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DEVELOPMENT AND EVALUATION OF UUM BUDDY: A CENTRALISED DIGITAL COMMUNICATION PLATFORM FOR ENHANCING STUDENT ENGAGEMENT IN HIGHER EDUCATION

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Abstract:

Fragmented digital communication within higher education institutions often results in inefficient information dissemination and limited interaction among campus communities. To address this challenge, this study develops and evaluates UUM BUDDY, a centralised mobile and web-based application designed to integrate academic, social, and institutional communication for the Universiti Utara Malaysia community. The study aims to design, develop, and evaluate a unified digital platform that supports student networking, mentorship, and official university announcements within a single ecosystem. An Agile development methodology was adopted to guide the system development process. Data were collected through structured questionnaires, usability testing, and expert evaluations involving university students and multimedia specialists. Quantitative data were analysed using descriptive statistical methods, while qualitative feedback was used to refine the application's interface and functionality. The preliminary needs analysis revealed that 26.7% of respondents perceived a centralised communication platform as highly beneficial for enhancing student interactions. Formative evaluation findings indicated positive perceptions of the application's usability, functionality, and effectiveness as an integrated campus hub, whereas summative evaluation indicated improved access to university information and reduced missed announcements. The study concludes that a context-specific multimedia communication platform can enhance institutional communication efficiency, strengthen student engagement, and support

digital transformation initiatives in higher education. These findings provide practical insights into the design and implementation of integrated campus networking systems for university communities.

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Campus Communication; Centralised Digital Platform; Higher Education; Multimedia Application; Student Networking



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Introduction

The rapid advancement of digital technologies has significantly transformed communication practices within higher education institutions. Universities increasingly rely on digital platforms to facilitate academic collaboration, disseminate institutional information, and strengthen interactions among students, lecturers, and administrative staff. The widespread adoption of mobile technologies and social media has further influenced how university communities access information, collaborate on academic activities, and engage in campus life. As higher education institutions continue to embrace digital transformation, the demand for integrated communication systems that support both academic and social engagement has become increasingly important (Al-Qaysi et al., 2023). Centralised communication ecosystems do not merely push informational updates; they directly influence how students psychologically connect with their university environment. As demonstrated by Niță and Guțu (2023), a comprehensive institutional digital transformation program directly correlates with elevated levels of student learning vigor, dedication, and active campus co-creation.

Despite the availability of various digital communication platforms such as email, messaging applications, learning management systems, and social networking services, communication within university environments often remains fragmented. Students frequently rely on multiple independent platforms to obtain academic announcements, communicate with peers, participate in student communities, and seek academic guidance. This fragmented ecosystem may result in duplicated information, inconsistent communication channels, delayed dissemination of announcements, and difficulties in accessing university-related resources efficiently. Consequently, students may experience reduced engagement with campus activities and increased likelihood of missing important institutional information.

Social media technologies have demonstrated considerable potential in supporting communication, collaboration, and knowledge sharing in higher education. Previous studies indicate that social media platforms encourage interaction among students, facilitate collaborative learning, and improve access to educational resources when appropriately integrated into academic environments (Al-Qaysi et al., 2023). However, most existing social media platforms are designed primarily for general communication rather than addressing the specific academic and institutional requirements of university communities. As a result, universities often continue to depend on multiple disconnected applications to manage academic communication, student engagement, and campus announcements.

Beyond communication, peer networking and mentoring have become essential components of student development in higher education. Effective peer mentoring has been shown to support academic adjustment, improve student retention, provide psychosocial support, and enhance students' overall educational experience. Successful mentoring relationships encourage knowledge sharing, emotional support, and collaborative learning among students, particularly during their transition into university life (Terrior & Leonard, 2007). Nevertheless, identifying suitable mentors and maintaining accessible communication channels remain challenging when mentoring activities are distributed across different platforms.

The effectiveness of any digital application depends not only on the availability of functional features but also on the quality of its user experience. Human-Centred Design (HCD) emphasizes designing systems based on users' needs, behaviours, and expectations throughout the development process. (Norman, 2013) argues that successful interactive systems should enable users to easily understand available functions, receive meaningful feedback, and interact with interfaces that are intuitive, discoverable, and usable. Rather than requiring users to adapt to technology, digital products should be designed around human capabilities and real-world usage patterns. These principles have become fundamental in the development of user-friendly multimedia applications and interactive systems.

Recognising these challenges, this study proposes **UUM Buddy**, a centralised multimedia application designed specifically for the Universiti Utara Malaysia (UUM) community. The application integrates multiple campus communication functions within a single platform, including student networking, mentor requests, community engagement, institutional announcements, and academic interaction. Unlike conventional communication platforms that operate independently, UUM Buddy aims to provide a unified digital ecosystem that improves communication efficiency while fostering stronger connections among university students.

The development of UUM Buddy adopted an Agile development methodology, allowing continuous refinement of the prototype through iterative design, expert evaluation, and user feedback. This approach aligns closely with the principles of Human-Centred Design, which advocate iterative testing and continuous improvement based on user needs and experiences (Norman, 2013). The prototype was subsequently evaluated through formative and summative evaluations involving multimedia experts and university students to assess its usability, functionality, and overall user acceptance.

Therefore, this study aims to design, develop, and evaluate UUM Buddy as a centralised student social and academic networking application for the Universiti Utara Malaysia community. Specifically, the study seeks to examine whether integrating academic communication, student networking, mentoring, and institutional announcements within a

single multimedia platform can improve communication efficiency, enhance student engagement, and provide a more effective digital communication environment in higher education. The findings of this study are expected to contribute practical insights into the design and implementation of centralised campus communication platforms while supporting ongoing digital transformation initiatives in universities.

Literature Review

The rapid advancement of digital technologies has significantly transformed the higher education landscape, reshaping how universities deliver educational services, facilitate communication, and support student engagement. The integration of mobile technologies, cloud computing, social networking platforms, and intelligent digital systems has enabled higher education institutions to move beyond traditional teaching environments toward more connected and technology-driven learning ecosystems. As universities continue to embrace digital transformation initiatives, there is an increasing emphasis on developing digital platforms that enhance communication efficiency, promote collaboration, and improve students' overall learning experiences.

Previous studies have investigated various aspects of digital transformation in higher education, including smart campus development, educational technologies, online collaboration, peer learning, and student engagement. While these studies consistently demonstrate the benefits of digital technologies in supporting teaching and learning, many existing solutions remain fragmented, requiring students to interact with multiple independent platforms to access academic resources, institutional announcements, and social communities. Therefore, understanding the current developments in digital transformation, educational communication, and student-centred technologies provides an essential theoretical foundation for developing integrated digital platforms such as UUM Buddy.

Digital Transformation in Higher Education

Digital transformation has become one of the primary strategic priorities for higher education institutions worldwide. The increasing adoption of digital technologies has fundamentally changed the ways universities manage academic activities, administrative processes, and communication among students, lecturers, and institutional stakeholders. Rather than serving merely as supplementary tools, digital technologies are now recognised as essential components that support teaching, learning, decision-making, and institutional management.

