Smart Buddy: Gamified Academic Productivity Through a Mobile-Based Application for LORMA CCSE Students

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Abstract

Smart Buddy functions as a game-based mobile application which enhances academic performance while resolving student difficulties in procrastinating, disorganization, and maintaining motivation and focus. The app includes AI-generated flashcards and digital notetaking alongside task management tools which function with an interactive virtual pet system that uses user progress to provide feedback. Inactivity leads the pet toward decline but performance restoration through task completion improves the health status and encourages productive behavior.

User feedback guided repeated improvements to Smart Buddy through implementation of Scrum Agile Framework principles. The effectiveness of the design was validated through User Experience Questionnaire scores which showed high marks in Stimulation (2.52) and Attractiveness (2.35) and Efficiency (2.02) and Perspicuity (1.97).
These ratings indicate the system provides an engaging user experience with friendly design. The reliability and innovative aspects of the system received additional affirmation from high ratings in Dependability (1.66) and Novelty (1.79). The integration of productivity features with gamification in Smart Buddy creates a system that fights procrastination without sacrificing student involvement. Additional enhancements and adaptable features will enable the system to better suit different academic requirements.
Keywords**:** *Gamified Mobile Application , Academic Productivity , Student Engagement, Procrastination, Disorganization, Motivation, Focus, Virtual Pet, AI-generated Flashcards, Digital Note-taking, Task Management, Leaderboard,, Scrum Agile Framework, User Experience Questionnaire*

1. Introduction

In recent years, students' priorities and mental concerns have shot up to a new height, making it difficult to juggle academic work, extracurricular activities, and personal duties. The problem has been aggravated by several other circumstances, such as the use of technology to enhance learning, the presence of many modern sources of information, poor studying practices, or even bad time management. Such challenges have affected not only students' productivity but also their ability to concentrate on their studies.

Moreover, given all the applications and tools needed to perform each academic task, students frequently found the use of numerous platforms to be tedious and time-consuming. This fragmentation caused reduced output and drew even more attention away from the academic objectives of students. To overcome this limitation, it was easier for students to use a single mobile application, which was gamified and had all the requisite features needed for them to be more productive.

This fragmentation and lack of focus often led to procrastination, one of the most noticeable and adverse effects of these challenges for students. The monotony that came with having to manage different platforms, together with the proliferation of distracting gadgets, encouraged students to put off academic work. Procrastination and delays resulted in unfinished activities like completing assignments and revising study materials and increased stress levels along with the probability of poor academic outcomes. This behavioral trend, in the long run, increased anxiety levels and rendered situations related to the learning process meaningless, which escalated low productivity and inefficiency. Absent countermeasures, these behaviors caused excessive academic and social difficulties.

As stated by Dr. Thomas MacCarty (2024), procrastination is the act of putting off a duty or an obligation for another time, with the knowledge and understanding that this is likely to have negative implications. Research shows that 15–20% of adult populations have moderate levels of procrastination that are so severe as to be disruptive to their activities of daily living, which overlap with college students in particular – with 80–95% of them deferring academic assignments, course works, and the like. Like any other behavior, procrastination is also affected by some variables that include the inability to remain on course, the impact of interruptions, or even how the individual looks at a particular duty. People are more likely to procrastinate about tasks that they perceive as unpleasant or boring than those that they find interesting or worthwhile.

There are various types of procrastination, which can differ based on the frequency and context of the behavior. Chronic procrastination can be defined as the instinctive delay of unpleasant tasks or effort, which has strong negative effects on the person's mental and emotional state, such as missed deadlines and undeclared goals. Situational procrastination pertains to behaviors related to particular settings, such as academics or work, but may translate to mundane activities like delayed sleeping. Decisional procrastination entails postponing decision-making activities as a psychological technique to mitigate current stress but frequently brings about long-term difficulties (MacCarty, 2024).

A significant contributor to procrastination, especially among students, is technology-related distractions. Primarily, social networks, games, and video services were extremely dangerous and negative in the context of time management, setting people up for procrastination rather than productivity. Yet again, technology was not

necessarily something that got in the way; it could also help solve procrastination strategies. Therefore, the transition of learning using games, such as employing rewards, levels, and challenges, made learning more fun. Besides enhancing concentration, such features contributed to effective cooperation as well as support established during the interaction process among students.

