DEVELOPMENT OF ISTUDENT@POLYCC MOBILE APPLICATION BASED ON AGILE MODEL

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ABSTRACT

The shift towards mobile learning in higher education has prompted the need for effective, student-centered digital tools. Students at POLYCC face recurring issues such as missed deadlines, inefficient scheduling, and limited access to e-learning materials. iStudent@POLYCC, a mobile application, was developed using the Agile methodology to address these issues. It integrates task management, class scheduling, and an eBook library. User Acceptance Testing with 60 students revealed high satisfaction: 91.7% valued the assignment tracker, 86.7% found timetable management helpful, and 70% appreciated the eBook feature. Development phases were documented with DFD, ERD, flowcharts, and use case diagrams. Agile methodology facilitated user-driven feature refinement, enhancing usability and relevance. The application promotes sustainable digital learning (SDG 4) by reducing paper use and improving student retention through efficient academic self-management..

1. Introduction

In today's fast-paced digital learning environment, the academic needs of students have grown more complex, particularly within polytechnic institutions like Malaysia's Polytechnics and Community Colleges (POLYCC). Students often face challenges in managing their academic responsibilities effectively, including issues with organizing tasks, keeping track of class schedules, and accessing learning resources in a timely and efficient manner (Yusof & Jamaluddin, 2021). These challenges are compounded by the lack of integrated tools that provide a centralized solution tailored to the specific needs of polytechnic learners.

The iStudent@POLYCC mobile application was conceptualized as an innovative response to these educational gaps. By combining a user-friendly design with core functionalities—namely a to-do list for assignment management, a personalized class timetable, and an embedded eBook reader—the application strives to empower students in managing their daily academic activities more effectively. To ensure high usability and functional quality, the application was developed using the Agile software development methodology, which enables continuous user feedback and iterative improvements (Beck et al., 2001).

This flexible approach allowed the development team to adapt features based on real-world usage and student input, a practice essential for creating student-centric applications that meet the needs of a dynamic student body (Cheng, 2023; Kumar & Singh, 2023; Bakke et al., 2023). The broader goal of this project is aligned with Sustainable Development Goal 4 (SDG 4): "ensure inclusive and equitable quality education and promote lifelong learning opportunities for all" (UNESCO, 2025). The integration of digital solutions such as iStudent@POLYCC helps reduce dependency on physical resources and promotes better academic planning, contributing to a more sustainable and effective learning ecosystem through enhanced self-regulated learning (Jones & Singh, 2022; Elmabaredy et al., 2024).

- **Literature Review**

Mobile learning (m-learning) has become an important driver of educational transformation. Recent systematic reviews confirm that m-learning enhances flexibility, engagement, and self-regulation in higher education (Naveed et al., 2023; NAER, 2023). However, many existing apps are fragmented, focusing only on one functionality such as task management, timetables, or e-books, rather than offering integrated solutions tailored for institutional use. Task management apps are effective for tracking assignments but lack institutional integration (Nguyen et al., 2019). E-book platforms improve content accessibility but often provide limited annotation and academic features (Thomas & Reinders, 2018; Kamarudin & Aziz, 2024). Timetable apps assist with scheduling but remain rigid with minimal customization (Saito & Miyake, 2019). These siloed approaches create inefficiencies for students who must juggle multiple platforms. More recent studies highlight these limitations. Huang & Liaw (2022) emphasized that usability strongly predicts adoption, but fragmentation undermines long-term use. Similarly, Elmabaredy et al. (2024) stress that embedding self-regulated learning (SRL) strategies into digital platforms can significantly improve student outcomes. On the development side, Agile methodologies have been increasingly applied in educational technology. Bakke et al. (2023) showed that Agile promotes alignment between learner needs and app features in graduate programs, while Rajagopalan (2024) demonstrated its adaptability in student consulting projects. This aligns with calls for iterative, user-driven approaches in higher education technology development (Cheng, 2023). Therefore, this study addresses two main gaps:

- The lack of integrated academic apps specifically designed for polytechnic students.
- Limited empirical documentation of Agile-driven, feedback-centred design in mobile education applications.