Recent advances in educational technology have encouraged universities to establish digitally connected learning environments, commonly referred to as smart campuses. A smart campus integrates various digital services, communication technologies, and information systems into a unified ecosystem that supports efficient campus operations and enhances the overall student experience. These digital ecosystems facilitate seamless access to academic resources, institutional services, and collaborative learning opportunities while promoting greater interaction among members of the university community. Such transformation aligns with the broader objective of preparing higher education institutions for increasingly digital and data-driven educational environments.

The emergence of educational technologies has further accelerated this transformation by enabling universities to integrate learning management systems, mobile applications, cloud-based services, and collaborative digital platforms into everyday academic activities. (Mukred et al., 2024) explain that digital transformation in higher education extends beyond technology adoption, requiring institutions to develop integrated digital infrastructures that support data-driven decision-making, enhance communication efficiency, and improve academic services. Their study highlights that successful implementation of educational technologies depends not only on technological capability but also on institutional readiness, perceived usefulness, and user acceptance. These factors collectively influence students' willingness to engage with digital platforms and determine the overall effectiveness of technology adoption within universities.

Similarly, (Terzieva et al., 2022) emphasise that smart education environments utilise interconnected digital technologies to create intelligent educational ecosystems capable of supporting communication, collaboration, and efficient information management. Their research explains that smart campuses integrate various technological components to optimise educational processes, improve access to information, and facilitate informed decision-making among students and institutional administrators. Rather than operating as isolated technological solutions, smart educational environments promote a comprehensive digital ecosystem where multiple services functions cohesively to improve learning experiences and institutional efficiency.

The growing implementation of intelligent educational technologies has also influenced how students interact with university services. Mobile devices, cloud computing, and online platforms enable students to access learning materials, communicate with peers, receive institutional updates, and participate in academic communities regardless of time or location. These technologies provide greater flexibility and accessibility while supporting continuous communication between students and higher education institutions. As digital technologies become increasingly embedded within university environments, students expect educational services to be delivered through integrated, user-friendly, and responsive digital platforms.

Despite these advancements, many universities continue to rely on multiple independent systems to manage academic communication, student engagement, and administrative services. Students often access learning management systems for course materials, messaging applications for peer communication, email for official correspondence, and social networking platforms for student communities. While each platform serves a specific purpose, the absence of integration frequently results in fragmented communication, duplicated information, and inconsistent access to institutional announcements. This fragmented digital environment may reduce communication efficiency and negatively affect students' engagement with university activities.

While digital infrastructures offer unparalleled operational support, universities face severe organisational and technical silos that resist integrated communication. This is supported by Singun (2025), who identified that departmental fragmentation and legacy system incompatibility represent the primary institutional barriers to unified campus software adoption.

Consequently, higher education institutions are increasingly recognising the importance of developing centralised digital platforms capable of integrating multiple communication and academic functions within a single ecosystem. Such platforms have the potential to improve information accessibility, strengthen collaboration, enhance student engagement, and support institutional digital transformation initiatives. These developments provide a strong foundation for exploring centralized campus communication platforms specifically designed to address the communication needs of university communities.

Student Communication, Collaboration, and Campus Engagement

Effective communication is fundamental to the successful operation of higher education institutions, as it supports academic coordination, information dissemination, and the development of meaningful relationships among students, lecturers, and university administrators. In addition to facilitating the exchange of academic information, communication contributes to students' sense of belonging, participation in campus activities, and overall university experience. As universities continue to expand their digital infrastructure, communication has increasingly shifted from traditional face-to-face interactions toward technology-mediated platforms that enable faster, more flexible, and accessible information sharing.

Digital communication technologies have significantly enhanced collaboration within higher education by enabling students to interact beyond the physical classroom. Mobile applications, online discussion platforms, learning management systems, and collaborative digital tools provide opportunities for students to exchange knowledge, discuss academic content, and participate in group activities regardless of geographical or time constraints. These technologies encourage collaborative learning by promoting continuous interaction, peer support, and collective problem-solving, which contribute positively to students' academic development and learning experiences.

Student communication has also evolved beyond purely academic purposes to encompass broader aspects of university life, including participation in student organisations, campus events, mentoring programmes, and extracurricular activities. Active engagement in campus communities has been associated with improved academic motivation, stronger interpersonal relationships, increased institutional attachment, and higher levels of student satisfaction. Universities therefore increasingly recognise that effective digital communication should support not only academic interactions but also social networking and community participation that contribute to students' holistic development.

The growing adoption of digital platforms has enabled institutions to create more connected learning communities by encouraging interaction among students with diverse academic backgrounds and interests. Educational technologies facilitate information sharing, collaborative knowledge construction, and peer-to-peer learning, allowing students to become active participants rather than passive recipients of information. These collaborative environments strengthen communication networks and foster a culture of continuous learning that extends beyond formal classroom settings.

Recent studies further suggest that educational use of digital communication platforms positively influences students' learning experiences when the technology effectively supports their academic tasks and communication needs. (Sabah & Altalbe, 2022) found that the

educational use of social media platforms contributes to improved student satisfaction, perceived academic performance, and learning outcomes by facilitating information sharing and collaborative interaction. Their findings indicate that communication technologies can positively influence educational experiences when they align with users' objectives and provide appropriate support for academic collaboration.

Similarly, studies examining social media-driven knowledge sharing in higher education demonstrate that digital communication platforms encourage collaborative learning, increase student engagement, and strengthen academic interactions among university communities. Through continuous information exchange and collaborative participation, students are better able to access learning resources, discuss academic issues, and develop stronger peer relationships that support both academic achievement and personal development.

Despite these advantages, communication within many universities remains distributed across multiple independent digital platforms. Students commonly rely on learning management systems for academic materials, messaging applications for group discussions, social media for student communities, and email for official university announcements. Although each platform addresses specific communication needs, the lack of integration often creates fragmented communication environments where information becomes scattered across different channels. This fragmentation may reduce communication efficiency, increase the likelihood of missed announcements, and require students to manage multiple applications simultaneously to remain informed about academic and campus activities.

The challenges associated with fragmented communication highlight the need for centralized digital platforms capable of integrating academic communication, collaborative learning, and campus engagement within a unified environment. Such platforms have the potential to streamline information dissemination, strengthen collaboration among university communities, and provide students with more efficient access to both academic and institutional resources. Accordingly, developing an integrated communication platform represents an important step toward supporting student engagement and improving the overall digital experience within higher education institutions.

Educational Social Networking

The widespread adoption of digital technologies has transformed social networking platforms into valuable educational tools that extend beyond personal communication. In higher education, educational social networking refers to the use of digital platforms that facilitate academic interaction, collaborative learning, knowledge exchange, and relationship building among students and educators. Unlike conventional learning management systems that primarily focus on course delivery, educational social networking platforms encourage continuous interaction and community participation, enabling students to communicate, collaborate, and share knowledge in both formal and informal learning contexts.