Rodrigues et al. (2019) note that gamification incorporates game-like elements such as points, leaderboards, and badges into non-game environments, like workplaces, consumer interactions, and educational settings, to promote engagement and motivation. This approach is most suitable for complicated activities, for it increases motivation and levels of participation among learners. Furthermore, Ahmad et al. (2020) observe that gamification has become increasingly adopted in educational settings due to its ability to improve performance, enhance student engagement, and enrich satisfaction.

Among the most important factors influencing students' academic success, motivation plays a key role. In the process of credit accumulation, motivation becomes one of the most influential factors that has an impact on students' learning activities, learning satisfaction, and even learning achievements (Lampropoulos & Kinshuk, 2024). Research on the effects of motivation on students' performance has received a lot of attention in the literature in many kinds of education settings, including traditional (Elfaki et al., 2019), online (Chiu et al., 2021), and game-based (Lampropoulos et al., 2019) learning environments among others. All such studies, time and again, underline the centrality of motivation in promoting student interest, effort, and accomplishment.

Motivation not only impacts students' engagement but also, crucially, the dynamic persistence of that engagement over time. Therefore, motivation has been considered an essential factor that defines learning and better efficiency in the learning process. Hence, there is a widespread practice of using instructional methods and practices that would mobilize extrinsic and intrinsic motivation among the students (Lampropoulos & Kinshuk, 2024).

Motivation played a significant role in designing a learning environment that encouraged students' participation in class as well as in managing how that participation continued over time, which was useful in enhancing students' performance at academic institutions. For instance, Duggal et al. (2021) indicate that students' engagement is a factor that may easily experience a challenge in the classroom learning setting. Their framework, which integrates interactive and varied learning methods into higher education, encourages students to engage in more dynamic and enjoyable learning experiences.

As a response to the problems students experienced with productivity, task management, and motivation, this research called for designing a mobile game application explicitly targeting college students. This solution utilized core productivity tools, including task management, digital note-taking, and AI-generated flashcards, to address academic tasks and thus improve learning effectiveness. To increase user activity and combat procrastination, the application incorporated gamified features such as a point system, a leaderboard, and a virtual pet.

The task management feature used the Google Classroom API, providing students the ability to view tasks in their classroom accounts to track assignments properly. To prevent misuse and abuse, it checks on the presence of files that may be attached and the due dates to confirm the authenticity of a task. The concept of a digital note-taking device functioned like a portable notebook, where students could type and save class

notes on their devices in a real-time basis, thus having a handy and organized way of capturing pertinent information. Lastly, based on digital notes, the AI-generated flashcards worked as study materials that allowed students to revise materials effectively. This combination of tools was designed to achieve one main goal: to create an ideal academic environment for college students, minimize stress when using several applications simultaneously, and maximize productivity.

2. Objectives

This study developed Smart Buddy, a mobile application that provides students with an all-in-one productivity tool integrated with gamified features to enhance students' motivation and productivity while combating procrastination.

The following statements are the specific objectives of the Smart Buddy Project:

1. Identify the current problems encountered by students in terms of:
    a. task management and organization,
    b. procrastination,
    c. lack of motivation, and
    d. difficulty in maintaining focus.
2. Develop Smart Buddy: Gamified Academic Productivity Through a Mobile-Based Application for LORMA-CCSE Students using the Scrum Agile Framework.
3. Evaluate and assess the system's performance in improving academic productivity and engagement as well as reducing procrastination among students using the User Experience Questionnaire (UEQ).

3. Materials and methods

This study utilized Mixed Methods Research as its research design. This type of study integrates both quantitative and qualitative approaches in an attempt to understand the research question. This approach adequately handles intricate research questions as it combines quantification and context into one complete number and narrative appeal (Dovetail Editorial Team, 2023). In particular, this study used the Explanatory Sequential Design, which is a type of mixed method where quantitative data is collected and analyzed, followed by the collection and analysis of qualitative data to explain the results obtained from the quantitative analysis (Othman et al., 2020).

This study was conducted at LORMA San Juan Campus, La Union, and it started in December 2024 and went until May 2025. The site was just for pilot testing. The study participants were four (4) students each from first year to fourth year in Bachelor of Science in Computer Science (BSCS), Bachelor of Science in Information Technology (BSIT), and Bachelor of Science in Computer Engineering (BSCOE) programs from the College of Computer Science and Engineering (CCSE). There were also four (4) Technical Experts, summing it up to fifty-two (52) respondents. purposive sampling approach was used to get technical experts, and attention was specifically directed toward their technological expertise. The selected experts had sufficient competency in both digital application assessment and evaluation of gamified systems that targeted productivity and academic performance enhancement. Participating experts played a crucial role in improving application features by referencing current standards of user experience and engagement. The researchers specifically picked student participants alongside technical experts to acquire sufficient insights for optimizing the application's design quality while improving its functionality.