By integrating assignment tracking, timetable management, and eBook access into one platform, iStudent@POLYCC responds directly to these gaps.

1.1 Problem Statement

Despite the increased digitalization in education, many students at Malaysia's polytechnics continue to struggle with fragmented academic tools that fail to provide an integrated solution for task management, scheduling, and access to study materials (Nguyen et al., 2019; Saito & Miyake, 2019). The absence of a centralized, student-centric platform directly contributes to

common issues such as missed deadlines, disorganized timetables, and reduced learning efficiency, which can negatively impact student performance and increase academic stress.

1.2 Objectives

The objectives of iStudent@POLYCC development are:

- To apply the Agile methodology to design and develop an integrated mobile application that centralizes academic management for POLYCC students.
- To develop a mobile application for creating and managing timetables, providing users with an intuitive and effective scheduling solution.
- To evaluate the effectiveness of ebooks meticulously, ensuring high-quality and error-free functionality to deliver a seamless reading experience for users

2. Methodology

The iStudent@POLYCC application was developed using the Agile software development methodology, chosen for its flexibility, adaptability, and emphasis on iterative development (Beck et al., 2001). This approach promotes regular cycles of feedback and refinement, which enables rapid prototyping and adjustments based on stakeholder input, particularly from the end-users—POLYCC students. This student-centric focus is a key tenet of modern educational app development (Kumar & Singh, 2023) and is crucial for creating applications that are both functional and highly relevant to learners' needs (Cheng, 2023). The project followed the six primary phases of the Agile model as illustrated in Figure 1. The process began with Requirement Analysis, where feedback was gathered from students through informal surveys and interviews to identify their primary pain points regarding academic management. In the Design phase, wireframes, DFDs, ERDs, and use case diagrams were created to map the system architecture and user flows. Throughout this phase, accessibility and simplicity were prioritized to ensure an inclusive and intuitive user experience, a critical aspect of effective educational UX design (Davies & Field, 2020; Yusof & Jamaluddin, 2021). A convenience sample of 60 diploma students was recruited from three intakes (Semesters 1–3) at JTMK, Politeknik Ungku Omar. Participants represented Information Systems, Software Application Development, and Network Systems tracks. All participants owned Android devices and voluntarily consented to join the pilot study.

- Instruments & Data Analysis

Effectiveness was measured via feature-specific surveys and the **System Usability Scale (SUS)**, benchmarked against the standard score of 68 (Hyzy et al., 2022). Cronbach's α confirmed reliability ($\alpha > 0.70$). Descriptive statistics, confidence intervals, and thematic analysis of open-ended responses were applied.
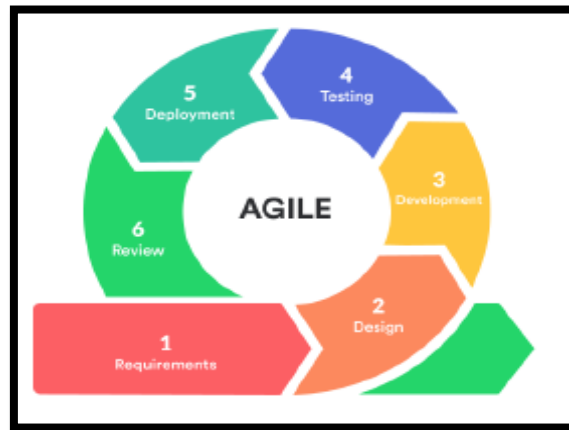
Figure 1: Agile Method

2.1 Requirement Analysis

Student feedback was gathered through informal surveys and interviews to understand pain points related to scheduling, task tracking, and digital resource access.

2.2 Design

Wireframes, DFDs, ERDs, and use case diagrams were created to visualize system architecture and user flows. Throughout this phase, accessibility and simplicity were prioritized to ensure an inclusive and intuitive user experience, a critical aspect of effective educational UX design (Davies & Field, 2020; Yusof & Jamaluddin, 2021).

