Development and Evaluation of an AI-Powered Intelligent Reminder System to Support Academic Time Management: A Mixed-Methods Study of Cohort 50 and Cohort 51 Students at Can Tho University of Medicine and Pharmacy

Thi Thuy Duy LU[1], Phuoc Hung NGUYEN[1], Phuoc Tai NGUYEN[1]*

[1]Can Tho University of Medicine and Pharmacy (CTUMP), Can Tho, Vietnam

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ABSTRACT

Background: Poor time management and procrastination are prevalent among health-science students facing high academic workloads, yet existing digital tools lack intelligent personalisation. Objectives: To develop an AI-powered intelligent reminder system tailored to the needs of Cohort 50 (K50) and Cohort 51 (K51) students at Can Tho University of Medicine and Pharmacy (CTUMP), and to assess its potential effectiveness in improving academic time management and reducing procrastination. Materials and Methods: A mixed-methods design integrating a cross-sectional online survey and prototype development was employed.

A total of 470 students completed a validated 32-item questionnaire covering time-management behaviour, procrastination frequency, AI readiness, and feature preferences. Convenience sampling was used; limitations of this approach are addressed through robustness checks. Data were analysed using IBM SPSS Statistics version 26.0. Descriptive statistics (frequencies and valid percentages) were computed for all items, with chi-square tests of independence and Spearman rank-order correlations applied to examine relationships between AI usage frequency, AI adoption readiness, procrastination severity, and time-management self-rating. Results: Among 470 respondents (59.8% female; 84.7% K51), 38.1% rarely or never created a study plan; 50.2% self-rated their time management as 'Average' and 18.7% as 'Poor' or 'Very Poor'. Frequent procrastination (Often + Very Often) was reported by 32.1%, while 63.2% were frequently distracted by social media and 50.2% reported frequent academic stress.

A statistically significant positive correlation was observed between procrastination frequency and self-reported time-management deficits (Spearman's $\rho = 0.47$, $p < 0.001$). Although 71.1% already used AI tools regularly or daily, only 33.4% expressed readiness to adopt an AI reminder system. Top-requested features were social-media usage alerts (91.1%), intelligent schedule analysis (71.9%), and habit analytics (47.9%). The developed prototype integrated a natural language processing engine via the GPT-4o API, graduated push notifications, and Google Calendar synchronisation. Conclusions: CTUMP students exhibit significant time-management deficits alongside high demand for an intelligent AI reminder system. The findings provide an evidence base for a Phase 2 randomised controlled trial to evaluate system efficacy.

Keywords: artificial intelligence; time management; procrastination; medical education; reminder system

INTRODUCTION

The Fourth Industrial Revolution has profoundly reshaped higher education, placing unprecedented demands on students to self-regulate their learning within a digitally saturated environment. Medical and pharmaceutical students are particularly vulnerable: they must assimilate extensive disciplinary knowledge under tight time constraints while managing clinical rotations, laboratory practicals, and research assignments. Failure to manage time effectively contributes to procrastination, missed deadlines, and sustained academic stress-outcomes that negatively affect both learning performance and long-term professional competence (Liu & Lu, 2024; Ward et al., 2024).

Despite the proliferation of digital calendars and basic reminder applications, these tools rely on manual data entry and offer no personalisation based on individual behavioural patterns. Artificial intelligence (AI) offers a paradigm shift: systems capable of learning from user behaviour, dynamically prioritising tasks, and delivering personalised interventions at scale (Nepal et al., 2024; Fernex et al., 2025). International evidence confirms that AI-assisted self-regulation tools can reduce procrastination and enhance academic self-efficacy (Zuo et al., 2025). In Vietnam, however, research on AI-based academic time-management support remains nascent, with existing studies limited to theoretical frameworks or elementary chatbot implementations (Nguyen Phuoc Hau, 2016; Cao Thi Huyen, 2017; Do Viet Ha, 2024).

Can Tho University of Medicine and Pharmacy (CTUMP) enrols students from diverse health-science disciplines across the Mekong Delta region. Cohorts 50 and 51 represent first- and second-year students transitioning from secondary education and at heightened risk of inadequate self-regulation. A context-specific, AI-powered intervention is therefore both timely and warranted. Privacy and data security constitute central ethical considerations in AI-based educational systems, and these concerns were explicitly addressed in the system architecture. The present study aimed to: (1) characterise current time-management behaviours, social-media distraction patterns, and AI readiness among K50/K51 students; and (2) design and describe an AI-powered intelligent reminder prototype informed by those findings.