Educational social networking supports the development of collaborative learning environments by enabling students to exchange ideas, discuss academic topics, and solve problems collectively. Through interactive features such as discussion forums, content sharing, peer feedback, and online communities, students actively participate in constructing knowledge rather than passively receiving information. This collaborative approach promotes critical thinking, communication skills, and lifelong learning while encouraging students to engage

with peers who possess diverse experiences and academic backgrounds. As learning increasingly occurs beyond the traditional classroom, social networking platforms provide flexible spaces that support continuous academic interaction regardless of geographical or time constraints.

Knowledge sharing represents one of the most significant contributions of educational social networking. Universities generate substantial amounts of academic information through lectures, assignments, research activities, student organisations, and institutional announcements. Digital networking platforms enable this information to be disseminated efficiently while encouraging students to contribute their own experiences, learning resources, and practical knowledge. Such collaborative knowledge exchange strengthens peer learning and enables students to benefit from collective experiences that extend beyond formal instructional activities. Personal Learning Environment (PLE) research similarly emphasises that digital technologies support collaborative knowledge creation by integrating communication, resource sharing, and self-directed learning within a connected educational ecosystem.

Previous studies have consistently demonstrated the educational value of integrating social networking technologies into higher education. (Sabah & Altalbe, 2022) investigated the educational use of social media platforms and found that their utilisation positively influenced students' perceived satisfaction, academic performance, and learning experiences through enhanced communication and information sharing. Their findings indicate that digital networking platforms create opportunities for meaningful collaboration and improve educational outcomes when the technology effectively supports students' academic tasks and communication needs. Furthermore, the study highlights that the effectiveness of educational social networking depends on the alignment between technological capabilities and users' learning requirements, suggesting that platforms specifically designed for educational contexts are more likely to support meaningful learning experiences than general-purpose social networking applications.

Similarly, studies examining social media-driven knowledge sharing in higher education report that digital networking technologies encourage collaborative learning by facilitating communication among students, strengthening academic communities, and promoting the exchange of educational resources. Through active participation in online learning communities, students are able to seek academic assistance, discuss course-related issues, and collaborate more effectively with peers. These interactions contribute to stronger academic engagement and create supportive learning environments that encourage continuous participation in university life.

Despite these educational benefits, many existing social networking platforms were originally designed for general social interaction rather than supporting the specific academic and institutional needs of university communities. Students frequently utilise commercial social media applications to communicate about coursework, organise student activities, and exchange learning resources. However, these platforms often lack features specifically intended for higher education, such as centralized institutional announcements, structured mentoring systems, academic resource organisation, and integration with official university communication channels. Consequently, academic information and campus-related discussions remain scattered across multiple independent applications, reducing communication efficiency

and making it difficult for students to access reliable institutional information through a single platform.

These limitations suggest that while educational social networking has considerable potential to enhance collaboration and knowledge sharing, there remains a need for integrated platforms specifically designed to support university ecosystems. A centralised educational networking platform that combines academic interaction, student communities, institutional communication, and collaborative learning within a unified environment could address many of the challenges associated with fragmented digital communication. Such an approach provides a stronger foundation for supporting student engagement while promoting more effective knowledge sharing across the university community.

Peer Mentoring in Higher Education

Peer mentoring has become an increasingly important strategy in higher education for supporting students' academic success, social integration, and personal development. Universities have widely adopted mentoring programmes to facilitate students' transition into university life by providing guidance, encouragement, and opportunities to learn from more experienced peers. Unlike formal academic advising, peer mentoring establishes supportive interpersonal relationships in which experienced students share their knowledge, experiences, and practical advice with less experienced students, thereby promoting both academic and social adjustment within the university environment.

The transition from secondary education to higher education often presents significant academic, psychological, and social challenges for students. New university students are required to adapt to unfamiliar learning environments, increased academic expectations, independent learning practices, and new social networks. Difficulties encountered during this transitional period may negatively affect students' confidence, academic performance, and engagement with university life. Consequently, higher education institutions increasingly recognise peer mentoring as an effective intervention that helps students navigate these challenges while strengthening their sense of belonging within the university community.

Previous research consistently demonstrates that effective peer mentoring contributes positively to student development and academic persistence. Terrion and Leonard (2007) identify several characteristics of successful peer mentoring relationships, including mutual trust, effective communication, accessibility, shared experiences, and emotional support. Their study highlights those mentors not only provide academic guidance but also assist mentees in developing confidence, problem-solving abilities, and a stronger understanding of university expectations. Through these supportive relationships, students are better equipped to overcome academic difficulties, adapt to university culture, and build meaningful connections with their peers. Peer-led support networks are essential for smooth academic transition. Le et al. (2024) systematic review of contemporary mentoring programs synthesizes these impacts across four critical dimensions: improved academic grades, lower university withdrawal rates, enhanced emotional and psychological well-being, and rapid social integration into the campus community.

In addition to facilitating students' transition into higher education, peer mentoring has been associated with improved student retention and long-term academic engagement. Students who receive timely academic guidance and social support are generally more likely to remain

motivated, participate actively in university activities, and successfully complete their studies. Mentoring relationships also contribute to students' psychological well-being by reducing feelings of isolation, increasing self-efficacy, and encouraging continuous participation in academic and extracurricular activities. Consequently, mentoring has become an integral component of many student success initiatives implemented by universities worldwide.

Advances in digital technologies have expanded opportunities for delivering peer mentoring through online platforms and mobile applications. Digital mentoring environments enable students to communicate more conveniently, seek academic advice regardless of location, and establish mentoring relationships beyond traditional face-to-face interactions. Technology-supported mentoring also increases accessibility by allowing students to request assistance, exchange information, and maintain continuous communication through centralized digital platforms. Such approaches are particularly valuable in contemporary higher education environments where students increasingly rely on mobile technologies to access academic support and university services.

Despite the recognised benefits of peer mentoring, many mentoring activities within universities continue to rely on informal communication channels or disconnected digital platforms. Students often depend on messaging applications, social media groups, or personal networks to identify suitable mentors and obtain academic guidance. These fragmented approaches may limit accessibility, reduce participation, and create inconsistencies in mentor availability and communication. Furthermore, the absence of centralized mentoring systems makes it difficult for students, particularly first-year students, to identify appropriate mentors based on their academic needs and interests.

These limitations highlight the importance of integrating structured mentoring services into centralized university communication platforms. By combining mentoring with academic networking, institutional communication, and student communities within a single digital ecosystem, universities can provide more accessible and organised support services that enhance students' transition into university life while strengthening long-term engagement and academic success. Therefore, incorporating a dedicated mentoring function within a centralized campus platform represents a practical approach to supporting both student development and institutional retention initiatives.