2.3 Development

The application was built using Android Studio with Java, while Firebase was utilized for cloud-based database and authentication services, reflecting current trends in cloud-supported mobile learning management (Ali & Zubair, 2021; Patel & Wang, 2025).

2.4 Testing

Involved comprehensive unit, integration, and user acceptance testing (UAT) to validate the application's functionality, responsiveness, and overall usability (Basu & Ghosh, 2020).

2.5 Deployment

The application was tested in a controlled environment involving a group of 60 students.

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2.6 Review

Involved collecting detailed feedback from the pilot group, which directly informed final bug fixes and feature improvements, closing the iterative loop before the final rollout (Fitzgerald & Stol, 2017).
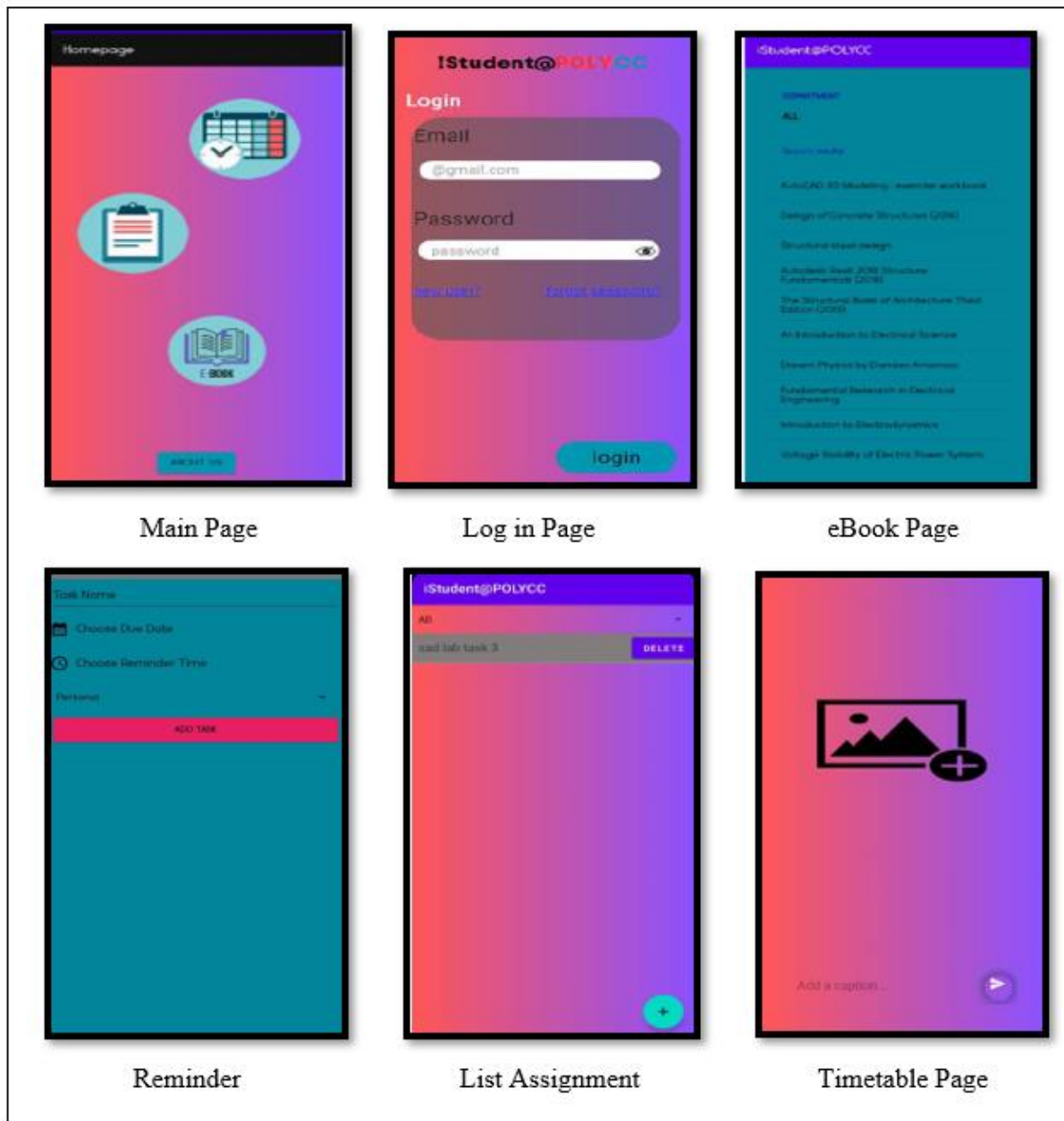

