Chapter III

RESEARCH METHODOLOGY

This section describes the research methodology, participants, population and sample, research tools, data collection, and procedures and methods for data analysis. These methods are designed to obtain extensive information regarding the usability, efficiency, and efficacy of the algorithm-based platform, especially document verification and visual progress tracking through the Kanban method.

Research Method Used

The researchers used a developmental research approach that focuses on the design and development of an algorithm-driven platform for thesis progress monitoring. The system integrates document parsing to read and process digital thesis submissions, AI-powered analysis for grammar, spelling, structural completeness, citation validation, and AI-generated content detection, along with a visual workflow tracker using the Kanban methodology. This approach allows for building, testing, and refining the platform to address inefficiencies in thesis supervision while enhancing the overall user experience for both students and faculty.

Population, Sample Size, and Sampling Technique

The participants of this study were individuals who are currently involved in the thesis process. These include 3rd Year CICT Thesis-writing students and subject advisors who are interested in using a system that helps monitor thesis progress through document analysis and visual tracking.

Description of Respondents

Table 1. Respondents, Frequency, and Percentage

Respondents	Frequency	Percentage (%)
3rd Year CICT Thesis-Writing Students	35	70%
Subject Advisors	10	15%
IT Professionals	5	15%
Total	**50**	**100%**

Table 1 illustrates the distribution of the target population for this study, which focuses on individuals involved in the thesis process. The target respondents include 3rd year CICT thesis-writing students, subject advisors, and IT professionals. The researchers specifically targeted individuals with a background in academic research and thesis development, as well as those who may have expertise in technology-related areas. The population includes 35 3rd year CICT thesis-writing students, 10 subject advisors, and 5 IT professionals, summing up to a total of 50 individuals.

This study's sample is composed of individuals directly involved in the thesis development and evaluation process. The researchers employed purposive sampling to ensure participants possess relevant experience and knowledge regarding thesis supervision and educational technology systems.

A total of **50 respondents** participated in the study categorized as follows:

- 35 3rd year thesis-writing students from the College of Information and Communications Technology (CICT)

- 10 professors serving as thesis advisors or evaluators
- 5 IT professionals with backgrounds in system development or educational technologies

Research Instrument

The researchers aimed to employ a quantitative research instrument, namely by utilizing survey questionnaires, in collecting data from the participants. The questionnaires were personally distributed. They were meant mainly for people engaged in the thesis process, including 3rd year CICT thesis-writing students, subject advisors, and IT professionals, to assess the algorithm-driven thesis progress monitoring platform developed.

The researchers also provided a space in the questionnaire where the respondents could provide their comments, experiences, perceptions, and recommendations about the use of the system. To evaluate the performance of the system, the researchers employed chosen criteria from the ISO 25010 quality model, which are functionality, reliability, usability, maintainability, and efficiency of the platform.

Data Gathering Procedure

Descriptive statistics, or frequency, mean, and standard deviation, were employed by researchers to examine the survey questionnaire responses. They used printed forms given to participants to manually obtain data. Using this, the system quality was assessed according to the ISO 25010 model regarding factors such as usability and functionality.

Survey Questionnaire

POINT	SCALE RANGE	EXPLANATION
4	4.00 - 3.00	Strongly Agree
3	2.99 – 2.00	Agree
2	1.99 – 1.00	Disagree
1	1.00 – 0.99	Strongly Disagree

Figure 2. Likert Scale

The figure above shows that the researchers used a 4-point Likert scale in this study to assess how users (3rd year CICT students, subject advisors, and IT professionals) felt about the performance of the ThesisTrack system. Each response was assigned a numerical value, and the average, or "weighted mean," was determined for each category, including functionality, efficiency, usability, reliability, maintainability, and portability. The researchers used a straightforward guideline to interpret the results: if the weighted mean falls between 3.25 and 4.00, it indicates that users strongly agreed that the system performs very well; if the score is between 2.50 and 3.24, it indicates that users agreed but may still have minor areas to improve; and a score between 1.75.

TAGUIG CITY UNIVERSITY

Software Evaluation Instrument of ISO 25010

(ThesisTrack: An Algorithm-Driven Platform for Efficient Monitoring of Student Research Progress for CICT)

Name (Optional): ______________________________ Date: __________________

Type of Respondents:_________________________

Numerical Rating and Equivalent

[4] - Strongly Agree [2] - Disagree

[3] - Agree [1] - Strongly Disagree

Instruction: Rate the following categories by putting a check (✔) for the favored selection before the characteristics reflected in the system. Select only one per item.

1. FUNCTIONAL SUITABILITY	**Rating Scale**			
	4	**3**	**2**	**1**
1.1 Functional Completion. Degree to which the set of functions covers all the specified tasks and user objectives.				
1.2 Functional Correctness. Degree to which the system provides the correct result with the needed degree of precision.				
1.3 Functional Appropriateness. Degree to which the functions Facilitate the accomplishment of specified task and objectives.				
TOTAL:				

2. PERFORMANCE EFFICIENCY	**Rating Scale**			
	4	**3**	**2**	**1**
2.1 Time Behavior. Degree to which the response and processing times and throughput rates of the system, when performing its functions, meet requirements.				
2.2 Resource Utilization. Degree to which the amounts and types of resources used by the system, when performing its functions, meet requirements.				
2.3 Capacity. Degree to which the maximum limits of the system parameter meet requirements.				
TOTAL:				

3. COMPATIBILITY	**Rating Scale**			
	4	**3**	**2**	**1**
3.1 Co-existence. The system can perform its required functions efficiently while sharing a common environment and resources with the product without detrimental impact on any product.				
3.2 Interoperability. The system can exchange information and the user information that has been exchanged.				
TOTAL:				
4. MAINTAINABILITY	**Rating Scale**			
	4	**3**	**2**	**1**
4.1 Modularity. Degree to which the system is composed of discrete components such that a change to one component has minimal impact on other components.				
4.2 Reusability. Degree to which an asset can be used in more than one system, or in building other assets.				

4.3 Analyzability. Degree of effectiveness and efficiency with which it is possible to assess the impact on the system of an intended change to one or more of its parts, or to diagnose a system for deficiencies or causes of failures, or to identify parts to be modified.				
4.4 Modifiability. Degree to which the system can be effectively and efficiently modified without introducing defects or degrading existing system quality.				
TOTAL:				

5. RELIABILITY	**Rating Scale**			
	4	**3**	**2**	**1**
5.1 Maturity. Degree to which the system meets needs for reliability under normal operation.				
5.2 Availability. Degree to which the system is operational and accessible when required for use.				
5.3 Fault Tolerance. Degree to which the system operates as intended despite the presence of hardware or software faults.				
5.4 Recoverability. Degree to which, in the event of an interruption or a failure, the system can recover the data directly affected and re-establish the desired state of the system.				
TOTAL:				

6. USABILITY	**Rating Scale**			
	4	**3**	**2**	**1**
6.1 Appropriateness Recognizability. Degree to which users can recognize whether the system is appropriate for their needs.				

6.2 Learnability. Degree to which the system can be used by specified users to achieve specific goals of learning to use the system with effectiveness, efficiency, freedom from risk and satisfaction in a specified context of use.				
6.3 Operability. Degree to which the system has attributes that make it easy to operate and control.				
6.4 User-Error Protection. Degree to which the system users against making errors.				
6.5 User Interface Aesthetics. Degree to which a user interface enables pleasing and satisfying interaction for the user.				
TOTAL:				
7. PORTABILITY	**Rating Scale**			
	4	**3**	**2**	**1**
7.1 Adaptability. Degree to which the system can effectively and efficiently be adapted for different or evolving hardware, software or other operational or usage environments.				
7.2 Installability. Degree of effectiveness and efficiency with which the system can be successfully installed and/or uninstalled in a specified environment.				
7.3 Replicability. Degree to which the system can replace another specified software product for the same purpose in the same environment				
TOTAL:				
8. SECURITY	**Rating Scale**			
	4	**3**	**2**	**1**
8.1 Confidentiality. Degree to which the system ensures that data are accessible only to those authorized to have access.				
8.2 Integrity. Degree to which the system prevents unauthorized access to, or modification of, computer programs or data.				