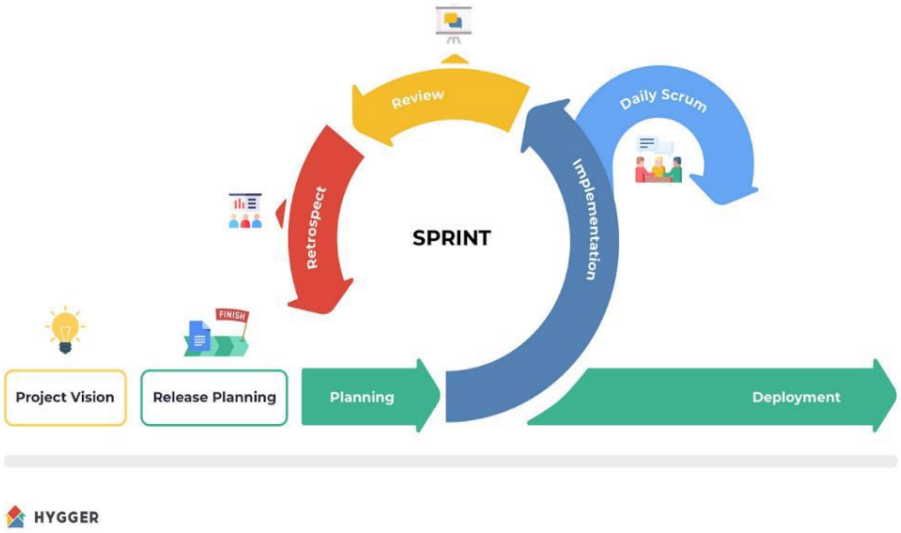

Figure 1. Software Methodology

Figure 1 presented the Scrum methodology, which consisted of the following phases: Sprint Planning, Sprint Execution, Daily Stand-ups, Sprint Review, and Sprint Retrospective. The team utilized the Scrum Agile Framework because it supports iterative development structures suited for this kind of project. It aligns to the proposed mobile-based gamified productivity application between different available software development methodologies including Waterfall Model, V-Model, and Spiral Model by assessing their features and flexibility. Scrum stood out as the most effective framework because it encourages adaptability, continuous improvement, and frequent user feedback integration throughout the development cycle. This was particularly important in developing Smart Buddy, which required several testing and revision phases to align with user needs.

Scrum Agile Framework facilitated value delivery by dividing work into short periods called sprints thus enabling the team to release features one-by-one while adjusting them according to user needs. The productive collaboration that Scrum provides requires an amount of flexibility which linear Waterfall projects cannot match since they provide feedback at only a single point during the final stages. The Scrum method enables efficient team communication and speeds up the discovery of problems and enhances stakeholder engagement. The advantages of Scrum framework proved to be the most effective solution for steering the development of the Smart Buddy.

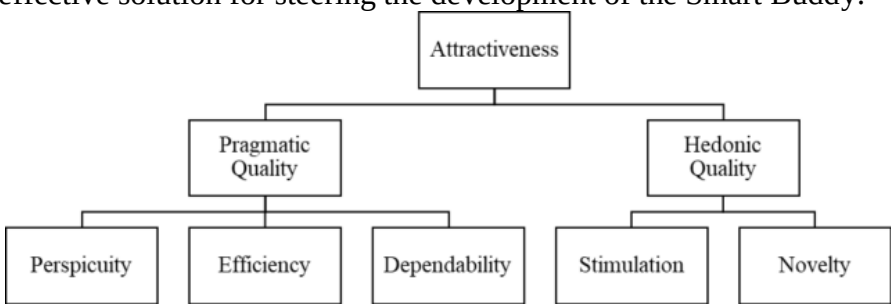

Figure 2. UEQ Six (6) Scales

The results obtained from the improvement of academic productivity, engagement, and baseline procrastination levels were assessed through the User Experience Questionnaire (UEQ) survey questionnaire. The researchers administered a survey questionnaire to the selected fifty-two (52) respondents using the UEQ.. The UEQ was one of the most frequently used tools whose objective was to measure the UX tied to products and services. Derived from the UNITED model, which was established in 2006, the UEQ was built to try and measure not only the utilitarian aspects of using interfaces but also the hedonic attributes of interactions.

