SELF-REGULATED ENGLISH LESRNING ANALYTIC APPLICATION

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ABSTRACT

Self-regulated learning (SRL) is a multifaceted educational concept that encompasses various cognitive, motivational, and emotional dimensions of the learning process. SLR places the learner at the center of their educational journey, empowering them to take control of their own learning experiences. In the context of this dynamic and interconnected world, English has emerged as the dominant lingua franca, holding the status of the most widely spoken language globally. The acquisition of English language skills is a fundamental aspiration for individuals worldwide, given the language's status as the most widely spoken and influential means of global communication. However, a considerable portion of English language learners, particularly in non-English speaking countries, encounter substantial challenges during their language acquisition journey. Objectives of this project are to identify suitable dashboard for self-regulated learning approach, to develop Self-regulated learning analytics application, to conduct usability test of Self-regulated learning analytics application. The project follows a Waterfall development approach, which is a linear and sequential methodology with distinct phases. This application stands as a beacon of innovation, seeking to empower learners with a tailored educational journey that transcends the traditional one-size-fits-all approach. Through the adept utilization of advanced algorithms, this application is uniquely positioned to calculate and curate personalized learning paths based on the nuanced understanding of each student's proficiency levels, historical learning patterns, and cognitive capabilities. The integration of self-regulated learning (SRL) principles forms the backbone of this initiative, highlighting the significance of learner autonomy and goal-setting.

INTRODUCTION

Self-regulated learning (SRL) is a multifaceted educational concept that encompasses various cognitive, motivational, and emotional dimensions of the learning process. Over the years, SRL has become a central focus of educational research and practice (Valentin Riemer, 2023). It places the learner at the center of their educational journey, empowering them to take control of their own learning experiences. In the context of this dynamic and interconnected world, English has emerged as the dominant lingua franca, holding the status of the most widely spoken language globally. Its omnipresence and influence have transcended borders, leaving a profound impact on individuals across the globe by enabling effective communication (Oktari Firda Hibatullah, 2019). This introduction sets the stage for the exploration of a critical intersection: the application of self-regulated learning principles in the context of the English language, which has become an essential skill in today's interconnected world. The amalgamation of self-regulation and English language acquisition forms the foundation for a novel educational initiative - the "Self-Regulated Learning Analytic Application." This application leverages the principles of SRL to enhance and streamline the English language learning process, promising a more personalized and effective learning experience for individuals seeking proficiency in the global lingua franca. To address these challenges, the proposed "Self-Regulated Learning Analytic Application" incorporates strategic elements. The application leverages artificial intelligence to offer personalized learning paths. Through MATLAB algorithms, the app analyzes users' learning history, proficiency, and test results, tailoring content to individual needs. This personalized approach aims to enhance learning effectiveness by addressing individual strengths and weaknesses. Furthermore, the application establishes functional connections between its features. The homepage tailors learning content based on students' proficiency levels. Users can selectively add words or sentences to their favorites, fostering repeated review. The review section provides curated articles generated by other platform users, creating a simulated learning environment. This interconnectedness forms a closed learning loop, where users contribute content and reinforce their learning. By integrating these components, the application strives to revolutionize English language learning, addressing individual needs, providing lifelike language exposure, and fostering a collaborative and engaging learning environment.

Background: The acquisition of English language skills is a fundamental aspiration for individuals worldwide, given the language's status as the most widely spoken and influential means of global communication. However, a considerable portion of English language learners, particularly in non-English speaking countries, encounter substantial challenges during their language acquisition journey. These challenges, underscored by Abdulbari Mahboob Ahmed Al-Hassaani (2022), are often rooted in the lack of motivation, encouragement, and adequate practice, which hinders their progress. In non-English speaking countries, the potential obstacles to effective English language learning can be significantly amplified when compared to those in English-speaking regions. These difficulties, as highlighted by Oktari Firda Hibatullah (2019), are