8.3 non-repudiation. Degree to which actions or events can be proven to have taken place, so that the events or actions cannot be repudiated later.				
8.4 Accountability. Degree to which the actions of an entity can be traced uniquely to the entity.				
8.5 Authenticity. Degree to which the identity of a subject or resource can be proved to be the one claimed.				
TOTAL:				

Comments/Suggestions:

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Signature

Interview and Observation

To supplement the quantitative information obtained from the questionnaire based on ISO 25010, structured interviews and systematic observations were also carried out among participants such as 3rd year CICT thesis-writing students, subject advisors, and IT professionals.

The interviews were structured around standardized questions aimed at the six quality attributes: Functionality, Reliability, Usability, Efficiency, Maintainability, and Portability. Responses from interviews were measured and analyzed to support questionnaire results and further illustrate user experience with the ThesisTrack platform.

The observations were facilitated with an ISO 25010-based checklist to help ensure alignment with the questionnaire and interview materials.

Data Analysis and Procedure

A structured questionnaire based on the ISO 25010 quality model served as the primary means of gathering data. The survey was distributed to a select group of IT professionals, subject advisors, and 3rd year CICT thesis-writing students. The answers were then encoded and subjected to descriptive statistics analysis.

The statistical instruments listed below were used:

Frequency: The number of participants who chose each rating (4, 3, 2, or 1) for each item

Percentage: to display the percentage of answers for each rating option.

Weighted Mean: is used to calculate the average rating for every aspect of system quality.

We used a 4-point Likert scale to rate each item:

4 - Strongly Agree

3 - Agree

2 - Disagree

1 - Strongly Disagree

To ascertain the general opinion of the platform's performance in areas including functionality, usability, dependability, and efficiency, the weighted mean was computed. While lower averages highlighted places for improvement, a weighted mean nearer 4 indicated significant agreement and pleasure. In order to determine whether the system fulfilled user expectations and performance criteria, these results were subsequently evaluated.

Validation and Distribution of the Instrument

To ensure that the questionnaire was appropriate for evaluating the developed platform, the researchers sought feedback from individuals with relevant expertise. The instrument was reviewed by professionals with backgrounds in system development, thesis advising, and academic research. Based on their input, the questionnaire was refined to improve clarity and relevance. Once finalized, the instrument was distributed to the selected participants for data collection.

Data Encoding and Formulation of the Solution

The collected data from the participants were compiled, sorted, and made ready for analysis. The researchers worked through the responses to analyze patterns and assess the general performance of the developed system. Appropriate conclusions and changes based on the results were made to enhance the platform's effectiveness.

Evaluation of Data and Result

Descriptive statistics was employed to analyze the obtained data with respect to the constructed platform. The responses from the survey were compared and categorized based on chosen ISO 25010 properties like functionality, usability, and efficiency. Through this, the researchers gained an understanding of how effective and easy to use the thesis monitoring system was. From the findings, the researchers made conclusions regarding the strengths and weaknesses of the platform that can be used to inform future development.

Statistical Treatment of Data

Statistical Tools

The researchers utilized statistical methods to assess responses from experienced participants in thesis development and supervision at Taguig City University. The questionnaire responses were examined through tallying.

Frequency

The respondents' number was found and split by a total number of respondents in order to get the right percentage and proper description.

$$F = \frac{f}{N} \times 100$$

Figure 3. Formula for Frequency

Where:

F = frequency

N = Sample Size / Total Population

Percentage

To enable comparison of the responses, this statistical instrument was used because it indicates which items were most preferred or least preferred.

The formula is:

$$\% = \left(\frac{frequency\ of\ response}{total\ response}\right) \times 100$$

Figure 4. Formula for Percentage

Where:

Frequency of response: The number of people who selected a particular answer.

Total number of responses: The total number of people who answered the question.

× 100: Converts the result into a percentage.

Weighted Mean

In order to identify how the respondents rated the constructed algorithm-driven thesis progress monitoring system, the weighted mean was utilized as a statistical measure. It aids in establishing the overall user perception based on users' ratings of quality indicators like functionality, usability, reliability, maintainability, and efficiency according to the ISO 25010 standards.

It is achieved through the use of the formula:

$$x_w = \frac{\sum(f \times w)}{\Sigma f}$$

Figure 5. Formula for Weighted Mean

Where:

Xw = weighted mean

f = frequency of responses per rating

w = weight assigned to each response (e.g., 4 = Strongly Agree, 3 = Agree, 2 = Disagree, 1 = Strongly Disagree)

$\sum f$ = total number of responses

Technical Requirements

This section describes the hardware, software, and networking requirements of the algorithm-driven thesis progress monitoring platform that has been developed. Hardware refers to the computing equipment used for accessing and developing the system, like desktop and laptops, to maintain smooth performance and compatibility. Software refers to the operating systems, development tools, databases, and application frameworks required to develop and execute the platform. Network requirements center on connection speed, stability, and security to enable real-time updates and access to the platform.

The project design well consolidates all the components—like structure verification, document parsing, and Kanban-based visualization of tasks—providing an organized system architecture in accordance with project objectives and promoting the user experience of students, advisors, and IT professionals involved in thesis supervision. Additional AI-powered features such as an AI Detector, Grammar Checker, and Spelling Checker enhance the system by ensuring the authenticity and correctness of submitted content, helping maintain academic integrity and improving the quality of research outputs.

Hardware Requirements

Table 2. Hardware Requirements

HARDWARE	DESCRIPTION
LAPTOP or DESKTOP	
RAM	Minimum of 4GB of RAM
ROM / Storage	At least 128GB of available storage
GPU	Inter UHD Graphics 605 or higher
CPU	Intel Core i5 (8th Gen) @2.3GHz or higher
Display	Minimum resolution of 1280x720 pixels

Table 2 presents the minimum hardware specifications required for the development and operation of “ThesisTrack: An Algorithm-Driven Platform for Efficient Monitoring of Student Research Progress for CICT”. This system is intended for use on laptops or desktops only. A minimum of 4GB RAM is needed to efficiently run the platform, particularly when handling multiple processes such as database operations, user interface rendering, and algorithm-based tracking features. To handle development tools, database backup, and project materials, an average of 128GB storage capacity is needed. To have efficient performance and necessary system response, the processor should be able to support at least 2.3 GHz from an Intel® Core™ i5 (8th Generation). One of the minimum requirements for Visual Display support is Intel® UHD Graphics 605 along with a 1280x720 screen resolution so that the interface stays uncluttered and user-friendly.

Software Requirements

The figures below were the software requirements that the researchers used to develop the proposed system, An Algorithm-Driven Platform for Thesis Progress Monitoring. The following figures provide details for the specific software requirements that were utilized in the development process.

Figure 6. Visual Studio Code

Visual Studio Code, or VS Code, is an integrated development environment (IDE) for Windows, Linux, and macOS operating systems developed using the Electron Framework. Robust and fast code editor dedicated to source code design and structuring in Python, HTML, CSS, JavaScript, and PHP.

Figure 7. XAMPP (Apache, MySQL, PHP)

The XAMPP package, a shared platform which offers a cross-platform web server solution, is maintained by the Apache community without any charges. Researchers depend on this application for managing and organizing the MySQL database.