It consisted of twenty-six (26) items grouped into six scales: The factors were defined as Attractiveness, Efficiency, Dependability, Perspicuity, Stimulation, and Novelty. Both sorts of, pragmatic quality and hedonic quality, incorporated various aspects of the user experience, the pragmatic features were concerned with the business-like aspects of a product, while hedonic features dealt with how the product makes the user feel (Boothe et al., 2024).

4. Results

Approximately 80% (16) of students identified social media and phone notifications as their principal distraction, based on the results as seen in Figure 19. Students experienced personal daydreaming that affected 70% (14) of the participants. Participants stated environmental noise as a major distraction affecting 60% (12 students) of them, together with socializing or talking with others (35% or 7 students). The remaining 5% (1 student) distributed their mentions among additional distractions such as games and laziness, together with busying with parents' errands and scouring for movies or series. Research indicated that digital interruptions alongside self-generated thoughts interrupted student concentration levels to a considerable extent during their study periods. Students need efficient methods to improve their focus.

Focus and Distraction survey results showed that 55% of students could stay focused between 30 to 60 minutes, but 30% of students failed to focus for even 30 minutes. The research showed that a tiny fraction of 15% students demonstrated extended focusing capacity which exceeded two hours. The selected focus period between one and two hours received no responses from participants. The students required between 10 to 20 minutes to regain productivity after losing focus, with 40% of participants and an additional 35% requiring 30 minutes or more. The combination of social media use through phones emerged as the primary source of interruptions reported by 80% of respondents, with personal daydreams affecting 70%, environmental noise disturbing 60% of the respondents, and social interactions affecting 35% of respondents. The survey revealed games were among the minimal diversions, alongside house chores and entertainment browsing, which affected 5% of students. Data from the survey showed that digital disturbances, together with internal interruptions, caused such profound attention loss that improved concentration strategies need immediate development.

As the team worked on creating the prototype, they established the backend infrastructure that would support the mobile application. The backend service implementation on Amazon Web Services (AWS) was configured specifically to achieve high efficiency in data processing for concurrent users. AWS cloud services delivered reliable scalability to provide users with an uninterrupted experience while the system expanded and its users increased. The major disadvantage of using AWS was its cost restrictiveness despite its many advantages. The free AWS services enable limited

usage until customers surpass their restrictions, where new resource-based billing takes effect. As the application acquired more users and data processing needs expanded the financial expense for maintaining backend infrastructure operations increased. The team practiced careful monitoring of application usage and optimization methods to limit pointless resource utilization.

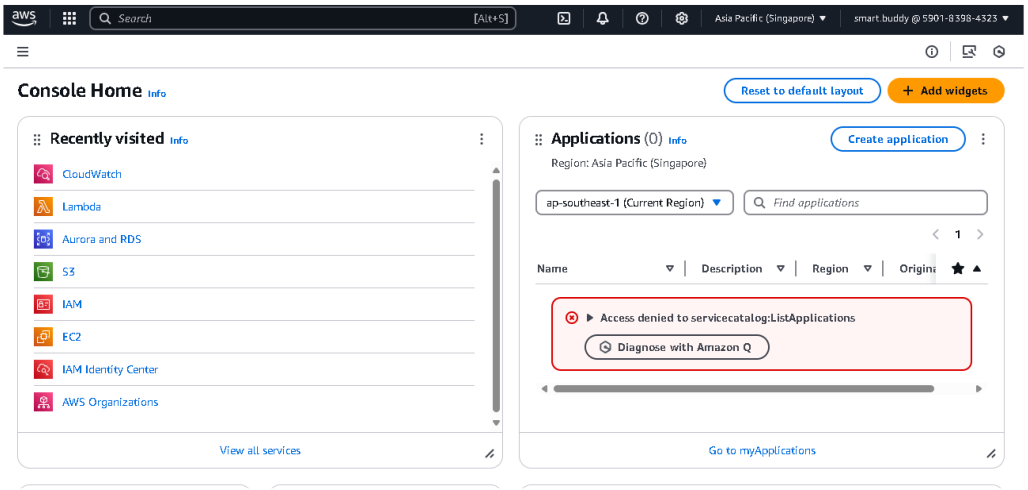

Figure 3. Amazon Web Services Console Home

The team incorporated basic third-party services through the Google Classroom API to add new application capabilities. With the integration of the Google Classroom API, users gained the ability to synchronize accounts as the platform offered educational material from the API's platform. API testing must be fully implemented together with authentication security to ensure problem-free application deployments. GitHub repository served as the teams' version control system because it enabled the team to maintain consistent code alongside improved collaborative work practices. As a main storage facility, the repository enabled the team to conduct teamwork and update management simultaneously. Through GitHub's platform, the team gained collaborative tools to develop projects by adding new features on individual branches that required review with pull requests. The team utilized version control to track modifications so they could determine the initial source of all these problems in their source files. The team conducted code review activities for maintaining high coding standards while discovering development stage defects.