Human-Centred Design in Educational Applications

The effectiveness of digital applications depends not only on their functionality but also on the quality of the user experience they provide. In higher education, students increasingly rely on digital platforms to access academic information, communicate with peers, and participate in university activities. Consequently, educational applications should be designed to support users' needs, behaviours, and expectations while enabling them to complete tasks efficiently and intuitively. Human-Centred Design (HCD) has become a widely adopted approach that places users at the centre of the system development process.

According to (Norman, 2013a) successful interactive systems should enable users to understand available functions easily and interact with interfaces naturally. Rather than requiring users to adapt to technology, HCD encourages designers to develop systems that align with users' capabilities and real-world behaviours. This approach improves usability through continuous user involvement, iterative evaluation, and interface refinement.

(Norman, 2013) further identifies affordance, discoverability, and feedback as essential principles of effective interface design. Affordance enables users to recognise possible actions within an interface, discoverability allows users to locate and understand system functions easily, while feedback informs users about the outcomes of their actions. Together, these principles improve usability by reducing confusion, supporting efficient navigation, and enhancing users' confidence when interacting with digital applications. An educational app's interface must prioritize discoverability and feedback to support intuitive navigation. Dionne and Pruneau (2025) design-thinking experiments demonstrate that applying human-centred design directly reduces student cognitive overload and supports campus well-being by transforming complex, fragmented institutional pathways into reassuring, cohesive, and visually-calm interactive portals.

These Human-Centred Design principles are particularly important for centralized campus communication platforms that integrate multiple services within a single application. By designing interfaces that are intuitive, easy to navigate, and responsive to user interactions, educational applications can improve accessibility, increase user satisfaction, and encourage continuous engagement. Therefore, Human-Centred Design provides an appropriate theoretical foundation for developing user-friendly multimedia applications that effectively support communication and collaboration in higher education.

Privacy and Cybersecurity in Educational Platforms

As higher education institutions increasingly adopt digital technologies, concerns regarding privacy, cybersecurity, and user trust have become essential considerations in the development of educational applications. Digital platforms routinely collect and manage users' personal information, academic records, and communication data, making the protection of sensitive information an important aspect of system design. Therefore, educational applications should not only provide effective communication and collaboration features but also ensure that users' data are managed securely and responsibly.

Alier et al. (2021) highlight that the growing use of cloud-based educational technologies has increased concerns regarding data privacy and confidentiality, as students' personal information is often stored and processed by third-party service providers. The authors argue that educational institutions must adopt appropriate privacy practices and ethical data management to protect users' information and maintain confidence in digital learning environments. Similarly, privacy has become a key factor influencing students' willingness to adopt and continuously use educational technologies.

In addition to privacy, cybersecurity awareness plays an important role in ensuring safe digital learning environments. Recent studies indicate that students' awareness of cybersecurity practices and adherence to information security policies contribute significantly to safer online learning experiences. Educational institutions are therefore encouraged to promote responsible digital behaviour while implementing secure communication platforms that minimise cybersecurity risks and protect users from potential online threats.

Privacy, cybersecurity, and user trust are particularly important for centralised campus communication platforms that integrate multiple services within a single application. Since users interact through messaging, mentoring, announcements, and community features, the platform must provide a secure environment that protects personal information while fostering

confidence in its services. Consequently, incorporating appropriate privacy considerations and secure communication practices is essential for supporting reliable and trustworthy digital communication within higher education. As centralisation increases the density of personal data moving through campus networks, maintaining robust and secure data governance is vital for fostering user trust. According to Cheong (2024), establishing complete transparency regarding how student communications and profiles are monitored is highly critical to safeguard user trust and protect psychological well-being in digital spaces.

Research Gap Summary

The existing literature demonstrates that digital transformation has significantly enhanced communication, collaboration, knowledge sharing, and student engagement within higher education through the adoption of educational technologies, social networking platforms, peer mentoring, and human-centred design principles. Previous studies have also emphasised the importance of privacy, cybersecurity, and usability in developing effective digital learning environments. However, most existing solutions focus on individual aspects of the student experience, such as communication, mentoring, or collaboration, and are often implemented through separate and disconnected platforms. Limited research has explored the design and evaluation of a centralized multimedia application that integrates academic communication, student networking, peer mentoring, community engagement, and institutional announcements within a single university-specific ecosystem. To address this gap, this study designs, develops, and evaluates UUM Buddy, a centralised campus communication platform that consolidates these essential services into one application. By integrating multiple student support functions within a unified digital environment, this study contributes practical insights into the development of user-centred communication platforms that support digital transformation and enhance student engagement in higher education.

Methodology

This study adopted a Design and Development Research (DDR) approach to design, develop, and evaluate UUM Buddy, a centralised social and academic networking application for the Universiti Utara Malaysia (UUM) community. The research combined systematic software development with user-centred evaluation to ensure that the proposed application addressed the communication and engagement needs identified during the preliminary analysis. The development process followed the Agile software development methodology, which supports iterative design, continuous refinement, and regular stakeholder feedback throughout the project lifecycle.

The prototype was developed and evaluated through two stages of assessment. A formative evaluation involving multimedia and user interface experts was conducted to identify usability issues and obtain recommendations for improving the application's design and functionality. Following prototype refinement, a summative evaluation involving university students was carried out to assess usability, functionality, and user acceptance of the developed application. Quantitative data were analysed using descriptive statistical analysis, while qualitative feedback from the evaluations was used to support iterative improvements to the prototype. The overall research methodology is presented in the following subsections.

Research Design

This study employed the Design and Development Research (DDR) approach to guide the design, development, and evaluation of UUM Buddy, a centralised social and academic networking application for the Universiti Utara Malaysia (UUM) community. DDR is a systematic research methodology that focuses on the creation and evaluation of educational products, systems, or technological solutions to address identified problems while contributing to both practical applications and academic knowledge. Unlike conventional research approaches that primarily examine existing phenomena, DDR emphasises the iterative development of artefacts through continuous design, implementation, evaluation, and refinement.

The selection of DDR was considered appropriate because the primary objective of this study was not only to investigate the communication challenges experienced by university students but also to develop and evaluate a functional multimedia application that addresses these challenges. The research therefore combined problem analysis with prototype development and user evaluation to ensure that the resulting application effectively met users' needs and expectations.

The research process consisted of three main phases. The first phase involved identifying communication issues and user requirements through a preliminary needs analysis and literature review. These findings established the functional and non-functional requirements that guided the system design. The second phase focused on designing and developing the UUM Buddy prototype using an iterative software development process. During this stage, the application's interface, navigation structure, and core functionalities were progressively refined based on stakeholder feedback and design improvements. The final phase involved evaluating the developed prototype through formative and summative evaluations to assess its usability, functionality, and user acceptance. Feedback collected from multimedia experts and university students was subsequently used to improve the overall quality of the application.

By integrating systematic development with continuous evaluation, the Design and Development Research approach ensured that the proposed application was developed based on real user requirements while maintaining alignment with Human-Centred Design principles. This approach also enabled the study to generate practical design recommendations for developing centralised campus communication platforms that support digital transformation and student engagement in higher education.