Figure 8. MySQL

Free and open-source relational database management system designed by MySQL AB, known as MySQL, or “My Structured Query Language”. Handles all user, thesis progression, timetable, notification, and system setting details.

Figure 9. Front-End Technologies (HTML, CSS, JavaScript)

These are all the technologies that culminate in the platform user interface. By using HTML to create the structure of content, CSS to lay out the design and aesthetic of the content, and JavaScript to add dynamic interactions such as real-time updates and form validations.

Figure 10. PHP (Hypertext Preprocessor)

A server-side scripting language that ensures control of the behind-the-scenes processes, interacting with form input, session control, and interactions with data in a database.

Figure 11. Python

Used in the creation of algorithms or data handling modules for instance, to visualize the trend of users' advancement status or to structure action-oriented flows.

Figure 12. Hugging Face FLAN-T5

Hugging Face DistilBERT is a smaller and faster version of the original BERT model, which is a type of artificial intelligence used to understand human language. It was created by Hugging Face to keep most of BERT's accuracy while making it quicker and easier to use. DistilBERT can help with tasks like grammar checking, classifying text, and answering questions

Network Requirements

Figure 13. Internet Connection

A stable connection to the internet is a prerequisite for efficiently operating a Thesis Progress Monitoring Algorithm-Driven Platform. Since the platform can only be accessed using laptops or desktops, it is advisable to use a Wi-Fi or an Ethernet connection for maximum performance. For optimal performance, users should have a minimum internet connection speed of 10 Mbps for real-time data exchange, progress observation, and algorithmic analysis in thesis work.

API Specifications

Table 3. API Specifications

Endpoint	Method	Description	Authentication Required
/api/login	POST	Logs in a user (student, subject advisor, or research coordinator)	No
/api/upload-chapter	POST	Uploads a thesis chapter	Yes
/api/validate-chapter	POST	Performs AI rule validation using DistilBERT on the uploaded chapter	Yes
/api/resubmit-chapter	POST	Resubmits a corrected chapter	Yes
/api/progress	GET	Retrieves the Kanban-style progress board	Yes
/api/feedback	POST	Submits subject advisor feedback	Yes
/api/view-feedback	GET	Student views feedback history	Yes
/api/generate-report	GET	Generates the final report of student progress	Yes
/api/notification	GET	Gets system alerts for the user	Yes

Table 3 presents the API designed for monitoring student research progress on ThesisTrack: An Algorithm-Driven Platform for CICT. The table contains important points that make it possible for the front end to interact with the backend server. Some of its essential tasks involve checking users, registering chapters, processing all validations, providing users with feedback, and monitoring their progress.

Each endpoint is associated with a specific HTTP method (such as GET or POST) and supports structured request parameters that either retrieve or send data to the server. For example, the /api/upload-chapter endpoint allows students to upload their thesis files, which are then passed through a rule-based AI validation process triggered by the /api/validate-chapter endpoint. This validation now leverages a fine-tuned version of Hugging Face's DistilBERT model, trained on institutional datasets, enabling intelligent assessments based on academic structure, content quality, and compliance with thesis standards.

Security is assured in the API because most processes need authentication using tokens to prevent unauthorized access by anyone other than the proper students and professors. Subject advisors can see all the student assignments and guide them accordingly and students are notified automatically about their errors or when their chapters are updated. Meanwhile, research coordinators also log into the system to oversee administrative functions such as creating advisor accounts, and assigning advisors to designated sections, thereby ensuring effective academic management.

Overall, this API framework ensures efficient system interaction, automated communication, and real-time data handling—crucial for enabling a seamless and responsive thesis monitoring experience.

The proposed web-based thesis progress tracking platform's initial layout is shown in the figures below. The interface is made up of a few key elements. Users can safely access their accounts via a login page, and new users can build their profiles on a registration page. Users are taken to the home page with a visual workflow in the Kanban style after logging in. Users may more easily monitor progress with this arrangement, which provides a clear picture of each thesis step.

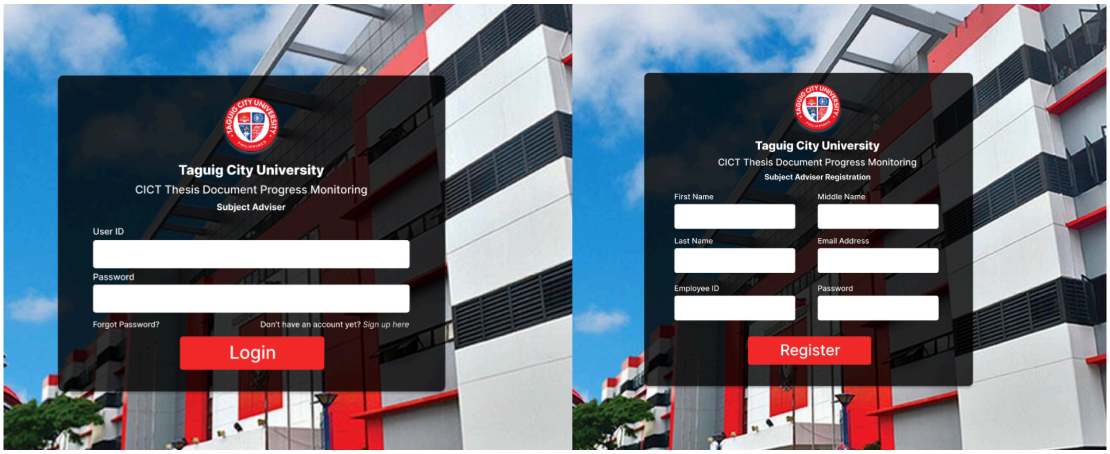

Figure 14. Subject Advisor Login and Registation Page

New subject advisors can securely create their accounts on the registration page. A secure password, employee ID, email address, last name, middle name, and first name are among the important personal and professional details it gathers.

On the other hand, subject advisors have an easy way to access their accounts through the login page too. To obtain access, advisors must input their User ID and password. The page has easy-to-use features like a sign-up link for users who haven't registered yet and "Forgot Password?" for password recovery.

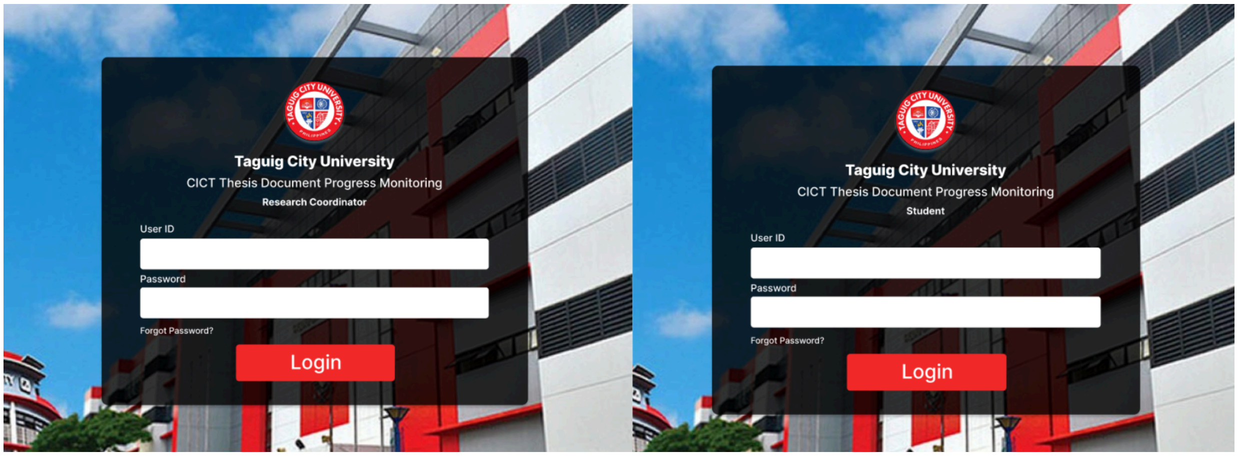

Figure 15. Student and Research Coordinator Login Page

Figure 15 above shows the login page is the entry point of users of the thesis document progress monitoring system. It has UserID and password input fields where users can safely key in their UserID and passwords. The login session is necessary to authenticate user identities and provide access to personalized system functions, such as uploading a thesis, monitoring progress, and advisor comments.