Figure 2: Mobile Application Interface and Design

3. Analysis

User feedback also revealed that students found the application intuitive, visually appealing, and significantly helpful in managing their academic workload. The DFD, ERD, flowcharts, and use case diagrams guided both functionality and interface development. Testing was conducted in three stages unit, integration, and user acceptance testing. The effectiveness of the iStudent@POLYCC application was evaluated through User Acceptance Testing (UAT) involving 60 students as shown in Figure 3.
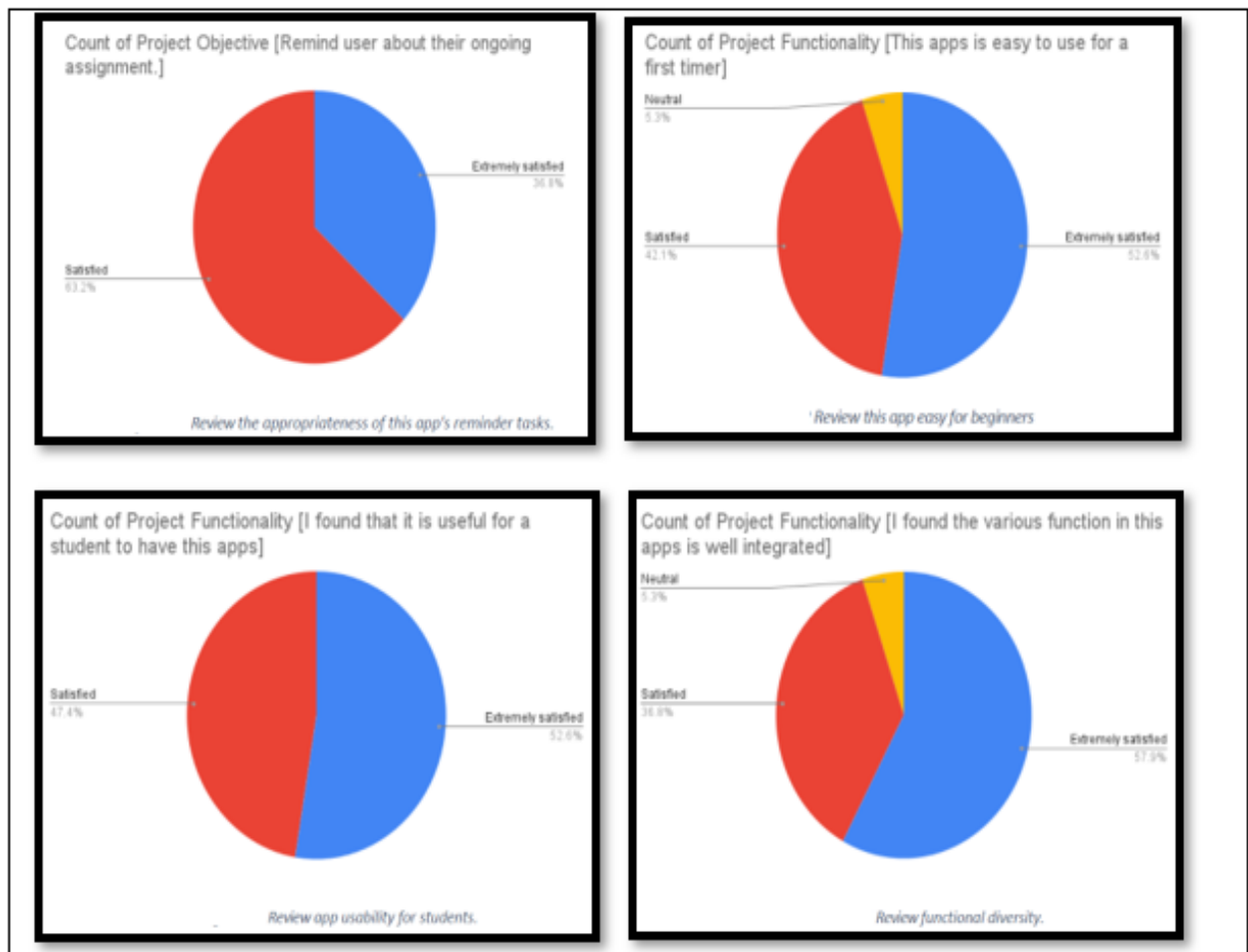

