from educators. By creating a supportive and adaptable online learning environment, "WeConnect" applies SDT principles to optimize engagement, motivation, and academic performance.

DRY Principle (Don't Repeat Yourself)

Cabezas et. al (2020) highlights that adopting the DRY principle enables developers to focus on creating innovative features rather than duplicating existing

functionalities, thus fostering a more dynamic learning environment. The DRY principle guides developers to steer clear of redundant code. It promotes the creation of modular and reusable code components, allowing specific functionalities to be implemented in one central location and referenced elsewhere as needed. Adhering to DRY enhances code maintainability, minimizes the chance of inconsistencies, and streamlines the process of making updates throughout the entire codebase.

This principle is crucial to the development of “WeConnect” as it significantly enhances the platform's efficiency, scalability, and maintainability. By adhering to the DRY principle, the development team minimizes code redundancy, ensuring that functionalities are implemented in a modular and reusable manner. This approach streamlines the development process, enabling quicker updates and seamless integration of new features, such as messaging, video calls, and task management, without disrupting existing functionalities. Additionally, the use of centralized and reusable code components ensures consistency across the platform, improving the user experience and reducing the likelihood of errors. By applying the DRY principle, “WeConnect” not only simplifies the management of its codebase but also positions itself for future scalability and innovation, ensuring the platform evolves efficiently to meet user needs.

Transactional Distance Theory

As stated by **Jesus (2017),** emphasizes that video conferencing plays a crucial role in reducing transactional distance by facilitating real-time interaction and engagement. Furthermore, **Saba and Shearer (2017**) highlight the importance of adaptive learning technologies, which personalize the educational experience by addressing individual learner needs and preferences. This seamless integration of

technology enhances both interaction and customization, promoting a more engaging and effective learning environment. While TDT provides a robust framework for understanding distance education, critics suggest that it may need to evolve further to address the complexities of modern learning environments, particularly with the rapid advancement of technology.

This study holds significant relevance for “WeConnect,” as it highlights the importance of fostering interaction and engagement in a digital learning platform. The inclusion of video conferencing and real-time communication tools in “WeConnect” effectively bridges the gap between students and educators, significantly reducing the transactional distance inherent in online education. Furthermore, the platform’s adaptive features, such as task management and real-time communication, support personalized learning experiences by addressing the unique needs and preferences of each user. By adhering to the principles of Transactional Distance Theory, “WeConnect” not only facilitates meaningful interaction but also enhances user engagement and academic collaboration, making it a responsive and impactful solution for contemporary educational challenges.

Social Presence Theory

Lee et al., (2023), explained that emotional engagement with peers enhances community identification, which is crucial for academic success. Furthermore, interaction patterns among users can significantly influence their sense of community and collaboration. Moreover, social presence fosters awareness of others' presence and activities, which is vital for collaborative learning environments. While SPT provides a robust framework for enhancing user interaction, it is essential to recognize that not all users may experience social presence equally, influenced by individual

differences and platform design. This variability suggests a need for tailored approaches in academic communication platforms.

In relation to the research outlined above, “WeConnect” leverages emotional engagement and peer interaction to cultivate a strong sense of community, which is pivotal for academic success. The platform incorporates features such as chat, video calls, notifications, and a dynamic newsfeed to enhance users' awareness of each other’s presence and activities. By integrating Social Presence Theory with other relevant frameworks, such as Constructivist Learning Theory, the platform emphasizes collaborative learning and engagement, creating a coherent and holistic academic environment. While these features foster a sense of belonging and encourage users to actively participate in discussions and knowledge sharing; potential challenges, such as individual differences in perceiving social presence, are also considered. This approach ensures that the platform supports diverse user needs while promoting meaningful academic interactions, ultimately enhancing student and educator engagement.

Constructivist Learning Theory

According to **Mishra (2023)**, constructivism promotes learner autonomy, encouraging students to take charge of their learning through reflective thinking and problem-solving. Collaborative learning is emphasized, where students engage in discussions and debates, fostering a deeper understanding of content. The design of online education platforms should facilitate conversation, negotiation, and cooperation among learners to support knowledge construction. Effective online learning environments leverage technology to create interactive spaces that align with constructivist principles, enhancing engagement and motivation. While constructivist

learning theory offers significant advantages in fostering active engagement and collaboration, it also faces challenges, such as ensuring that all learners are equipped with the necessary digital skills to navigate online platforms effectively. This highlights the need for ongoing support and training in digital literacy to maximize the benefits of constructivist approaches in education.

Guided by these insights, this is relevant to “WeConnect” as it emphasizes collaboration, learner’s autonomy, and interactive learning—principles central to the platform's design. The platform incorporates constructivist principles through features such as task management, calendar labeling, and notifications, which empower students to take charge of their learning by organizing and prioritizing tasks independently. Collaborative tools like comments, reactions, chat, and video calls facilitate meaningful interactions, discussions, and knowledge sharing among users, fostering deeper engagement. Furthermore, by leveraging technology to create an interactive and engaging environment, “WeConnect” supports active participation and collaborative learning, as envisioned by constructivist theory. To address challenges such as digital literacy, the platform offers resources and user-friendly design to ensure all learners can effectively navigate its features, thus maximizing their learning experience and promoting equitable access to its benefits.

Technology Acceptance Model (TAM)

As stated by **Zelada (2024)**, users are more likely to adopt a platform if they believe it enhances their academic performance. Studies show that TAM effectively predicts the acceptance of various educational technologies. Furthermore, **Jatnika et. al, (2023)** discussed that the simpler a platform is to navigate, the higher the likelihood of its adoption. Research indicates that ease of use significantly influences users'

behavioral intentions.This refers to the user's intention to utilize technology, which is influenced by both perceived usefulness and ease of use. A strong correlation exists between these factors and actual system use. While TAM has proven effective in understanding technology acceptance, it is essential to recognize its limitations. Critics argue that the model may not fully capture the complexities of user behavior in diverse educational contexts, suggesting a need for further research and potential model extensions.

Based on these findings, Technology Acceptance Model (TAM) is highly relevant to “WeConnect” as it provides a theoretical framework for understanding how users perceive and adopt educational technologies. By addressing *perceived usefulness*—such as how “WeConnect” enhances academic performance—and *ease of use*—like intuitive navigation; WeConnect aligns with the key factors that influence user adoption. Research supporting TAM highlights the importance of designing user-friendly features, directly impacting behavioral intentions to use WeConnect.

Digital Collaboration Theory

Digital tools improve interaction among researchers, fostering a more connected academic community. According to **Rennstich (2019**), digital environments support interdisciplinary collaboration, allowing for innovative problem-solving through diverse perspectives. While digital collaboration offers numerous advantages, it also necessitates a careful consideration of technological and user-related challenges to maximize its potential in academic communication.

The relevance of Digital Collaboration Theory is evident in how it supports the "WeConnect" mission to enhance academic interaction among students and educators. By fostering an interdisciplinary digital environment, "WeConnect" aligns

with the assertion that such platforms promote innovative problem-solving through diverse perspectives. The system integrates features like video calls and chats to address geographical and disciplinary barriers, creating a seamless and inclusive collaboration space. Additionally, recognizing challenges such as technological adoption, digital literacy, and user experience, "WeConnect" includes user-friendly interfaces and continuous technical support to mitigate these issues. This commitment to overcoming potential limitations ensures that "WeConnect" not only adheres to the principles of digital collaboration but also evolves to meet the diverse and dynamic needs of the academic community.