Agile Development

The development of UUM Buddy followed the Agile software development methodology, which emphasises iterative development, continuous stakeholder involvement, and incremental system improvement. Agile is widely adopted in software development because it enables developers to respond effectively to changing user requirements through frequent evaluation and refinement rather than relying on a rigid sequential development process. This flexibility makes Agile particularly suitable for developing user-centred applications where continuous feedback is essential for improving usability and functionality.

The development process was organised into a series of iterative cycles, commonly referred to as sprints, in which specific application features were designed, developed, and evaluated before progressing to subsequent stages. Each sprint focused on implementing core functionalities of the application, including user authentication, student networking, community interaction, mentor requests, announcements, and communication features. Upon completion of each sprint, the prototype was reviewed to ensure that the implemented functions met the identified user requirements and project objectives.

A key characteristic of Agile is its emphasis on iteration, where the prototype is continuously improved based on feedback gathered throughout the development process. Rather than developing the entire application before evaluation, individual components were progressively refined through repeated design, testing, and revision. This iterative approach enabled usability issues, interface inconsistencies, and functional limitations to be identified and addressed early, resulting in a more intuitive and user-friendly application.

The iterative refinement process was further supported through formative evaluation involving multimedia and user interface experts. Feedback obtained from the evaluation informed several improvements to the prototype, including enhancements to the navigation structure, interface consistency, branding, privacy features, and overall user experience. These refinements ensured that the final prototype better aligned with users' needs while adhering to Human-Centred Design principles. Consequently, the Agile methodology provided an effective framework for developing and continuously improving UUM Buddy, resulting in a prototype that was subsequently evaluated for usability, functionality, and user acceptance.

System Development

The system development phase focused on transforming the identified user requirements into a functional prototype of UUM Buddy. This phase consisted of four main activities: requirement analysis, user interface (UI) design, system development, and testing. These activities were carried out iteratively following the Agile methodology to ensure that the application aligned with users' needs and project objectives.

The requirement analysis was conducted based on the findings of the preliminary needs analysis and the literature review. Functional requirements, including student networking, community interaction, mentor requests, announcements, chat, and user profile management, were identified to address the communication challenges experienced by university students. Non-functional requirements, such as usability, accessibility, and ease of navigation, were also considered to ensure a positive user experience.

Following the requirement analysis, the user interface (UI) design was developed by applying Human-Centred Design principles. The interface was designed to provide clear navigation, visual consistency, and intuitive interaction to support users in completing tasks efficiently. Wireframes and high-fidelity interface designs were created before being implemented into the prototype, ensuring that the application's layout and functionality reflected users' expectations and institutional branding.

The system development process involved implementing the designed interface and application features using the Adalo no-code development platform. Core modules, including user authentication, home feed, mentor request, community, announcements, chat, and profile

management, were progressively developed through iterative cycles. Each feature was integrated into the prototype and reviewed to ensure that it functioned according to the specified requirements. Most of the mobile apps nowadays have been developed using Adalo (Muda, et. al, 2022; Saidin et. al., 2024; Saidin et. al, 2025). The high-fidelity prototype of UUM Buddy was rapidly developed using the Adalo platform. This approach is validated by Ansari and Lu (2024), who argued that low-code and no-code visual development architectures successfully democratize software engineering, enabling educational researchers to bypass complex syntax limits and focus on rapid, agile, and human-centred design iterations.

Finally, testing was conducted throughout the development process to verify the functionality and usability of the application. Functional testing was performed after each development iteration to identify and resolve interface inconsistencies, navigation issues, and system errors before proceeding to subsequent development stages. The completed prototype was then prepared for formative evaluation involving multimedia experts, followed by summative evaluation with university students to assess its overall usability, functionality, and user acceptance.

Prototype Development

The outcome of the system development process was a high-fidelity prototype of UUM Buddy, designed to function as a centralised social and academic networking platform for the Universiti Utara Malaysia (UUM) community. The prototype was developed to integrate multiple campus communication services within a single application, allowing students to access academic and social features through a unified digital environment. The design focused on providing a simple, intuitive, and user-friendly interface that supports efficient navigation and interaction while adhering to Human-Centred Design principles.

The prototype consists of several core modules that address students' communication and engagement needs. These include a Login module for secure user authentication, a Home Feed that enables students to share updates and interact with posts, a Mentor Request feature that facilitates connections between students and mentors, a Chat function for direct communication, a Community module that supports participation in interest-based groups and discussions, and can be used as Announcement section for disseminating official university information, and a Profile module that allows users to manage their personal information and application settings. Collectively, these features provide an integrated platform that supports academic communication, peer networking, mentoring, and campus engagement.

Rather than functioning as separate applications, these modules were designed to operate within a single ecosystem, enabling users to access essential university services more efficiently. The completed prototype subsequently served as the primary artefact for the formative and summative evaluations, where its usability, functionality, and overall user acceptance were assessed by multimedia experts and university students.

Formative Evaluation

The formative evaluation was conducted to assess the usability, functionality, and overall design quality of the UUM Buddy prototype before its implementation in the summative evaluation. This evaluation aimed to identify interface issues, usability concerns, and potential improvements that could enhance the application's effectiveness and user experience.

Conducting formative evaluation during the development process is consistent with the Human-Centred Design approach, which emphasises continuous user feedback and iterative refinement to produce user-friendly digital applications.

The evaluation involved three experts with experience in multimedia design, user interface (UI), user experience (UX), and educational technology. These experts were selected based on their expertise in evaluating interactive multimedia applications and their ability to provide constructive feedback regarding the prototype's design and functionality.

Data were collected using a structured evaluation instrument consisting of usability-related questions and open-ended feedback. During the evaluation session, the experts were asked to explore the prototype independently by completing several predefined tasks that represented the application's core functionalities. Upon completing the tasks, the experts evaluated the prototype and provided recommendations for improving the interface, navigation, functionality, and overall user experience.

The feedback obtained from the formative evaluation was analysed qualitatively and used to refine the prototype before proceeding to the summative evaluation. Several improvements were implemented based on the experts' recommendations, including enhancements to the user interface, navigation consistency, branding, privacy-related features, and overall usability. This iterative refinement process ensured that the developed prototype better aligned with users' needs and provided a more effective and intuitive platform for subsequent user evaluation.

Summative Evaluation

The summative evaluation was conducted to assess the usability, functionality, and overall user acceptance of the UUM Buddy prototype after the improvements identified during the formative evaluation had been implemented. The purpose of this evaluation was to determine whether the developed application effectively addressed the communication and engagement needs of university students while providing a positive user experience. Unlike the formative evaluation, which focused on identifying design improvements, the summative evaluation examined users' overall perceptions of the completed prototype.

The evaluation involved 31 Universiti Utara Malaysia (UUM) students, representing the intended target users of the application. The participants were selected because they regularly use various digital platforms for academic communication, social networking, and accessing university-related information. Their participation provided valuable insights into the application's practicality and suitability for supporting campus communication and student engagement.