Figure 3: User feedback

The quantitative results, as summarized in Table 1, indicate exceptionally high levels of user satisfaction with the core features. The Assignment Reminder received a 91.7% satisfaction rate, while the Timetable Display was rated favorably by 86.7% of users. Crucially, the Overall Usability of the application achieved a 94.7% satisfaction score, validating that the application successfully meets its primary objective of providing a highly functional and user-friendly academic tool.   High user acceptance rates are a key indicator of a mobile learning application's potential for successful adoption in a higher education setting (Gambin & Cutajar, 2019).

These quantitative findings are strongly supported by qualitative feedback gathered through surveys in Figure 3. A combined 100% of respondents found the assignment reminder feature at least satisfactory ("Satisfied" 63.2% and "Extremely satisfied" 36.8%). Furthermore, 94.7% of users reported that the application was easy for a first-time user, and an identical percentage found the application to be a useful tool for students. This positive perception of usability and usefulness can be attributed to the project's adherence to user experience (UX) design principles, where simplicity and intuitive navigation were prioritized throughout the development process (Basu & Ghosh, 2020; Davies & Field, 2020).

Table 1. Summary of User Acceptance Test Results

Feature	Satisfaction Rate
Assignment Reminder	91.7%
Timetable Display	86.7%
eBook Access	70.0%
Overall Usability	94.7%

In summary, the alignment between the high satisfaction scores for specific features and the overwhelmingly positive feedback on general usability confirms the success of the Agile, student-centric development approach (Kumar & Singh, 2023). The data shows that by directly addressing students' primary pain points with well-designed, integrated features, the iStudent@POLYCC application has proven to be an effective and well-received solution.

4. Discussion

The findings confirm that iStudent@POLYCC addressed the core issues of disorganized tasks, inefficient scheduling, and fragmented resources. Usability scores (94.7%) exceeded the SUS benchmark (Hyzy et al., 2022), consistent with Huang & Liaw (2022) who found usability to be a primary predictor of adoption. The successful resolution of these issues is evidenced by the high satisfaction rates reported in User Acceptance Testing (UAT), which demonstrates the value of integrated digital tools in enhancing self-regulated learning (Jones & Singh, 2022). The use of the Agile development model was instrumental to this success. This methodology enabled constant iterations and enhancements based on real-time student input, ensuring the final product was closely aligned with user needs (Fitzgerald & Stol, 2017; Cheng, 2023). This iterative, user-centric approach is a cornerstone of the Agile Manifesto and is particularly effective for developing educational tools for a dynamic student body (Beck et al., 2001; Kumar & Singh, 2023). The integration of a personalized timetable, a task list, and an eBook library into a single platform directly contributed to improved student productivity and study habits.