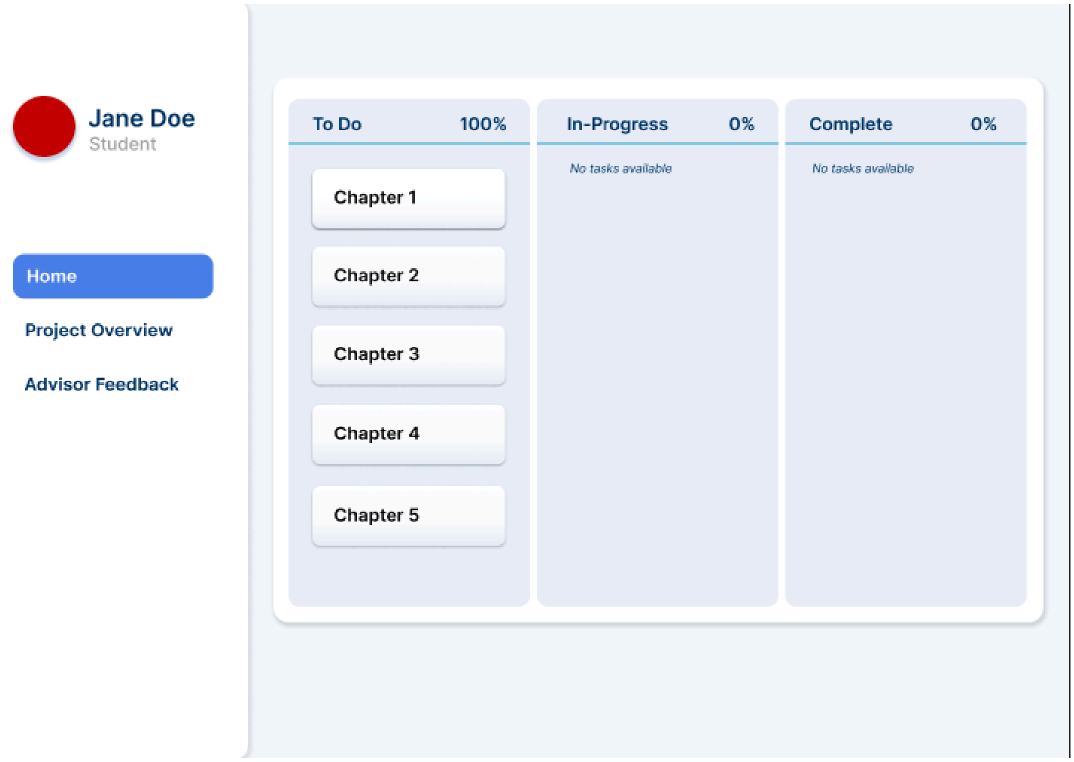

Figure 16. Student Home Page

Figure 16 shows when a user logs into the system, they are directed to the home page. The student's name and role are displayed at the top of the interface for identification. Below this, a kanban visual workflow board is shown, divided into three sections: To Do, In Progress, and Completed. Each section includes a status label and a progress percentage. At this stage, all sections show "No tasks available," indicating that no tasks have been added yet. The progress bars remain at 0%. At the side part of the screen, navigation buttons are provided. These include Home, Project Overview, and advisor Feedback, allowing users to move to other sections of the system.

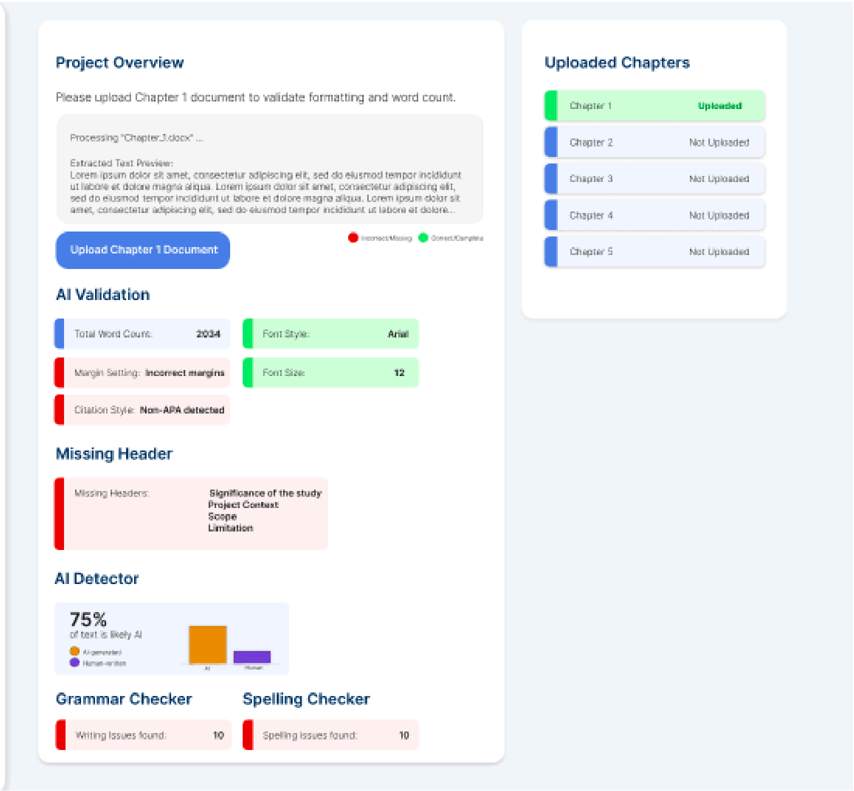

Figure 17. Student Project Overview Page

Students are asked to upload Chapter 1 for preliminary validation on the Project Overview Page, as seen in Figure 17. The interface verifies that the document is being processed by displaying the file name and a preview of its contents.

The platform's AI-powered validation system produces a diagnostic report following upload. This involves proofreading for spelling, punctuation, word count, margins, and the inclusion of necessary elements such as abstracts and headers. It also confirms adherence to citation style. The system has an AI-written content detector that looks for patterns in the text to identify potentially machine-generated content in order to uphold academic integrity.