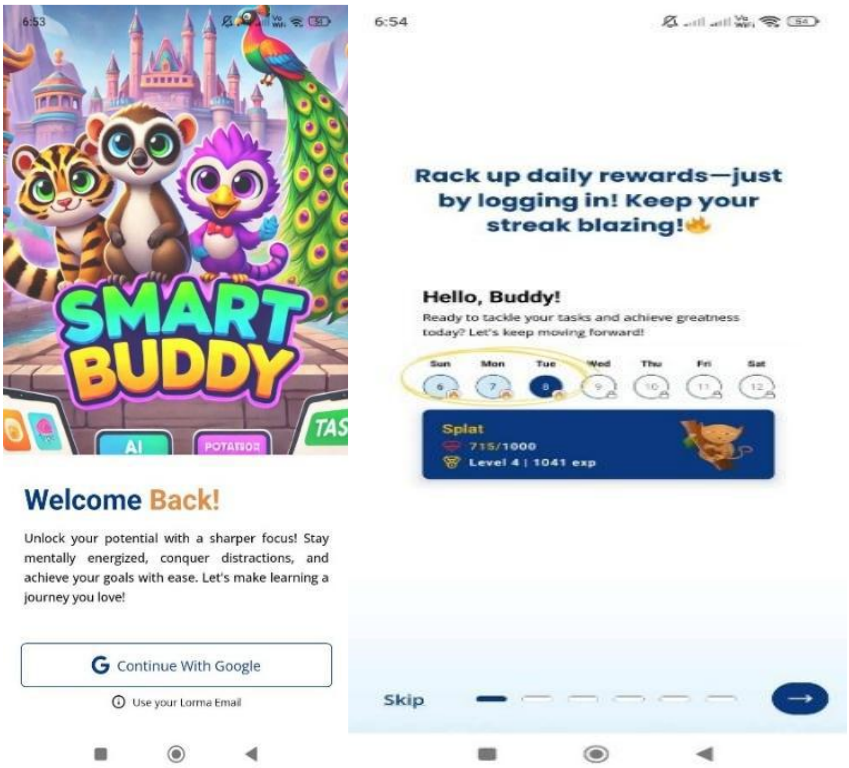

Figure 4. Login Screen and Tutorial Screen

As shown in Figure 4, the Login screen enables users to access the application using their Lorma email account through Google Authentication. The system exclusively accepts Lorma-issued emails to guarantee smooth integration with users' Google Classroom accounts and to prevent unauthorized or non-affiliated individuals from gaining access.

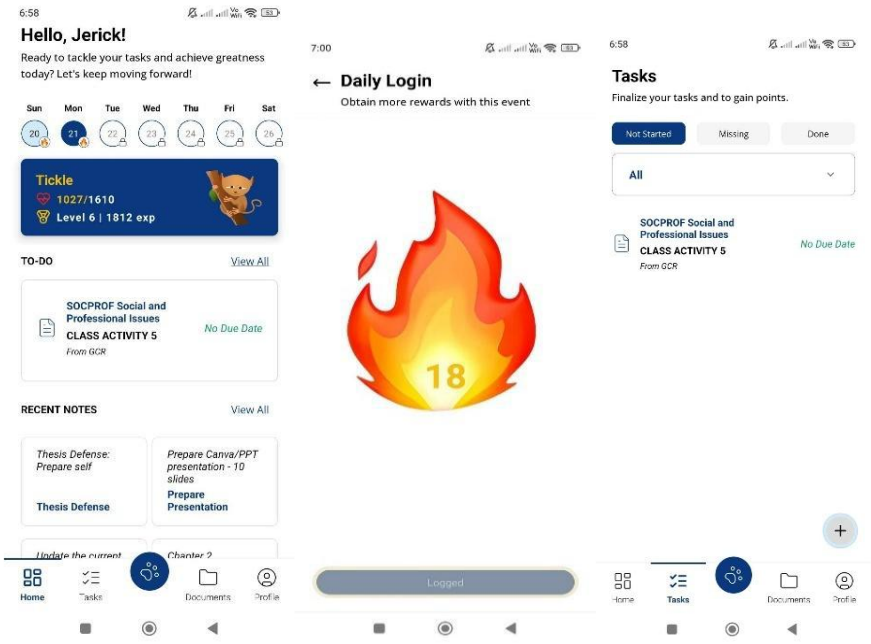

Figure 6. Homepage Module, Daily Login Screen and Tasks Module

The Homepage, as shown in Figure 6, is where users can navigate between various features such as daily login, to-do lists, recent notes, and their virtual pet. Users can claim their daily coin reward on the Daily Login screen. The amount of coins scales based on the user's login streak, with the streak number displayed inside the flame. In the Tasks module, users can access their tasks that is not yet started, missing, or done. They also have the option to filter tasks by specific subjects and create their personal tasks here which can be seen.