influenced by a multitude of factors, including learners' varying abilities, levels of motivation, environmental constraints, available practice opportunities, and their prior knowledge of foreign language acquisition. These challenges present a complex and interconnected landscape that learners must navigate. A study conducted by Ali et al. in 2019 further emphasizes that poor learning environments, and insufficient motivation are primary contributing factors to learners' inability to effectively speak English. These factors collectively obstruct the development of English language proficiency, limiting the learners' capacity to engage in global communication and access a broad spectrum of opportunities. The imperative for English language proficiency on a global scale is indisputable, as it stands as the predominant and impactful medium for global communication. Yet, a considerable segment of English language learners, particularly those situated in non-English speaking countries, encounters formidable obstacles in their journey toward language acquisition. This predicament, as elucidated by Abdulbari Mahboob Ahmed Al-Hassaani (2022), is intricately linked to deficiencies in motivation, encouragement, and adequate practice, thereby posing significant impediments to their linguistic advancement. The challenges faced by learners in non-English speaking countries echo a resonance throughout the educational landscape. The absence of a pervasive English-speaking environment often deprives learners of immersive language experiences, hindering the development of essential language skills. Motivational deficiencies, brought to the forefront by Al-Hassaani's research, exacerbate these challenges, creating a confluence of factors that curtail the progress of English language learners. In the absence of a stimulating language environment, learners may struggle to engage with authentic language usage, thereby impinging on their ability to grasp nuanced expressions and cultural intricacies embedded in English communication. The shortage of encouragement and tailored guidance further compounds the issue, leaving learners without the necessary support structures to navigate the complexities of language acquisition. The significance of practice in language learning cannot be overstated. Inadequate opportunities for consistent and targeted practice contibute to a deficiency in language fluency. Al-Hassaani's insights emphasize that learners in non-English speaking countries often face limitations in accessing platforms or resources that facilitate effective and immersive language practice, exacerbating their struggle to attain proficiency. This multifaceted problem underscores the urgency for innovative solutions that address motivational, environmental, and practice-related challenges faced by English language learners. The incorporation of technology, such as the proposed "Self-Regulated Learning Analytic Application," becomes pivotal in overcoming these challenges and creating a conducive learning environment that propels learners toward English language mastery.

Objective: The primary objective of the Self-Regulated English Learning Analytic Application is to create a seamless and interconnected learning environment that maximizes the effectiveness of language acquisition for learners. This involves the integration of personalized features such as customized homepages, dynamic vocabulary books, memory tracking, and a user-friendly interface that allows for

selective word and sentence collection. By leveraging technology to provide personalized content and feedback, the application aims to improve learning outcomes, enhance retention, and foster greater motivation among users.

Providing personalized vocabulary books is a cornerstone of the application. These books are tailored to individual learners' needs, interests, and proficiency levels, ensuring that the vocabulary they learn is relevant and useful. Users can specify their learning goals and interests during the initial setup. For instance, a user might be interested in academic English, conversational English, or specialized vocabulary for a particular field like medicine or technology. Vocabulary books are categorized into different levels (beginner, intermediate, advanced) and further tailored to the user’s specific proficiency as determined by ongoing assessments and progress tracking. The books include a variety of word categories such as academic, conversational, and specialized vocabulary. This helps learners build a well-rounded vocabulary that is applicable in different contexts.

As learners progress, the application continuously updates and adjusts the vocabulary books based on their performance and feedback. New words are added as needed, and mastered words are reviewed less frequently. Memory tracking is another critical feature that monitors and records the learners' familiarity and recall accuracy for each word. This data is presented through visual charts and graphs, such as learning calendars, daily word counts, and word status diagrams, providing learners with a clear picture of their progress. Detailed reports highlight areas for improvement and reinforce retention, helping learners focus their efforts on the most challenging aspects.

Additionally, the application allows users to selectively add words or sentences to their favorites, creating a personalized collection for review. This feature ensures that learners can focus on the vocabulary that is most relevant to them, enhancing their ability to retain and recall information.

By offering these interconnected features, the Self-Regulated English Learning Analytic Application creates a comprehensive and adaptive learning environment that supports learners in achieving their language acquisition goals.

RESEARCH METHODOLOGY

The methodology for developing the Self-Regulated English Learning Analytic Application involves a comprehensive and systematic approach to ensure a high-quality and user-friendly learning tool. The initial phase focuses on defining the application's objectives, which aim to enhance English language learning through personalized tools like vocabulary management, memory tracking, and user-specific word folder management. The application is developed using Android Studio for Java, providing a robust environment for creating Android applications. Java is chosen for its versatility and strong community support. Efficient database design is crucial, and SQLite is selected due to its simplicity and full integration with Android. The schema includes a user table for storing user information, a vocabulary table for vocabulary words and their definitions, and a memory status table for tracking users' familiarity and recall accuracy for each word. This schema ensures data is organized efficiently and can be accessed quickly, providing a responsive user experience.