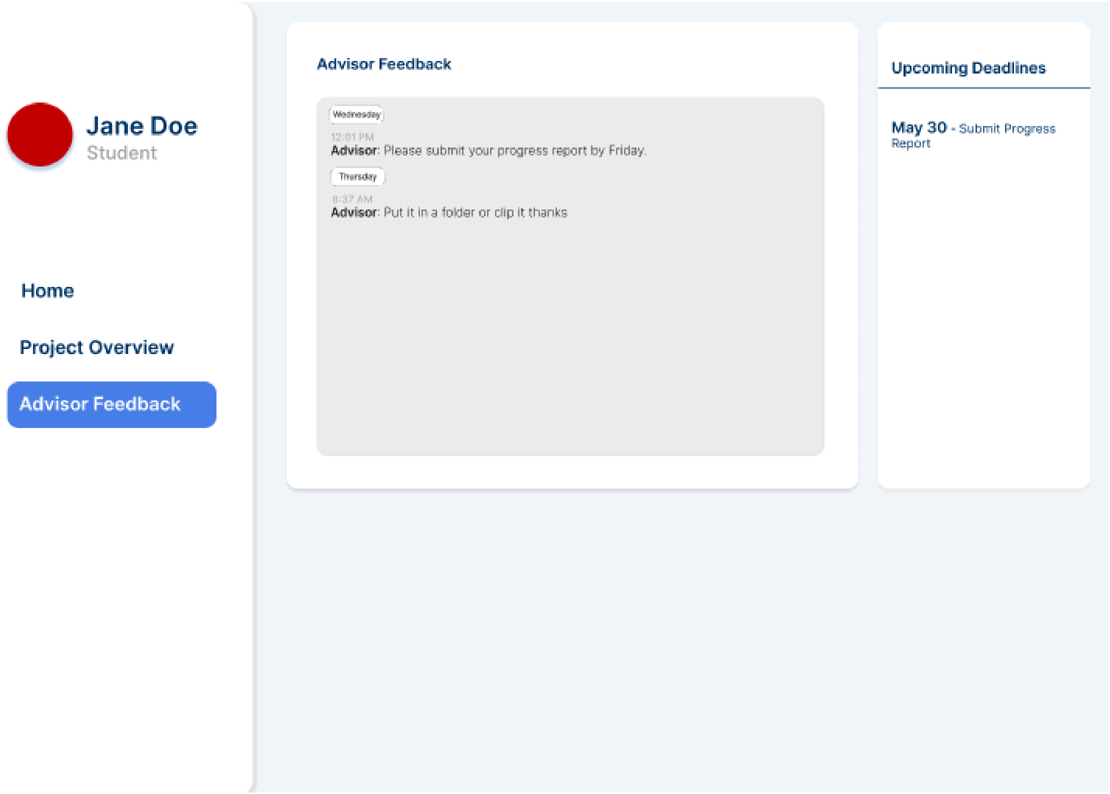

Figure 18. Student advisor Feedback Page

Figure 18 shows the advisor Feedback Page, where the student can see any comments their thesis advisor has made. After reviewing the advisor's comments, the student can look at the section on upcoming deadlines, which can be found just below the comments. This section outlines crucial deadlines that the student must follow while working on their thesis. In order to stay on track and finish their thesis on time, the student must follow certain deadlines.

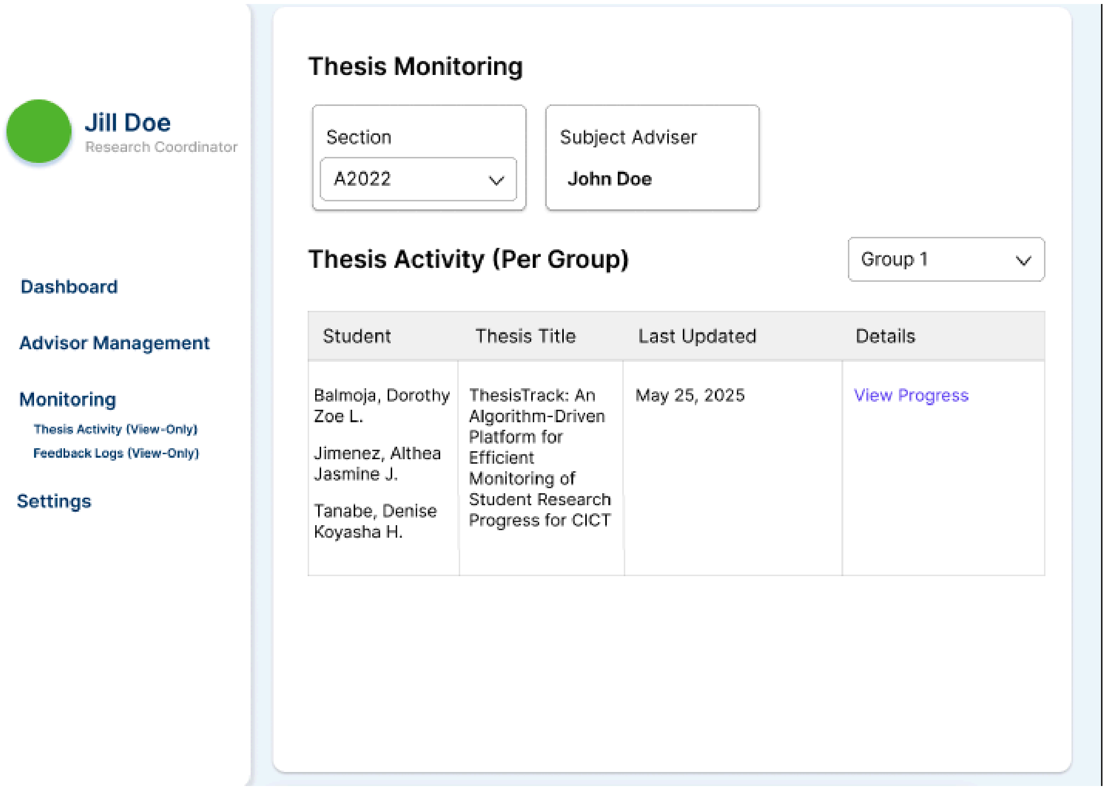

Figure 19. Research Coordinator Thesis Monitoring Page (View Only)

The figure 19 represents the Thesis Monitoring page designed for a Research Coordinator. At the top of the page, dropdown selectors allow the coordinator to filter thesis data by Section and view the work supervised by a specific Subject advisor.

The central part of the page displays the Thesis Activity (Per Group) table, which organizes thesis information by group number (e.g., Group 1). For each group, the interface lists student members, the thesis title, the last updated date, and a link to view progress.

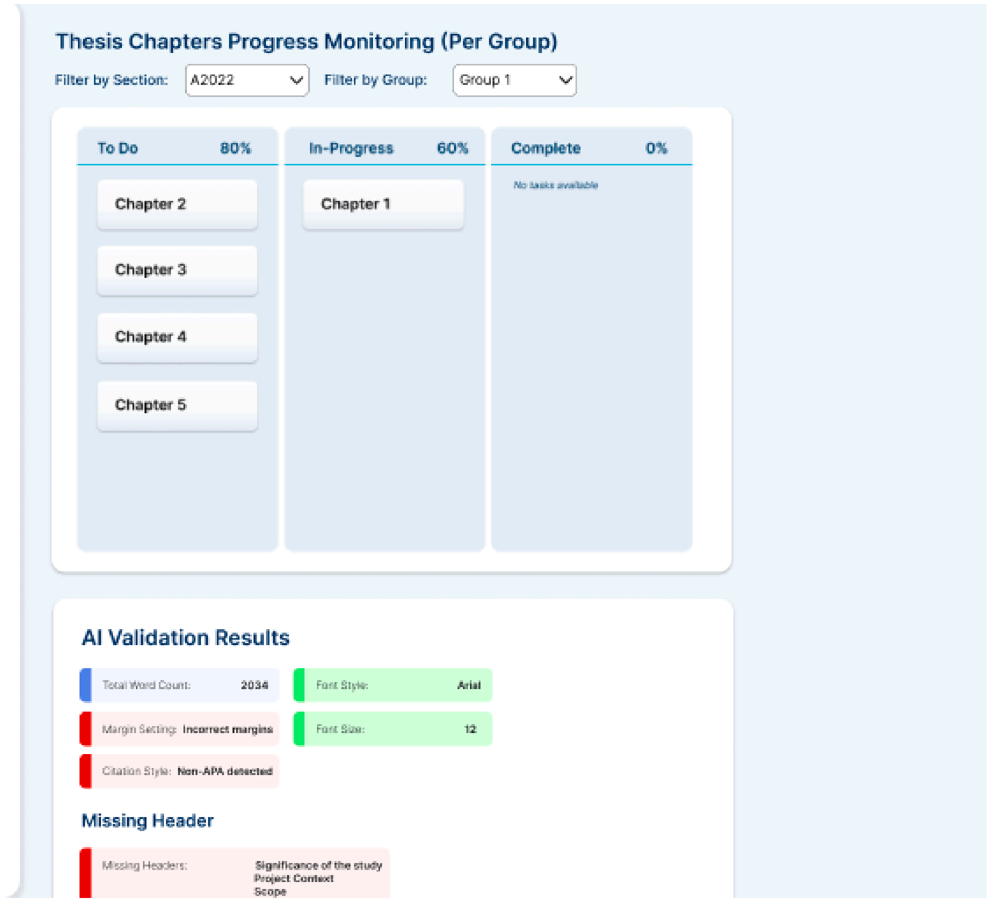

Figure 20. Subject advisor Progress Monitoring Page

Figure 20 shows which chapters have been finished, which are still in process, and which have not yet been started. In this instance, none of the chapters have been finished, one is presently being worked on, and the majority are still in the "To Do" stage. An AI validation portion of the dashboard also verifies the document's formatting and content compliance. In addition to highlighting problems like improper margins, non-APA citation style, and missing necessary headers, it shows the word count, font style, and size.