Data were collected using a structured questionnaire consisting of demographic information, usability assessment items, and open-ended questions. Before completing the questionnaire, participants were asked to perform several predefined tasks using the prototype, including logging into the application, browsing the home feed, accessing announcements, submitting a mentor request, participating in community discussions, and communicating through the chat feature. These tasks were designed to evaluate the usability and functionality of the application's core features within a realistic usage scenario.

The quantitative data obtained from the questionnaire were analysed using descriptive statistical analysis to summarise participants' responses regarding the application's usability, functionality, and overall acceptance. In addition, qualitative feedback from the open-ended questions was reviewed to identify users' suggestions for further improvements. The findings from the summative evaluation provided evidence of the application's effectiveness as a centralised campus communication platform and informed the overall assessment of UUM Buddy's suitability for supporting digital communication and student engagement within the university environment.

Data Analysis

The data collected from both the formative and summative evaluations were analysed using quantitative and qualitative analysis techniques to obtain a comprehensive understanding of the prototype's performance and user acceptance. The combination of these approaches enabled the study to evaluate the usability and functionality of UUM Buddy while also identifying areas for further improvement based on participants' feedback.

The quantitative data obtained from the structured questionnaires were analysed using descriptive statistical analysis. Descriptive statistics, including frequencies, percentages, means, and standard deviations, were used to summarise participants' demographic information and their responses to the usability, functionality, and user acceptance items. The results provided an overview of users' perceptions of the developed prototype and facilitated the interpretation of the application's overall performance.

The qualitative data collected through open-ended responses during the formative and summative evaluations were analysed using thematic analysis. Participants' comments and suggestions were reviewed, coded, and organised into common themes to identify recurring usability issues, interface improvements, and recommendations for future development. The qualitative findings complemented the quantitative results by providing deeper insights into users' experiences and supporting the iterative refinement of the UUM Buddy prototype. Together, these analyses enabled a comprehensive evaluation of the application and informed the study's conclusions regarding its effectiveness as a centralized campus communication platform.

Results

This section presents the findings obtained from the formative and summative evaluations conducted to assess the usability, functionality, and user acceptance of the UUM Buddy prototype. The results are organised according to the evaluation stages, beginning with the formative evaluation involving multimedia experts, followed by the summative evaluation involving university students. The formative evaluation findings highlight the recommendations used to refine the prototype, while the summative evaluation presents users' perceptions of the developed application. The findings are presented descriptively through tables and figures without interpretation, while the implications of the results are discussed in the subsequent Discussion section.

Formative Evaluation

The formative evaluation was conducted to assess the usability, interface design, and functionality of the UUM Buddy prototype before proceeding to the summative evaluation. The evaluation involved three multimedia experts who reviewed the prototype by performing a series of predefined tasks and subsequently provided feedback through a structured evaluation instrument. The objective of this evaluation was to identify potential usability issues and gather expert recommendations that could improve the overall quality of the application.

The findings from the formative evaluation were organised into four main themes: user interface (UI), navigation, branding, and privacy. Overall, the experts expressed positive perceptions of the prototype, indicating that the application successfully integrated the essential communication features required for a centralized campus platform. Nevertheless, several improvements were recommended to enhance the application's usability, visual consistency, and user experience.

From the user interface (UI) perspective, the experts suggested improving the clarity of certain interface elements by adding indicators for mandatory input fields and ensuring greater consistency in the design of forms and interactive components. These recommendations were intended to minimise user confusion and improve task completion efficiency. Regarding navigation, the experts recommended implementing a sticky bottom navigation bar to provide users with quicker access to the application's primary features and to improve overall navigation efficiency.

In terms of branding, the experts observed that the prototype should better reflect the institutional identity of Universiti Utara Malaysia (UUM). Consequently, improvements were made to the application's logo, colour scheme, and visual identity to establish a stronger connection with the university's corporate image. In addition, the chat feature was refined by restricting communication to connected users, thereby improving user privacy and creating a more secure communication environment.

The recommendations obtained from the formative evaluation were subsequently incorporated into the prototype through iterative refinement. These improvements enhanced the application's usability, interface consistency, branding, navigation, and privacy features before it was evaluated by the target users during the summative evaluation. The summary of expert recommendations and the corresponding improvements implemented in the prototype is presented in Table 1.

Table 1: Summary of Expert Recommendations and Implemented Improvements

Expert Feedback	Improvement Implemented
Add required (*) indicators	Required field indicators were added to registration forms.
Improve UUM branding	Logo and colour scheme were redesigned according to UUM identity.
Improve navigation	Sticky bottom navigation was implemented.
Strengthen privacy	Privacy explanation was included in the application.
Restrict messaging	Chat functionality was limited to connected users.

Prototype Improvements

Following the formative evaluation, several improvements were implemented to enhance the usability, functionality, and overall user experience of the UUM Buddy prototype. The refinement process was guided by the recommendations provided by the multimedia experts and was carried out using the iterative approach adopted throughout the Agile development process. The objective of these improvements was to ensure that the application better met users' needs before proceeding to the summative evaluation.

The implemented improvements focused on several key aspects of the application. Enhancements to the user interface included the addition of mandatory field indicators to improve form clarity and reduce user errors during data entry. The navigation structure was also refined by incorporating a sticky bottom navigation bar, allowing users to access the application's primary features more efficiently. To strengthen the application's institutional identity, the logo and colour scheme were redesigned to align with Universiti Utara Malaysia's corporate branding. Furthermore, the chat functionality was also refined by restricting communication to connected users, thereby enhancing user privacy and creating a more secure communication environment.

These improvements resulted in a more intuitive, visually consistent, and user-friendly prototype that better reflected the requirements identified during the formative evaluation. The refined prototype subsequently served as the final version evaluated during the summative evaluation to determine its usability, functionality, and overall user acceptance. A summary of the expert recommendations and the corresponding improvements implemented in the prototype is presented in Table 2.

Table 2: Summary of Expert Recommendations and Implemented Improvements

Expert Recommendation	Improvement Implemented
Add indicators for mandatory input fields	Required field (*) indicators were added to relevant forms.
Improve navigation efficiency	Sticky bottom navigation was implemented for easier access to core features.
Strengthen institutional branding	The application logo and colour scheme were redesigned to align with UUM's corporate identity.
Improve communication privacy	The chat feature was restricted to connected users only.
Enhance overall interface consistency	Minor interface refinements were made to improve visual consistency and usability.

Summative Evaluation

The summative evaluation was conducted to assess the usability, functionality, and overall user acceptance of the refined UUM Buddy prototype. A total of 31 Universiti Utara Malaysia (UUM) students participated in the evaluation after completing a series of predefined tasks using the application. Participants subsequently completed a structured questionnaire consisting of demographic information, prototype evaluation, overall satisfaction, and open-ended questions.