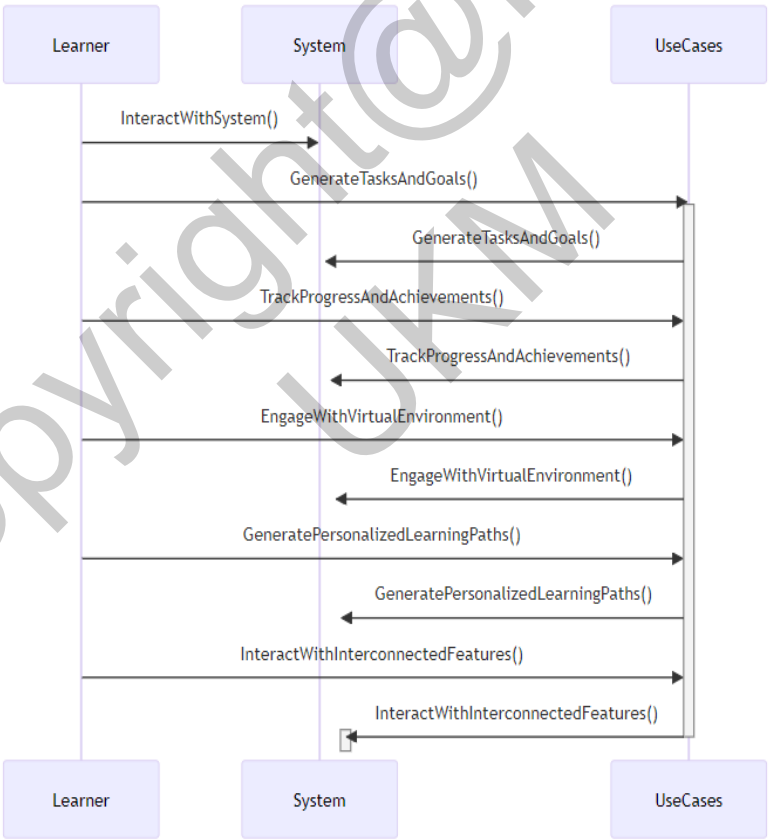


Figure 1.1 Methodology Diagram

The core features of the application are implemented in a modular fashion, allowing for flexibility and ease of maintenance. Personalized vocabulary books are tailored to individual learners' needs, interests, and proficiency levels, with users

specifying their learning goals and interests during the initial setup. Vocabulary books are dynamically updated based on users' progress and feedback, ensuring the content remains relevant and challenging. Memory tracking is implemented to monitor and record learners' familiarity and recall accuracy for each word, visualized through charts and graphs such as learning calendars, daily word counts, and word status diagrams. This provides learners with a clear picture of their progress and helps identify areas for improvement.

Figure 1.2 Plan Modification Activities

The ChangePlanActivity class manages the functionality for users to modify their word learning plans within the app. It initializes UI components like an EditText for entering the daily word count, and TextView elements to display the current book's name and maximum word count. On activity creation, it retrieves user configuration data from the LitePal database and sets up the textGo button's click listener. When textGo is clicked, it validates the user's input to ensure it's within a reasonable range. If valid, it hides the keyboard and updates the UserConfig object with the new word count. If it's the user's first time setting up the plan, a progress dialog is shown, and a background thread downloads and processes the necessary data files. Once the data is processed, handlers update the UI by dismissing the progress dialog, resetting the last start time, and removing the current day's records from the MyDate table. If the plan is simply being updated, the app checks if the word count has changed, resets the last start time, deletes the day's records, and provides user feedback. This streamlined approach ensures a smooth user experience for modifying learning plans.