Diagrams

Diagrams are visual representations constructed by researchers to guide them in developing the proposed system. This section includes the System Architecture, Data Flow Diagram, Flowchart, Unified Modeling Language, Database Structure, and System Development. Preliminary diagrams were done for each category to comprehend the system functionality.

System Architecture

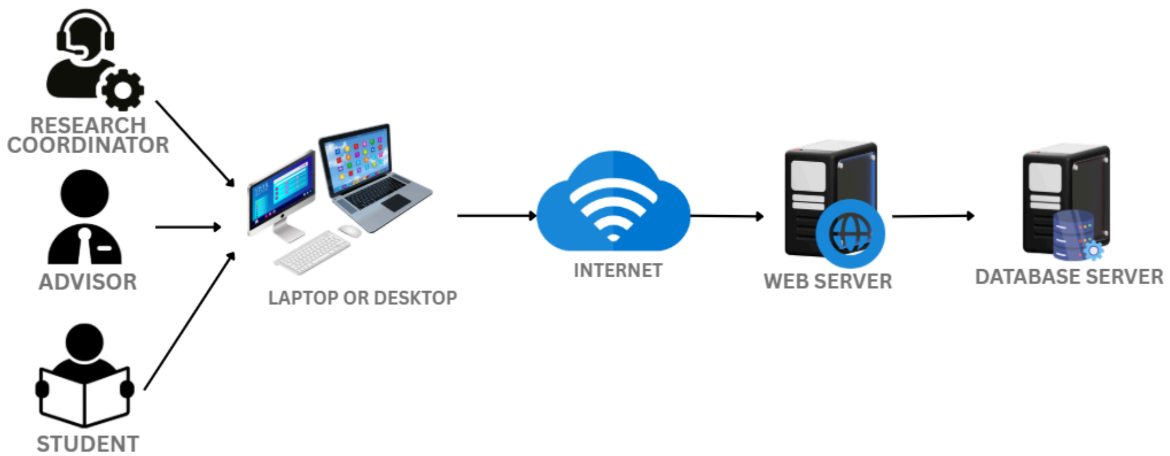

Figure 21. Architectural Design

This figure shows the architectural design of the proposed system, ThesisTrack: An Algorithm-Driven Platform for Efficient Monitoring of Student Research Progress for CICT. It shows the interaction between the important system components. For students, advisors, and research coordinator, they are using either laptops or desktop computers to log in the internet to access the platform. These requests go through a web server, which deals with the critical application logic and speaks directly to the database server. All the data, like user information, thesis submissions, validation reports, and feedback, are stored in the database server. This client-server architecture guarantees effective communication, centralized data storage, and live monitoring of the progress of the thesis.

Data Flow Diagram (Context Level/Diagram 0, DFD level 1)

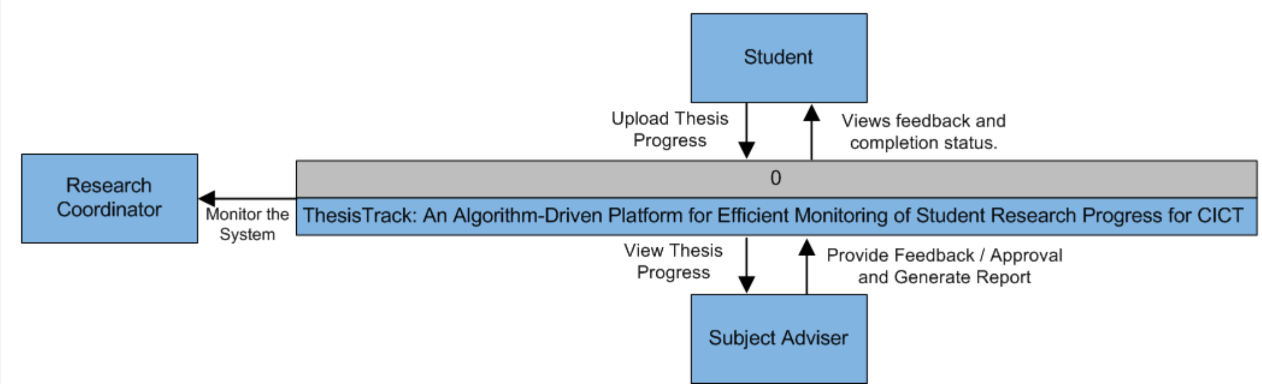

Figure 22. Data Flow Diagram Context Level 0

Figure 22 shows the Context Level 0 Data Flow Diagram, providing a high-level view of the system's interactions with subject advisors, students, and the research coordinator. Students upload thesis progress documents and receive feedback along with completion status updates, ensuring transparency on required improvements. Subject advisors review submissions, provide feedback, and generate reports, enabling structured supervision and automated tracking. The research coordinator plays a supervisory role in the system. They monitor overall activity, creating advisor accounts, and assign advisors to specific section, to ensure that only authorized personnel participate in the thesis monitoring process. This oversight helps maintain the quality and integrity of the supervision process across the academic institution.

The system serves as a centralized platform for feedback and documentation, improving efficiency and progress tracking in thesis development for all stakeholders involved.

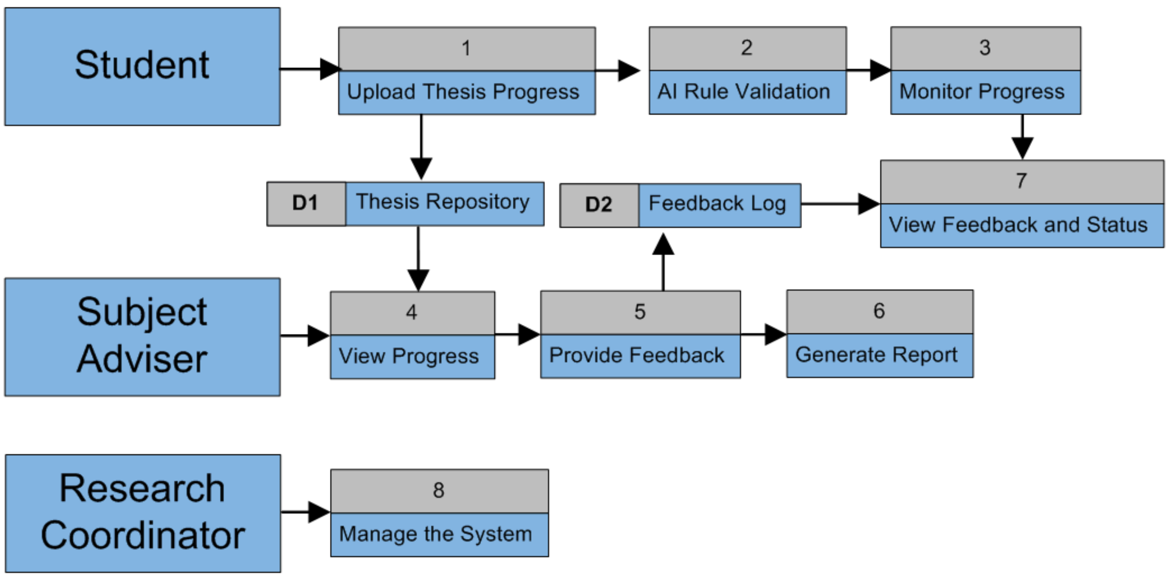

Figure 23. Data Flow Diagram Level 1

Figure 23 illustrates the Level 1 DFD of the thesis tracking system, showing internal activities and data flow between users, functions, and storage. Students upload thesis papers (Process 1), which go through AI checking (Process 2) to qualify for academic standards. Approved papers are stored in the Thesis Repository (D1), whereas students monitor progress through Process 3.