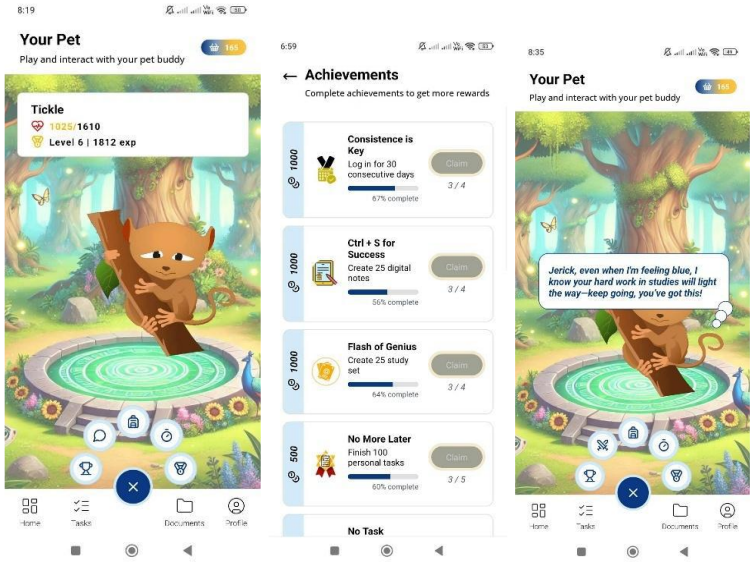

Figure 7. Virtual Pet Module, Achievements Screen and Thought Bubble Screen

The Virtual Pet module, as shown in Figure 7, is where users manage their virtual pet. The virtual pet's facial expression changes dynamically based on its health points (HP) which can be change to either happy, sad, or angry face. Additionally, the pet may also cry or growl if the user increases their device's volume. Users can access various supplementary features here, such as achievements, thought bubble, storage, Pomodoro, leaderboard, and shop. These features can be seen further in the following figures. The Achievements screen allows users to track their progress by displaying earned milestones based on their activity and task completion within the application. Users are rewarded with coins for every milestone complete. Though Bubble screen is where the virtual pet communicates with the users. The content of the thought bubble is randomly generated and corresponds to the pet's current mood.