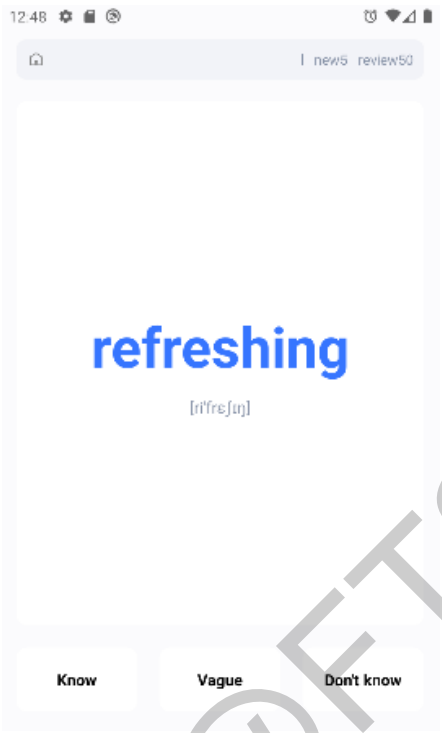


Figure 1.3 Learning Activity

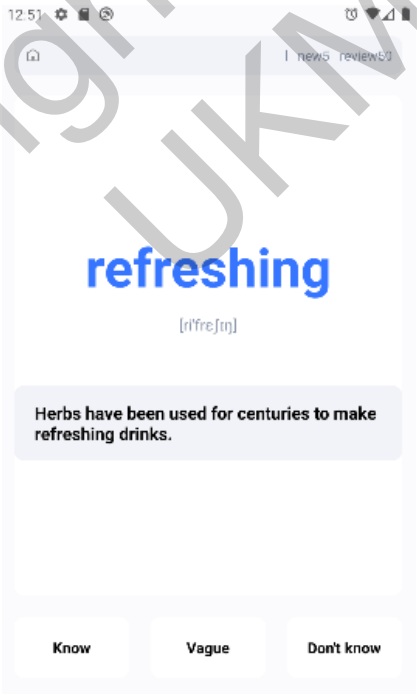


Figure 1.4 Vague Hint

Figure 1.5 Word Details

LearnWordActivity manages the user’ s word learning sessions by facilitating various functionalities such as reviewing and learning new words. Upon activity creation, it initializes UI components, sets up a RecyclerView for word choice options, and retrieves the current learning mode from the intent. The activity supports two modes: general learning and once-a-day review. The init method sets up UI elements including buttons for voice playback, deleting words, and showing hints. When a user selects a word meaning, the app checks if the selection is correct and updates the word's learning status accordingly. Incorrect selections lead to a detailed word view and a reset of the learning state, while correct selections update the status directly. This process is managed by handlers to ensure smooth transitions. The onClick method handles user interactions with various buttons, such as playing word pronunciations, displaying word details, and updating word learning statuses. The updateStatus method refreshes the UI based on the current learning task, retrieving word data from the database and updating the word list and hint sentence as necessary. The showLearn and showReview methods control the visibility of UI elements based on the current task. When the activity is destroyed, it logs the learning duration for the session and updates the database with the new learning time. This comprehensive structure ensures an organized and efficient learning process for users.