Subject advisors check submissions (Process 5) and give feedback (Process 6), recorded in the Feedback Log (D2) for student viewing (Process 7). They can also create progress reports (Process 6). The diagram shows the integration of rule-based validation, and feedback mechanisms to facilitate thesis supervision.

The research coordinator, as shown under “Manage the System” (Process 8), oversees administrative and supervisory tasks within the platform. They are responsible for creating advisor accounts, and assigning advisors to specific sections. This ensures that only verified faculty can access the system and that each section is properly monitored by an assigned advisor, supporting consistent thesis guidance across the platform.

The overall design emphasizes automation through AI validation, along with centralized documentation and structured feedback to streamline thesis progress tracking and academic supervision.

Proposed Flowchart

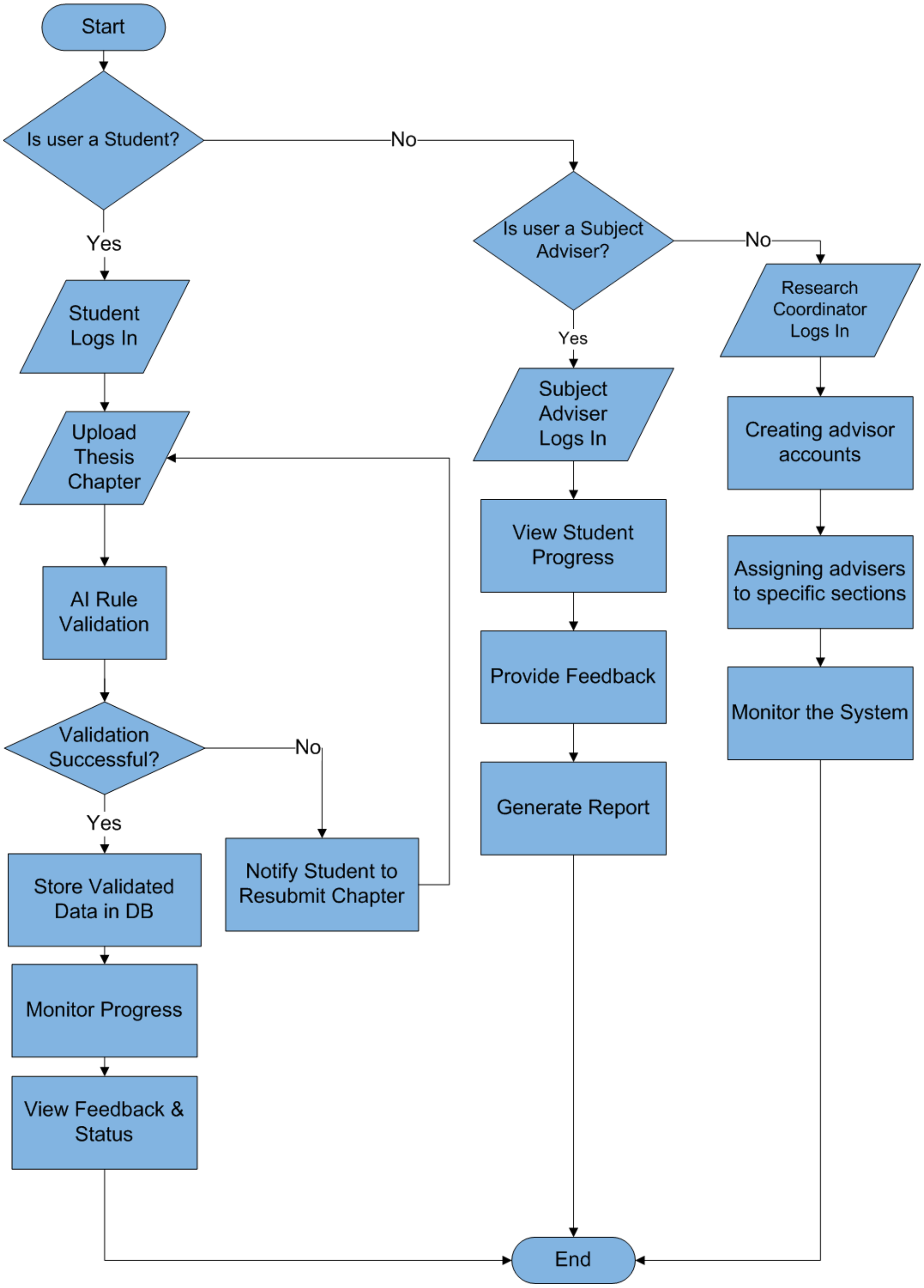

Figure 24. System Flowchart

The system flow of the Algorithm-Driven Platform for Thesis Progress Monitoring is shown in Figure 24. The process starts when the user identifies himself or herself as a student, subject advisor, or research coordinator.

Students log into the system and upload their thesis chapters, which are validated using AI rule-based checking aligned with academic standards. In case validation fails, the student is notified that he should revise and resubmit. When it is passed, the validated data is stored in the database. After that, students can see where their thesis stands, get updates and look at any feedback their advisor has left for them.

Subject advisors, on the other hand, log into the system to view student progress, provide feedback based on validation results and academic review, and generate performance reports. Meanwhile, research coordinators also log in to manage the system by creating advisor accounts, and assigning advisors to specific sections. This differentiated yet integrated flow ensures that each user role follows a tailored process, resulting in an organized and efficient system for supervising, monitoring, and improving the thesis development workflow.