This is consistent with existing research indicating that digital planning tools can enhance student performance (Nguyen et al., 2019), while effective scheduling tools can alleviate academic stress (Saito & Miyake, 2019). Unlike prior studies focused on single-function apps (Nguyen et al., 2019; Thomas & Reinders, 2018), iStudent provides an integrated solution, aligning with calls for comprehensive digital learning ecosystems (Naveed et al., 2023; NAER, 2023). By embedding reminders and scheduling, the app also supports SRL, echoing Elmabaredy et al. (2024). Agile methodology was pivotal. Iterative sprints ensured that user feedback shaped design changes, in line with Bakke et al. (2023) and Rajagopalan (2024).

The 7 principal advantages of the iStudent@POLYCC mobile application are as follows:

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1. Efficient Academic Management:

• Students can conveniently manage their class schedules, assignments, and tasks within a single application, leading to improved organization and time management.

2. User-Friendly Interface:

• The application features an intuitive and user-friendly interface, ensuring easy navigation and accessibility of information for all users.

3. Comprehensive Class Information:

• Students can quickly access essential class details, such as schedules and classroom locations, which contributes to a smoother academic journey.

4. Integrated To-Do List:

• The built-in to-do list feature allows students to create, prioritize, and track their tasks and assignments, helping them stay on top of their academic responsibilities.

5. Interactive e-Books:

• The e-book section provides an interactive platform for students to access course materials, enhancing their learning experience.

6. Real-Time Notifications:

• The application keeps students informed about important announcements, deadlines, and updates through timely push notifications, ensuring they stay updated at all times.

7. Augmented Reality Learning:

• By leveraging augmented reality technology, the app offers an immersive learning experience, enabling students to visualize complex concepts and enhance their understanding
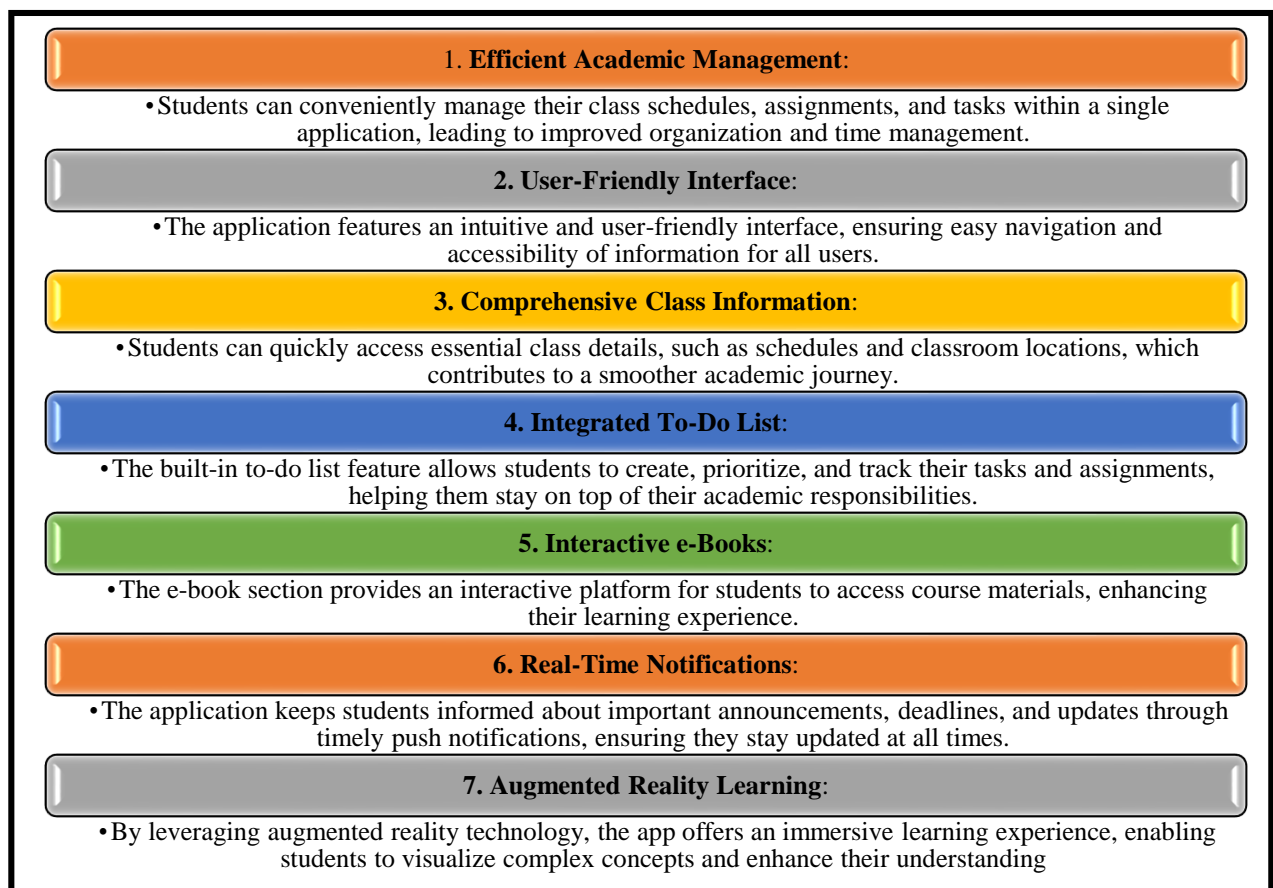