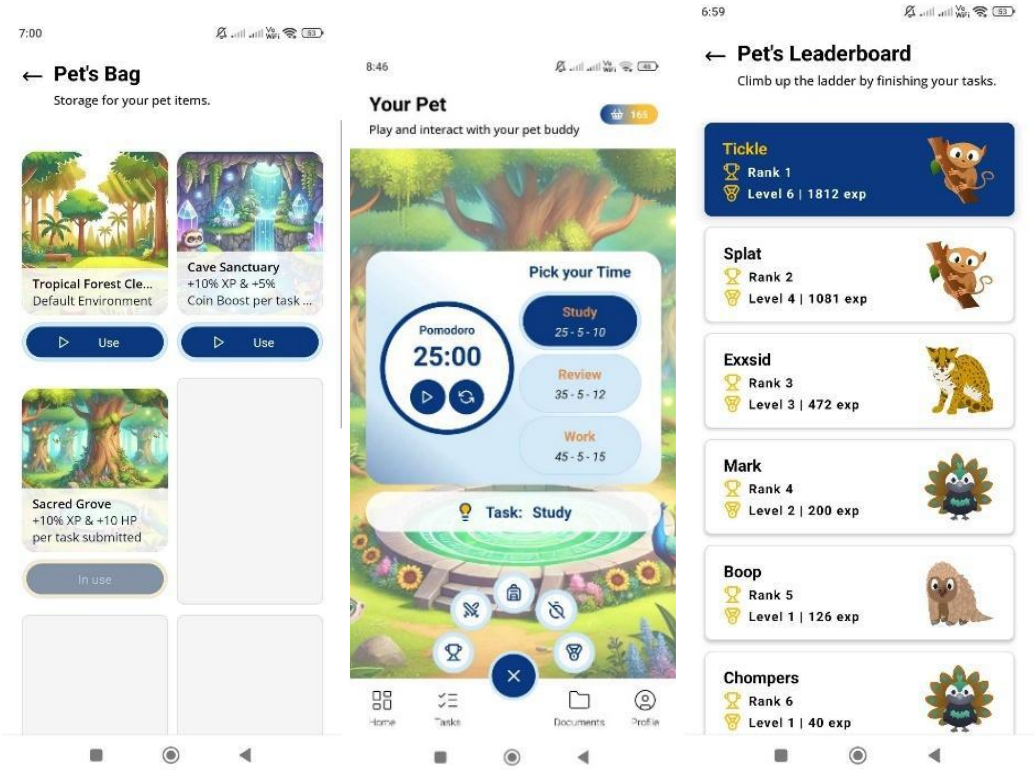

Figure 8. Storage Screen, Pomodoro Screen and Leaderboard Screen

The Storage screen or Pet's bag is where users can find the items they've purchased from the shop. This includes pet toys, pet environments, and potions. Figure 8 shows the Pomodoro screen, where users can choose a task, they want to accomplish—such as studying, reviewing, or working. Users can also listen to lo-fi music while the Pomodoro timer is in progress. The leaderboard ranking the top ten (10) users with the highest experience. Users can also visit other users' pets and view their achievements.

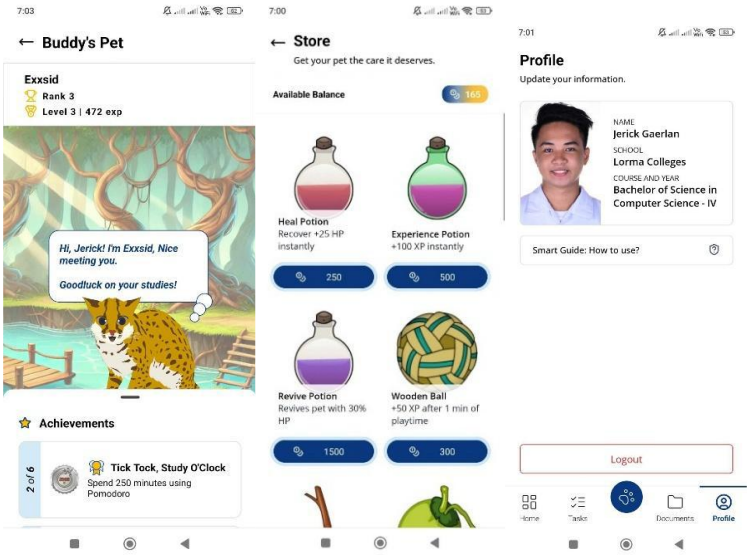

Figure 9. Visit Other Users' Pet Screen, Shop Screen and User Profile Screen

Figure 9 shows the screen allows users to view the virtual pets and achievements of other users. By showcasing peers' progress and pet status, this feature promotes a sense of community and friendly competition, serving as an additional source of motivation for students to stay productive. The Shop or Store screen displays items that users can purchase, ranging from potions to pet toys and pet environment. These items also provide different buffs. The User Profile screen, which displays user details such as name, school, and course. It also includes the Smart Guide, where users can revisit the tutorial and learn how the app works.

The third objective involved an evaluation of Smart Buddy application system performance through a User Experience Questionnaire (UEQ) survey questionnaire. The research instrument enabled user information collection for performance assessment of application features related to user experience elements, such as usability, along with aesthetic quality and user expectations. The verification of the Smart Buddy mobile application relied on user testing, where fifty-two (52) respondents assessed its system functionality. From the original twenty (20) in the pre-development survey, the researchers invited those first respondents to refer friends or classmates who were also registered in the LORMA CCSE department and met the purposive sampling criteria, thus increasing the total number of participants. The researchers utilized snowball sampling to enlarge their participant base and maintain consistent adherence to the research's selection criteria. The researchers obtained enriched user feedback about the app testing through this procedure. During the research all participants had their answers safely maintained while receiving strict privacy protection. Survey participants could choose to stay unknown while full acknowledgment of the freedom to quit the questionnaire anytime without payment existed.