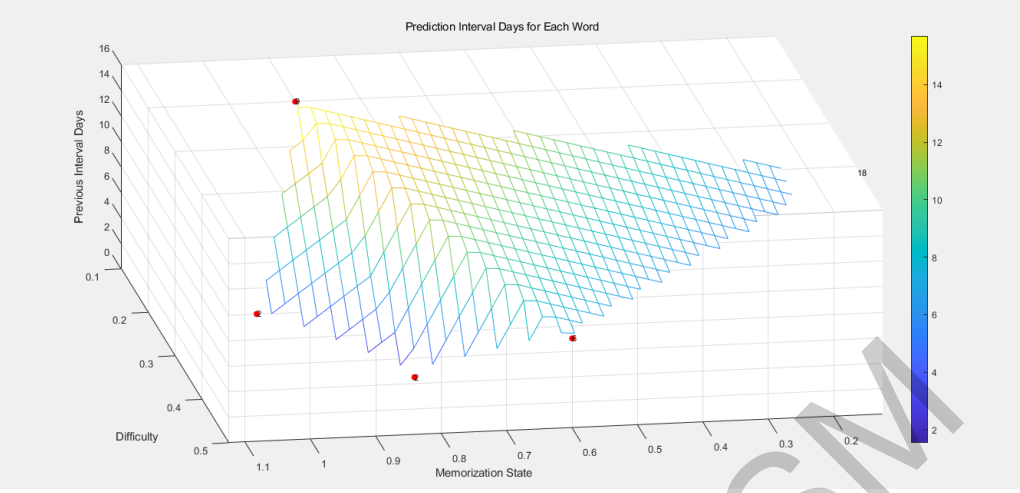


Figure 1.6 The Result of Optimal Interval Days for reviewing 5 words 01

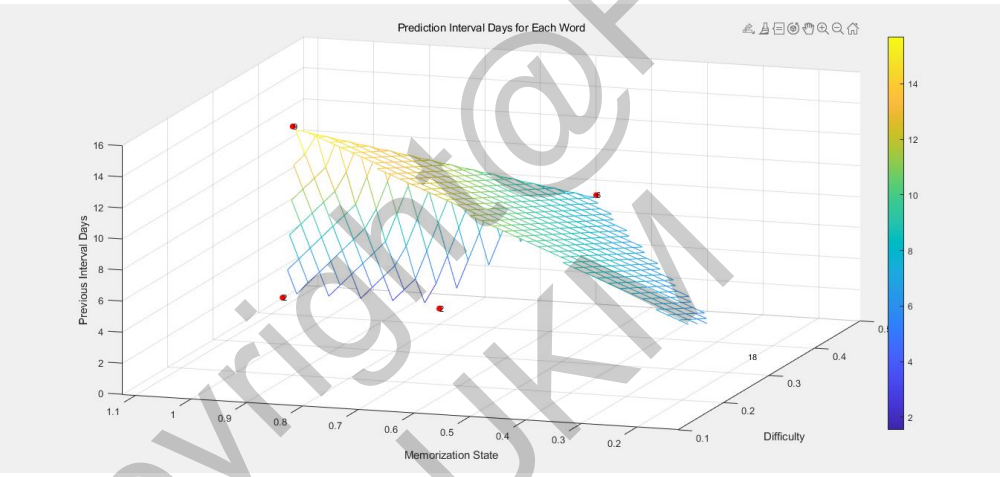


Figure 1.7 The Result of Optimal Interval Days for reviewing 5 words 02

The provided arrays memorization_state, difficulty, and prev_interval_days serve as input parameters to the plotPredictionIntervalDays function, which aims to predict the optimal interval days for reviewing each word. Let's delve into how these test items contribute to the prediction of the best interval days: Memorization State: The memorization_state array indicates the extent to which each word has been memorized, ranging from 0 to 1. Higher values of memorization state suggest that the word is well-memorized, while lower values indicate less memorization. A higher memorization state generally implies that the word can be reviewed less frequently, as it is already well-retained in memory. Difficulty:The difficulty array denotes the difficulty level of each word, also ranging from 0 to 1. Words with higher difficulty levels (closer to 1) are typically harder to remember, while those with lower difficulty levels (closer to 0) are easier. Higher difficulty words may require more frequent reviews to ensure retention, while easier words may need less frequent reinforcement. Previous Interval

Days: The prev_interval_days array specifies the number of days since each word was last reviewed or studied. Shorter previous interval days indicate more recent reviews, while longer intervals suggest that more time has elapsed since the last review. Words with shorter previous interval days may need longer intervals before the next review, while those with longer intervals may require more immediate review to prevent forgetting. By analyzing these test items, the plotPredictionIntervalDays function calculates the optimal interval days for reviewing each word. It employs a weighted average formula, considering the memorization state, difficulty, and previous interval days to predict the most suitable interval for effective retention. The resulting plot visualizes these predictions, allowing users to identify the optimal review schedule for maximizing learning outcomes. In essence, the function leverages the provided parameters to generate personalized recommendations for interval days, ensuring that each word is reviewed at the most opportune time to enhance long-term memorization and learning retention.

Figure 1.8 Study-time Analysis

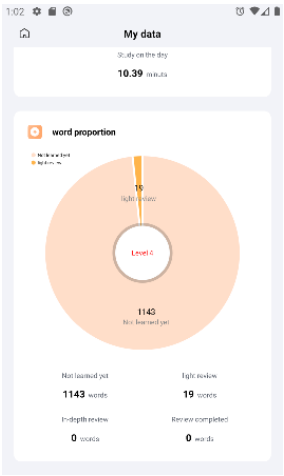
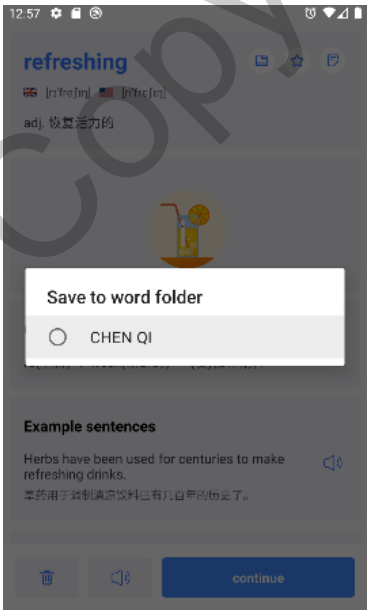