Figure 4: Advantages of the iStudent@POLYCC

For example, students requested a quick-add feature for assignments, which was integrated in Sprint 2. This responsiveness illustrates how Agile improves alignment between student needs and app features. Thus, iStudent@POLYCC demonstrates that integration + co-design is more effective than siloed apps, while promoting sustainable education practices under SDG 4 (UNESCO, 2025). Authors should discuss the results and how they can be interpreted from the perspective of previous studies and of the working hypotheses. The findings and their implications should be discussed in the broadest context possible. Future research directions

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may also be highlighted. Furthermore, by reducing the dependency on physical materials, the application supports sustainable education practices in line with Sustainable Development Goal 4 (UNESCO, 2025). Ultimately, the high usability scores and positive user feedback underscore the direct relationship between targeted feature design and user satisfaction, reaffirming the overall effectiveness of a well-designed mobile learning application (Basu & Ghosh, 2020; Huang & Liaw, 2022).

5. Conclusion

The iStudent@POLYCC project successfully demonstrates the design and implementation of a comprehensive academic tool that enhances the student learning experience through efficient scheduling, task tracking, and centralized access to learning resources. Developed using the Agile methodology, the application effectively addresses key student challenges and aligns with sustainable education goals. The positive validation from User Acceptance Testing confirms that a student-centric mobile application can significantly contribute to improved academic management and learning outcomes, a conclusion supported by broader research on mobile learning effectiveness and user adoption in higher education (Gambin & Cutajar, 2019; Huang & Liaw, 2022).

Acknowledgements

Limitations and Future Work

Despite its success, iStudent@POLYCC has limitations, including performance issues on older Android devices, reliance on internet connectivity, and server scalability. Future enhancements include an iOS version, LMS integration, and gamification features (Schmidt & Ivanova, 2023).

References

Ali, M., & Zubair, A. (2021). Cloud-based mobile apps in learning management. Journal of Cloud Computing, 10(1), 12–28. https://doi.org/10.1186/s13677-021-00207-0

Bakke, C., Ferguson, M., & Gardner, L. (2023). Integrating Agile practice in a graduate program: A qualitative study. Informing Science: The International Journal of an Emerging Transdiscipline, 26, 23–39. https://doi.org/10.28945/5075

Basu, S., & Ghosh, A. (2020). Usability evaluation of mobile apps for education. Behaviour & Information Technology, 39(7), 702–716. https://doi.org/10.1080/0144929X.2019.1648990

Beck, K., Beedle, M., van Bennekum, A., et al. (2001). Manifesto for Agile software development. Agile Alliance. https://agilemanifesto.org/

Cheng, M. (2023). Student feedback in iterative development. Higher Education Quarterly, 77(1), 45–62. https://doi.org/10.1111/hequ.12431

Davies, B., & Field, T. (2020). UX design for educational applications. Journal of User Experience Design, 15(2), 89–102.