Respondent Demographics

The demographic profile of the respondents indicates that the majority of participants were female students (71.0%), while 29.0% were male. Most respondents were between 21 and 23 years old (51.6%), followed by those aged 24–26 years (29.0%), 18–20 years (16.1%), and above 26 years (9.7%). In terms of their role within the university, 74.2% were undergraduate students, while the remaining respondents consisted of postgraduate students, student representatives, alumni, vendors, and other university community members. The demographic distribution of the respondents is presented in Table 3.

Table 3 Demographic Profile of Respondents (n = 31)

Variable	Category	Frequency	Percentage (%)
Gender	Male	9	29.0
	Female	22	71.0
Age	18–20 years	5	16.1
	21–23 years	16	51.6
	24–26 years	9	29.0
	Above 26 years	3	9.7
Role at UUM	Undergraduate Student	23	74.2
	Postgraduate Student	2	6.5
	Student Representative	2	6.5
	Alumni	2	6.4
	Vendor Staff	1	3.2
	Others	1	3.2

The respondents also demonstrated a high level of familiarity with digital communication technologies. Approximately 58.1% of the participants reported spending more than four hours per day on social media, while only 16.1% used social media for less than one hour daily. Furthermore, WhatsApp (51.6%) was identified as the primary platform for academic communication, followed by UUM Online Learning (29.0%) and Telegram (9.7%), indicating that students currently rely on multiple independent platforms to manage their academic communication.

Table 4 Digital Communication Behaviour of Respondents

Variable	Category	Frequency	Percentage (%)
Daily Social Media Usage	Less than 1 hour	5	16.1
	1–3 hours	8	25.8
	4–6 hours	10	32.3
	More than 6 hours	8	25.8
Primary Academic Communication Platform	WhatsApp	16	51.6
	UUM Online Learning	9	29.0
	Telegram	3	9.7

	Instagram	2	6.5
	Webex	1	3.2

Prototype Evaluation

The prototype evaluation consisted of four major constructs: usability, user interface design, application functionality, and overall satisfaction. Overall, respondents expressed highly positive perceptions across all constructs, with the majority selecting "Agree" or "Strongly Agree" for almost every evaluation item.

For usability, respondents indicated that the application was easy to learn, simple to navigate, and provided clear interface elements. More than half of the participants selected the highest rating for statements related to navigation, icon recognition, and interface organisation, suggesting that the application successfully supported intuitive interaction and efficient task completion.

Similarly, the user interface design received favourable evaluations. Most respondents agreed that the application's colour scheme was visually appealing, the interface appeared modern, and the displayed information was organised logically. These findings indicate that the Human-Centred Design principles adopted during development contributed positively to the application's visual quality and usability.

The application functionality also demonstrated high user acceptance. Participants responded positively toward features such as the Home Feed, Community, Buddy Chat, Mentor Request, study material sharing, and centralized announcements. Notably, approximately 71% of respondents strongly agreed that the interaction features (such as Like, Follow, and Save), Buddy Chat, and study material sharing would be useful for supporting academic communication and collaboration. Likewise, 67.7% strongly agreed that the Mentor feature would assist students in obtaining academic guidance, highlighting the perceived value of integrating mentoring services into a centralised platform.

Overall satisfaction with the application was similarly encouraging. More than 60% of respondents strongly agreed that they were satisfied with UUM Buddy, while 67.7% believed that the application effectively addressed communication problems among UUM students. Furthermore, 64.5% agreed that the application could strengthen campus community engagement, 67.7% indicated that they would use the application if it were officially launched, and 74.2% strongly agreed that the application would be beneficial for the UUM community.

Table 5: Summary of Summative Evaluation Findings

Evaluation Construct	Overall Finding
Usability	Participants found the application easy to learn, navigate, and use.
User Interface Design	Respondents positively evaluated the application's visual appearance and information organisation.
Application Functionality	Core features such as Home Feed, Community, Buddy Chat, Mentor Request, and Announcements were perceived as useful and relevant.

Overall Satisfaction	Most respondents expressed satisfaction and indicated their willingness to use the application if officially implemented.
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Open-Ended Feedback

The qualitative responses further supported the quantitative findings. Many participants highlighted the application's clean interface, centralized communication, Buddy Chat, Community, and overall layout as their favourite features. Several respondents commented that integrating multiple communication functions within a single application would improve convenience and reduce dependence on multiple platforms.

Although the overall feedback was highly positive, participants also suggested several improvements for future development. The most frequently mentioned recommendations included the addition of push notifications, enhancements to the official announcement module, improvements to profile picture editing, and further refinement of the application's visual design. Most respondents also reported experiencing no significant difficulties while using the prototype, indicating that the application provided a generally smooth and intuitive user experience.

Discussion

This section discusses the findings of the formative and summative evaluations in relation to the study's objectives and previous literature. The discussion focuses on how the UUM Buddy prototype addresses the communication challenges identified during the needs analysis while supporting student engagement through an integrated digital platform rather than repeating the statistical findings presented in the results section. The discussion interprets their significance and highlights the practical implications of developing a centralized campus communication application for higher education.

Improved Campus Communication

The findings demonstrate that participants positively perceived UUM Buddy as a centralized platform for academic and institutional communication. The integration of multiple communication functions, including announcements, community discussions, and direct messaging, reduced the need for students to rely on several independent applications. These findings support previous studies that suggest integrated digital platforms improve communication efficiency and facilitate information sharing within higher education institutions. By consolidating essential communication services into a single application, UUM Buddy addresses the challenges of fragmented communication that commonly exist in university environments.

Student Engagement and Collaboration

The positive responses toward the Home Feed, Community, and Buddy Chat features indicate that UUM Buddy has the potential to strengthen student engagement and encourage collaborative learning. The application provides opportunities for students to share information, participate in academic discussions, and interact with their peers through a centralised platform. These findings are consistent with previous research demonstrating that educational social networking technologies promote knowledge sharing, collaborative

learning, and active participation among university students. The integration of communication and networking features within one application therefore contributes to a more connected and engaging campus environment.

Peer Mentoring Support

The Mentor Request feature was also positively evaluated by participants, suggesting that students recognise the value of having structured academic support within a centralized application. Previous studies have shown that peer mentoring contributes to students' academic adjustment, confidence, and overall university experience by providing guidance and encouraging meaningful interactions between experienced and new students. Integrating mentoring into UUM Buddy extends these benefits by providing students with an accessible platform for seeking academic assistance while strengthening peer relationships within the university community. Although shifting mentorship online dramatically improves accessibility, sustaining these relationships digitally requires structural platform configurations to avoid dropouts. Toreid et al. (2025) qualitative evaluation revealed that digital mentoring requires explicit institutional frameworks and safety guidelines—such as user validation and structured connection parameters—to prevent communication breakdown and protect participant boundaries.