Unified Modeling Language

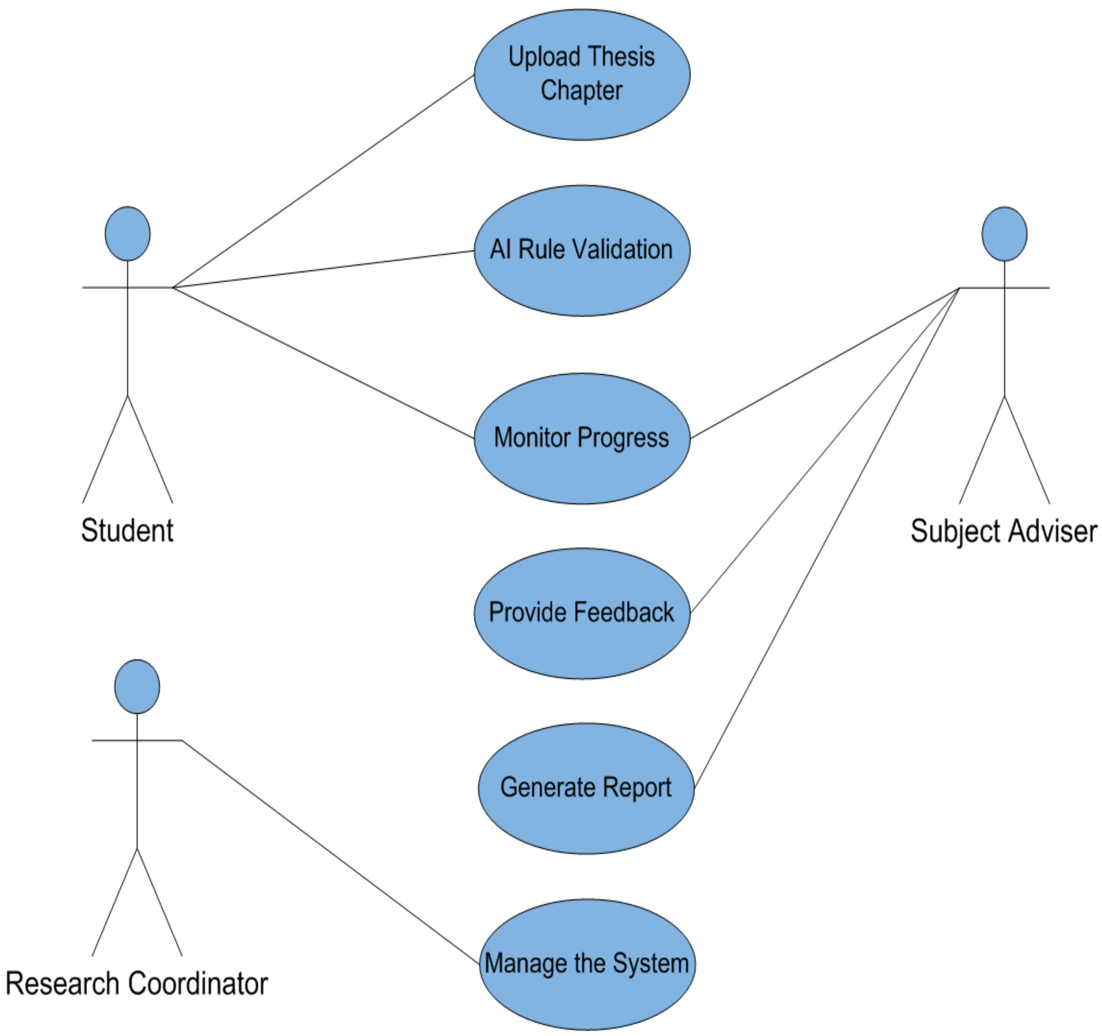

Figure 25. Unified Modeling Language

Figure 25, presented at the top, describes the main components and interactions within the proposed “ThesisTrack: An Algorithm-Driven Platform for Efficient Monitoring of Student Research Progress for CICT”. It identifies three primary actors: The system is accessed by both the Student, Subject advisors, and the Research Coordinator, each through a selection of predefined use cases.

The process is started by the Student when they upload their thesis chapter. The moment the upload happens, the system carries out AI Rule-Based Validation,checking the document against predefined academic standards.If the submission passes, it is stored in the database; otherwise, the student is notified to revise and resubmit. By selecting Monitor Progress, students may view a summary of their thesis progress as well as review previous feedback.

The Subject advisors can use the system by going to the Monitor Progress feature to examine the student's submissions. The professor can give feedback using the system's validation data and personal judgment, and can create reports that summarize the student's performance and thesis status.

In the system, the Research Coordinator supervises and manages daily administrative tasks. They are responsible for managing the overall workflow by creating advisor accounts, and assigning advisors to specific sections. This ensures that each class or research group has a designated advisor and maintains consistent academic oversight across all users. Their involvement supports accountability and balanced distribution of advisory duties.

This diagram emphasizes the collaborative roles of each user type and shows how the platform's automated features—such as AI validation, and centralized feedback—work together to streamline and enhance the research supervision process.

System Development

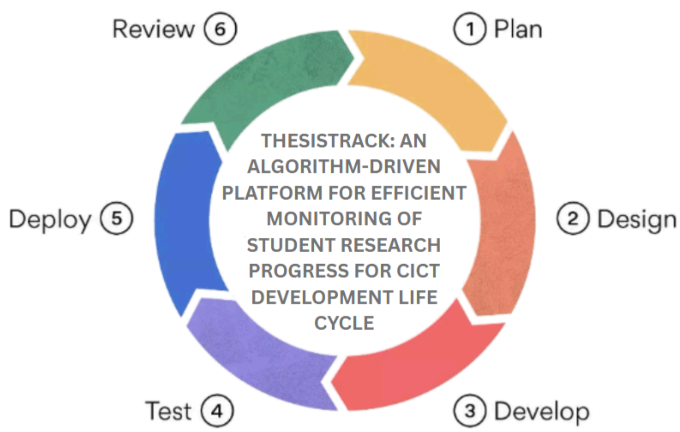

Figure 26. ThesisTrack: An Algorithm-Driven Platform for Efficient Monitoring of Student Research Progress for CICT Development Life Cycle (Kanban Agile Methodology)

Planning

In this stage, the researchers identified the system's primary objectives, which include automating and visually monitoring faculty supervision and student thesis progress tracking. The key proposed features are thesis chapter uploads, intelligent document parsing for structural and content validation, and task flow visualization through the Kanban methodology. The system also integrates AI-driven grammar and spelling correction, citation formatting validation, and an AI-written content detection feature that analyzes textual patterns to estimate the percentage of potentially machine-generated content.

Design

The system design was mapped according to user needs. Interface wireframes were created, focusing on the simplicity of navigation for students and teachers alike. Document upload modules, feedback modules, and report generation modules were organized.

Development

During this stage, system coding was initiated to implement key functions such as user registration, thesis document uploads, automated AI-driven document analysis, professor feedback logging, and visual progress tracking using Kanban boards. The document parser and fine-tuned NLP model to directly process digital submissions, enabling more accurate analysis of structural elements, grammar, spelling, citation compliance, and AI-generated content detection. These components were integrated to support efficient, consistent, and intelligent thesis supervision.

Testing

To make sure that the essential features worked as intended, the system will go through multiple testing cycles. This will assist in pinpointing areas that need improvement or change.

Deployment

The application was made available to the target users for real use. This phase entailed setting up the system in a live environment for performance testing. The researchers kept track of the performance of the system to determine areas for future improvement, such as enhanced feedback mechanisms or document tracking.

Review

In order to understand whether the system was successful, the team gathered further input from real users at this point. The development cycle came to a close when the system was complete and prepared for full deployment following iterative refining. This loop made it possible to improve responsive features all the way through the development process.

Algorithm Discussion

The proposed system employs a document parsing algorithm combined with a fine-tuned NLP model to evaluate thesis submissions. The parser reads and structures the digital content of uploaded Word or PDF documents, preparing it for analysis. The AI model then performs three primary tasks:

Features

- **Spelling and Grammar Correction:** Detects and suggests corrections for errors in word usage, sentence structure, and punctuation.
- **AI-Written Percentage Detector:** Analyzes the text and provides an estimated score indicating the extent of AI-generated content.

- **Section and Formatting Validation:** Identifies missing thesis components (e.g., abstract, introduction, methodology) and checks compliance with institutional citation and formatting guidelines.

Function

- Generates **instant feedback** highlighting specific errors or missing elements.
- Produces a **completeness and originality report** for both students and advisors.
- Integrates with the workflow system to ensure only compliant drafts move forward in the review process.

Uses

- **For Professors:** Reduces time spent on mechanical error-checking, allowing them to focus on the content and originality of student work.
- **For Students:** Offers immediate insights into their draft quality, helping them revise and improve before submission.
- **For Institutions:** Ensures consistency in thesis evaluations and accelerates the overall supervision process.

References

Alqahtani, T., Badreldin, H., & Alrashed, M. (2023, June 4). The emergent role of Artificial Intelligence, natural learning processing, and large language models in