Dimension	Mean Score	Adjective	Acceptable
Attractiveness	2.35	Excellent	Acceptable
Perspicuity	1.97	Excellent	Acceptable
Efficiency	2.02	Excellent	Acceptable
Dependability	1.66	Excellent	Acceptable
Stimulation	2.52	Excellent	Acceptable
Novelty	1.79	Excellent	Acceptable

Figure 10. UEQ Result

Figure 10 indicates that Smart Buddy delivered outstanding user experience performance in each UEQ measurement dimension because all mean scores remained within the 'Excellent' segment of the UEQ benchmark scale. The application showed remarkable effectiveness in engaging users through its Stimulation dimension with a score of 2.52 and attracting users with a rating of 2.35 in Attractiveness. The interface received top scores in Efficiency (2.02) and Perspicuity (1.97) because it operated efficiently with obvious features that met LORMA-CCSE students' requirements for a focused and uncluttered environment. The Dependability score reached 1.66 on the

scale indicating the application delivers reliable performance that users can depend on daily. The users saw Smart Buddy as an innovative application despite novelty not being one of the key design priorities with a mean of 1.79. The collected results demonstrate that Smart Buddy achieved all its fundamental design targets to create a productive student tool which students found attractive and dependable and efficient to use.

5. Conclusion

The researchers successfully identified students' present difficulties with task management, procrastination, motivation, and focus through an initial survey conducted among LORMA CCSE students. The collected data revealed inconsistent task planning behavior with students experiencing a heavy academic workload every day. Students often delay their assignments because they deal with numerous interruptions from social media, insufficient motivation for their work, and inadequate time management skills. Students shared that they had difficulty keeping themselves focused along with maintaining drive throughout their study periods. The survey data validated that students faced the same productivity obstacles which became the basis for creating essential functionalities within the Smart Buddy application.

For the second objective, the development of the Smart Buddy mobile application reached success through the utilization of the Scrum Agile Framework. The team transformed recognized productivity problems into functional features along with digital note-taking, AI-generated flashcards, and task management feature through the repetitive cycles of sprint planning, execution, and continuous feedback sessions The development tools utilized by the process included React Native, FastAPI, and AWS which allowed the creation of scalable and accessible features for Android users. Notion, together with GitHub and Google Drive enabled the completion of documentation requirements while supporting the development of design diagrams and the administration of team collaboration tasks. The application of agile methodology allowed researchers to develop an efficiency tool directed at LORMA CCSE students.

For the third objective, users measured the Smart Buddy system performance through the User Experience Questionnaire (UEQ) survey questionnaire. Students at LORMA-CCSE alongside technical experts scored the mobile application highly in terms of Perspicuity (1.97) and Efficiency (2.02) because the interface was intuitive and the operation was smooth. Users rated the smoothing Stimulation score (2.52) as top-notch for keeping students engaged and rated Attractiveness (2.35) and Dependability (1.66) highly for their nice appearance and trustworthy operation. Users scored the application as innovative (1.79) even though Novelty was not a leading objective of the design. The research findings show Smart Buddy developed a productive tool which provides accessible engagement for academic use.

6. References

Chou, Y. (2019). Actionable gamification: Beyond points, badges, and Leaderboards. Packt Publishing.

Lampropoulos, G.; Anastasiadis, T.; Siakas, K. (2019). Digital Game-based Learning in Education: Significance of Motivating, Engaging and Interactive Learning Environments. In Proceedings of the 24th International Conference on Software Process Improvement-Research into Education and Training (INSPIRE), Southampton, UK, 16 April 2019; pp. 117–127.

Menon, A. R., Hedin, B., & Eriksson, E. (2021, August). Expanding Affective Computing Paradigms Through Animistic Design Principles. In IFIP Conference on Human-Computer Interaction (pp. 115-135). Springer, Cham.

Tong, X., Gromala, D., Neustaedter, C., Fracchia, F. D., Dai, Y., & Lu, Z. (2021). Players' Stories and Secrets in Animal Crossing: New Horizons-Exploring Design Factors for Positive Emotions and Social Interactions in a Multiplayer Online Game. Proceedings of the ACM on Human-Computer Interaction, 5(CHI PLAY), 1-23.

Ahmad, A., Zeshan, F., Khan, M. S., Marriam, R., Ali, A., & Samreen, A. (2020). The impact of gamification on learning outcomes of computer science majors. ACM Transactions on Computing Education, 20(2), 1–25. https://doi.org/10.1145/3383456

Chiu, T. K. F., Lin, T., & Lonka, K. (2021). Motivating Online Learning: The challenges of COVID-19 and beyond. The Asia-Pacific Education Researcher, 30(3), 187–190. https://doi.org/10.1007/s40299-021-00566-w

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