Figure 1.9 Analysis of word memory level

In the ChartActivity class, several key methods and handlers are implemented to handle the creation and display of various charts using the MPAndroidChart library. The onCreate method initializes the activity, setting up the layout and calling initialization methods for the charts. The init method is responsible for linking the UI components from the layout file to the activity. The initBarChart and initPieChart methods configure the bar and pie charts respectively, setting up properties such as axis labels, animations, and legends. The Handler is utilized to manage asynchronous tasks, specifically to update the UI once data loading is complete. The handler updates the UI with the loaded data, including updating text views and dismissing the progress dialog. Data loading is handled in a separate thread to avoid blocking the main UI thread. This thread calls methods like loadWordData, readPieData, and loadTimeData to fetch and process data from the local database using the LitePal library. The processed data is then passed to the handler to update the charts and text views. The configBarTimeData, configBarWordData, and configPieData methods are responsible for configuring the datasets and updating the charts with the newly loaded data. For example, configPieData sets up the PieDataSet with different colors, spacing, and labels, then binds it to the PieChart. Overall, the logic of this activity revolves around initializing UI components, asynchronously loading data, and updating charts with the loaded data to provide a visual representation of the user's learning progress.

To develop the Self-Regulated English Learning Analytic Application, a structured and efficient methodology is employed, encompassing various stages from initial design to final deployment. The application aims to enhance English language learning through personalized tools, including vocabulary management, memory tracking, and user-specific word folder management.



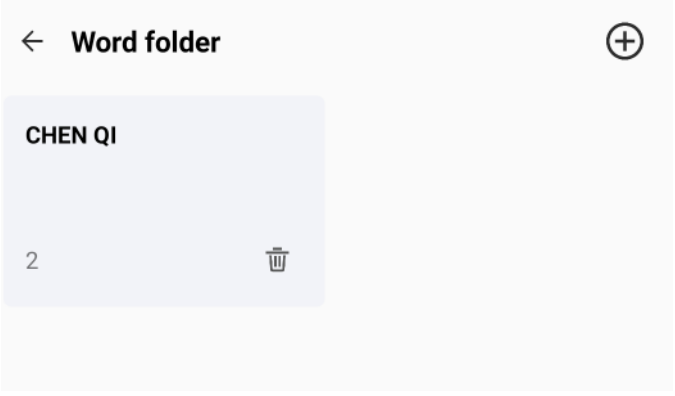


Figure 1.10 Adding To Word Folder

In the FolderDetailActivity class, implement a detailed view of a word folder's content, providing functionalities to edit and learn words. In the onCreate method, we first initialize the UI elements, including the folder name, remark, start learning button, and the RecyclerView for displaying the word list. We use the LitePal library to query the current folder's details and set the corresponding display content. When the user clicks on the folder name, a dialog is shown offering options to edit the name or the remark. Upon selection, another input dialog appears, allowing the user to enter a new name or remark, which is then updated in the database. The start learning button checks if there are any words in the current folder. If there are, it adds the words to the list of words to be learned and starts the learning activity. Additionally, the getMeans method is used to retrieve the meanings of the words and format them as a string to display on the UI. The overall logic includes: 1. Initializing UI elements. 2. Querying and displaying the current folder's details. 3. Providing functionality to edit the folder name and remark. 4. Providing functionality to start learning words. 5. Interacting with the database using the LitePal library to ensure data is read and updated correctly. This way, users can conveniently manage and learn the contents of their word folders, enhancing their English learning efficiency.