Human-Centred Design

The favourable evaluations of the application's usability and interface design indicate that the adoption of Human-Centred Design principles contributed positively to the development of UUM Buddy. Participants generally found the application easy to learn, navigate, and interact with, reflecting the importance of designing systems that align with users' needs and expectations. These findings are consistent with Norman's Human-Centred Design principles, which emphasise affordance, discoverability, feedback, and usability as essential elements of effective interactive systems. The formative evaluation and iterative prototype refinement further supported the development of an intuitive interface that enhanced users' overall experience.

Practical Implications

The findings of this study provide practical implications for universities seeking to improve digital communication and student engagement. Rather than relying on multiple independent platforms for academic communication, institutions may benefit from implementing centralised applications that integrate announcements, student networking, mentoring, and community interaction within a single ecosystem. Such platforms can improve communication efficiency, strengthen collaboration among university communities, and support institutional digital transformation initiatives. Furthermore, the design and evaluation process presented in this study offers useful guidance for developers and higher education institutions interested in developing user-centred multimedia applications that address the evolving communication needs of university students.

Conclusion

This study aimed to design, develop, and evaluate UUM Buddy, a centralised social and academic networking application developed to address the fragmented communication

experienced by the Universiti Utara Malaysia (UUM) community. By integrating student networking, community engagement, peer mentoring, official announcements, and communication features within a single platform, the application sought to provide a more efficient and user-centred digital environment that supports academic interaction and campus engagement.

The findings from both the formative and summative evaluations indicate that the developed prototype was positively received by experts and target users. The formative evaluation provided valuable recommendations that improved the application's usability, interface design, navigation, branding, and privacy features through iterative refinement. Subsequently, the summative evaluation demonstrated positive user perceptions regarding the application's usability, functionality, interface design, and overall satisfaction. Participants agreed that the centralised platform could improve access to university information, facilitate communication among students, and strengthen collaboration and engagement within the university community.

This study contributes to the growing body of research on digital transformation in higher education by demonstrating the design and evaluation of a centralised campus communication platform that integrates multiple student services within a single multimedia application. The findings also provide practical guidance for higher education institutions and application developers seeking to develop user-centred communication platforms that enhance institutional communication and support student engagement.

Despite these contributions, this study has several limitations. The prototype was evaluated using a relatively small sample consisting primarily of Universiti Utara Malaysia students, which may limit the generalisability of the findings to other higher education institutions. In addition, the study focused on evaluating a high-fidelity prototype rather than a fully deployed application; therefore, long-term user behaviour and system performance in real-world environments were not examined.

Future research may extend this study by implementing UUM Buddy as a fully functional application integrated with university information systems and evaluating its effectiveness through larger and more diverse user populations. Additional features, such as push notifications, advanced personalization, enhanced security mechanisms, and artificial intelligence-based recommendation services, may also be incorporated to further improve user experience and support the evolving communication needs of higher education institutions.

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References

- Al-Qaysi, N., Granić, A., Al-Emran, M., Ramayah, T., Garces, E., & Daim, T. U. (2023). Social media adoption in education: A systematic review of disciplines, applications, and influential factors. *Technology in Society*, 73. <https://doi.org/10.1016/j.techsoc.2023.102249>
- Ansari, I. S., & Lu, H. Y. (2024). Democratizing software creation in higher education: The rise of low-code/no-code platforms for custom educational application design. *Computers & Education Open*, 6, Article 100174. <https://doi.org/10.1016/j.caeo.2024.100174>
- Cheong, B. C. (2024). Transparency and accountability in AI and smart systems: Safeguarding wellbeing in the age of algorithmic decision-making. *Frontiers in Human Dynamics*, 6, Article 1421273. <https://doi.org/10.3389/fhumd.2024.1421273>
- Dionne, L., & Pruneau, D. (2025). Promoting the wellbeing of students and the sustainability of a university campus: Solutions from a design thinking experiment. *International Journal of Sustainability in Higher Education*, 26(1), 1–17. <https://doi.org/10.1108/IJSHE-03-2025-0194>
- Le, H.-G., Sok, S., & Heng, K. (2024). The benefits of peer mentoring in higher education: Findings from a systematic review. *Journal of Learning Development in Higher Education*, (31), Article 1159. <https://doi.org/10.47408/jldhe.vi31.1159>
- Muda, T. Z. T., Wong, X. Y., & Teh, X. L. (2022). Designing a MobileApps: Savior. *Journal of Information System and Technology Management*, 7 (29), 178-185. <https://doi.org/10.35631/JISTM.729016>
- Mukred, M., Mokhtar, U. A., Hawash, B., AlSalman, H., & Zohaib, M. (2024). The adoption and use of learning analytics tools to improve decision making in higher learning institutions: An extension of technology acceptance model. *Heliyon*, 10(4). <https://doi.org/10.1016/j.heliyon.2024.e26315>
- Niță, V., & Guțu, I. (2023). The role of leadership and digital transformation in higher education students' work engagement. *International Journal of Environmental Research and Public Health*, 20(6), Article 5124. <https://doi.org/10.3390/ijerph20065124>
- Norman, D. A. . (2013). *The design of everyday things*. Basic Books.
- Sabah, N. M., & Altalbe, A. A. (2022). Learning Outcomes of Educational Usage of Social Media: The Moderating Roles of Task–Technology Fit and Perceived Risk. *Sustainability (Switzerland)*, 14(14). <https://doi.org/10.3390/su14148895>
- Saidin, A. Z., Yusoff, Y. M., Ropi, S. A. M. (2025). S3I: Towards a MobileBased Solution for Enhancing Sign Language Communication Between Parents and Children with Hearing Impairment. *Journal of Information System and Technology Management*, 10 (41), 390-404. <https://doi.org/10.35631/JISTM.1041025>
- Saidin, A.Z., Mohd Salmi, N.A.M., & Syukri, A.N. (2024). Padanan Pintar: A Game-Based Intervention in Regulating Sensoryand Emotional Overload in Children With ASD. *Journal of Creative Industry and Sustainable Culture*, 3 (7), 101-113. <https://doi.org/10.32890/jcisc2024.3.7>
- Singun, A. J. (2025). Unveiling the barriers to digital transformation in higher education institutions: A systematic literature review. *Discover Education*, 4(1), Article 37. <https://doi.org/10.1007/s44217-025-00430-9>
- Terrion, J. L., & Leonard, D. (2007). A taxonomy of the characteristics of student peer mentors in higher education: Findings from a literature review. *Mentoring and Tutoring: Partnership in Learning*, 15(2), 149–164. <https://doi.org/10.1080/13611260601086311>

- Terzieva, V., Ilchev, S., & Todorova, K. (2022). The Role of Internet of Things in Smart Education. IFAC-PapersOnLine, 55(11), 108–113. <https://doi.org/10.1016/j.ifacol.2022.08>
- Toreid, H. E., Sjølie, B. H. M., Bjørbæk, S. A., & Köhler, M. (2025). Digital peer mentoring in higher education: Results from a qualitative study involving digital part-time nursing students. Heliyon, 11(4), Article e42454. <https://doi.org/10.1016/j.heliyon.2025.e4245>