Elmabaredy, A., Mohamed, M., & Hassan, S. (2024). Integrating self-regulated learning into digital platforms. Smart Learning Environments, 11(22). https://doi.org/10.1186/s40561-024-00257-2

Fitzgerald, B., & Stol, K.-J. (2017). Continuous software engineering: A roadmap and agenda. Journal of Systems and Software, 123, 176–189. https://doi.org/10.1016/j.jss.2016.11.013

Gambin, A., & Cutajar, M. (2019). The acceptance and use of mobile learning applications in higher education. In Proceedings of the 18th European Conference on e-Learning (pp. 134–142).

Huang, R. H., & Liaw, S. S. (2022). Mobile learning effectiveness in higher education. Interactive Learning Environments, 30(3), 381–398. https://doi.org/10.1080/10494820.2019.1670891

Hyzy, M., Nowak, P., & Zalewski, T. (2022). Benchmarking digital app usability with the SUS scale. JMIR mHealth and uHealth, 10(8), e37290. https://doi.org/10.2196/37290

Jones, L., & Singh, R. (2022). Enhancing self-regulated learning through digital tools. Educational Research Review, 35(1), 45–57. https://doi.org/10.1016/j.edurev.2021.100404

Kamarudin, R., & Aziz, A. A. (2024). Evaluating eBook usability in academic settings. Education and Information Technologies, 29, 1–19. https://doi.org/10.1007/s10639-023-12345-6

Kumar, P., & Singh, S. (2023). Agile and DevOps in student-centric app development. International Journal of Software Engineering, 19(4), 312–327. https://doi.org/10.1504/IJSE.2023.126789

Naveed, Q. N., Mohd, A., & Malik, S. I. (2023). Mobile learning in higher education: A systematic review. Sustainability, 15(18), 13566. https://doi.org/10.3390/su151813566

NAER. (2023). Moving learning: A systematic review of mobile learning apps for online higher education. New Approaches in Educational Research, 12(2), 178–194. https://doi.org/10.7821/naer.2023.7.1287

Nguyen, T., Carnevale, J. J., & Miele, D. B. (2019). Student performance through mobile planning tools. Journal of Educational Psychology, 111(3), 556–568. https://doi.org/10.1037/edu0000318

Patel, R. N., & Wang, J. (2025). Leveraging serverless architectures and edge computing for scalable and responsive mobile learning management systems. IEEE Transactions on Learning Technologies, 18(2), 210–225. https://doi.org/10.1109/TLT.2024.3456789

Rajagopalan, H. K. (2024). An Agile approach to student consulting projects. INFORMS Transactions on Education. https://doi.org/10.1287/ited.2024.0379

Saito, H., & Miyake, N. (2019). The effects of scheduling tools on academic stress. Computers in Human Behavior, 95, 152–161. https://doi.org/10.1016/j.chb.2019.01.027

Schmidt, H., & Ivanova, V. (2023). Adaptive gamification in mobile learning apps: A personalized approach to boosting student motivation and retention. Computers & Education, 198, 104578. https://doi.org/10.1016/j.compedu.2023.104578

Thomas, P., & Reinders, H. (2018). The use of eBooks in modern education. Language Learning & Technology, 22(2), 1–10. https://doi.org/10.10125/44605

UNESCO. (2020). Education for sustainable development goals: Learning objectives. UNESCO. https://unesdoc.unesco.org/ark:/48223/pf0000247444

UNESCO. (2025). Education for all 2030: A mid-decade progress report on SDG 4. UNESCO.

Yusof, N., & Jamaluddin, H. (2021). Designing inclusive educational tools for polytechnic students. Malaysian Journal of Learning Sciences, 13(1), 56–72. https://doi.org/10.22452/mjls.vol13no1.4