RESULTS AND DISCUSSION

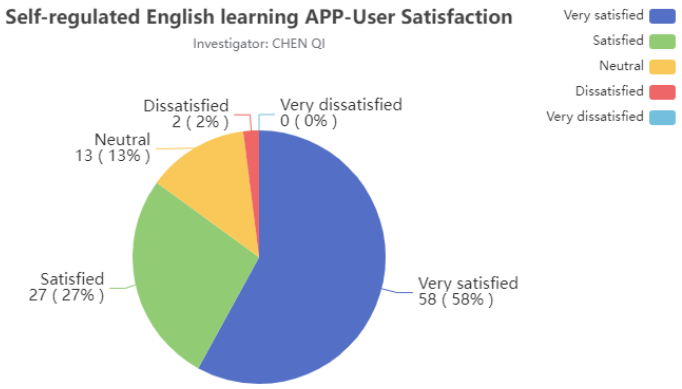
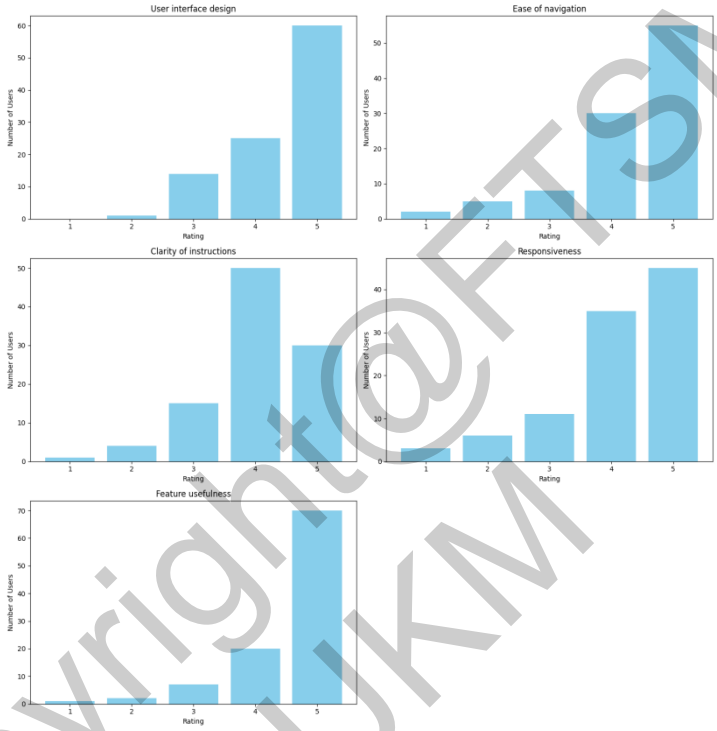


Table 1.11 User Satisfaction

User Satisfaction: Overall Usability Satisfaction: Very satisfied: 58, Satisfied: 27, Neutral: 13, Dissatisfied: 2, Very dissatisfied: 0. The bar chart above illustrates the user evaluations of various aspects of the "Self-Regulated English Learning" application. Each aspect's rating is divided into levels ranging from 1 (lowest) to 5 (highest), representing the users' satisfaction levels with the respective aspect.

Table 1.1 Aspect's Rating



User Interface Design: Most users express satisfaction with the application's interface design, with 60% of users giving the highest rating, indicating they find the interface design excellent.

Ease of Navigation: While 55% of users find the application's navigation easy to use, 30% still encounter some difficulty. Clarity of Instructions: In terms of instruction clarity, 50% of users give a higher rating, but 30% find the instructions less clear. Responsiveness: The application's responsiveness is acknowledged by 45% of users, but 35% still find the response speed inadequate. Feature Usefulness: The majority of users (70%) consider the application's features highly useful, whereas only 20% of users find them less useful. In summary, although the application receives high ratings in some aspects, there are still areas for improvement, particularly in navigation and responsiveness.

CONCLUSION

This project focused on the development and implementation of a Self-Regulated Learning (SRL) application for English language learners, leveraging the capabilities of Android Studio. The primary aim was to empower learners by placing them at the center of their educational journey, thus allowing them to take control of their learning experiences. In a world where English has become the predominant means of global communication, this application sought to address the challenges faced by non-native speakers in acquiring English language skills.

Key features implemented in the application include a Self-Regulated Learning Module, Alarm Reminder, Word Bookmarking, Daily Progress Calendar, Study Records and Visualization, Word Mastery and Progress Tracking, Daily Study Plan Execution, Database Management, Word Detail Editing, Custom Folders, Folder-based Learning, Word Search, Daily Task Completion Messages, Study Plan Adjustment, Word Memory Games, Quick Review Module, Word Matching Module, Word Recognition via Photo, and Daily English Sentence. Each feature was meticulously tested to ensure functionality and user-friendliness.

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