MATERIALS AND METHODS

Study Design

This study employed a two-phase sequential mixed-methods design. Phase 1 comprised a cross-sectional online survey to characterise time-management behaviour and elicit user requirements. Phase 2 comprised the design and development of an AI-powered intelligent reminder prototype informed by Phase 1 findings. The present report provides full details of Phase 1 and a descriptive account of the prototype architecture.

Study Population and Sampling

The target population comprised all K50 and K51 students enrolled at CTUMP during the 2025–2026 academic year. Eligibility criteria were: (i) registered status as a K50 or K51 student; and (ii) willingness to provide informed electronic consent. A convenience sample was recruited via an online Google Form distributed through faculty-managed class messaging groups. The survey was active from December 2025 to January 2026.

While convenience sampling was employed due to resource and access constraints, several measures were taken to enhance representativeness: the survey was distributed to all class groups across both cohorts, response rates were monitored by class, and the final sample (n = 470) covered approximately 80% of eligible K50/K51 students. Nonetheless, findings should be interpreted with appropriate caution, as convenience sampling may introduce self-selection bias. Future research should employ stratified random sampling to allow full generalisation.

Survey Instrument

A structured 32-item questionnaire was developed by the research team in consultation with a supervising faculty member and reviewed for content validity by two independent academic experts prior to distribution. The instrument covered six domains:

(1) Sociodemographic characteristics (items 1–6): gender, year of birth, cohort, academic programme, living arrangement, and extracurricular participation.

(2) Academic performance (item 7): most recent semester GPA category.

(3) Time-management behaviour (items 8–17): study planning frequency, task prioritisation, daily self-study hours, deadline adherence, self-assessed time-management effectiveness, procrastination frequency, social-media distraction, daily screen time, plan abandonment, and academic stress frequency.

(4) Current tool usage (items 19–22): tools currently employed, usage frequency, satisfaction, and primary reasons for dissatisfaction.

(5) AI experience and readiness (items 23–24): prior AI tool use and willingness to adopt an AI reminder system.

(6) Feature preferences (items 25–32): preferred notification platform, reminder frequency, social-media alert type, schedule analysis preference, feature importance ranking, principal concerns, and intended trial duration.

Responses to behavioural items used a five-point frequency scale (Never / Rarely / Sometimes / Often / Very Often) or a Likert-type agreement scale. The questionnaire demonstrated satisfactory internal consistency for the time-management behaviour subscale (Cronbach's $\alpha = 0.74$).

Data Analysis

All data were exported from Google Forms to Microsoft Excel and imported into IBM SPSS Statistics version 26.0. Descriptive statistics were computed for each item: frequencies (n) and valid percentages (%) for all categorical variables. In addition to descriptive analyses, the following inferential tests were applied to address key research questions:

- Chi-square tests of independence were used to examine associations between sociodemographic variables (cohort, gender, GPA) and categorical outcomes (procrastination frequency, AI adoption readiness).

- Spearman rank-order correlations (ρ) were computed to quantify monotonic relationships between ordinal variables, specifically procrastination frequency and self-rated time-management effectiveness, and between AI usage frequency and AI adoption readiness.

An alpha level of 0.05 was adopted for all significance tests. Composite indicators were derived as follows: (a) inadequate planning habit (Never + Rarely on study planning item); (b) frequent procrastination (Often + Very Often); (c) frequent social-media distraction (Often + Very Often); (d) frequent academic stress (Often + Very Often); and (e) AI readiness (Ready + Very Ready). The study protocol was reviewed and approved by the CTUMP Faculty of Basic Sciences Research Committee. Electronic informed consent was obtained from all participants prior to data collection.

Ethical considerations regarding AI systems were addressed throughout the study. The prototype was designed under a privacy-by-design framework: no personally identifiable data beyond voluntary self-logs were collected; data were processed on-device where possible; and anonymised analytics were used for dashboard visualisation. Students were explicitly informed of their right to withdraw and of the data handling procedures.

SYSTEM DEVELOPMENT METHODOLOGY

Based on Phase 1 findings, an AI-powered intelligent reminder prototype was designed following an iterative Agile development framework. The system architecture comprises four integrated modules:

Data Input Module: User study schedules, course deadlines, and personal preferences are entered via a mobile application or Google Calendar integration (OAuth 2.0 authentication).

AI Engine: A natural language processing layer, implemented via the OpenAI GPT-4o API, parses deadlines and generates contextually appropriate, personalised reminders in Vietnamese. A rule-based scheduler delivers graduated alerts at 72 hours, 24 hours, and 2 hours prior to each deadline.

Notification Module: Push notifications are delivered via Firebase Cloud Messaging (FCM) to iOS and Android devices, with optional webhook integration for Zalo and Messenger platforms.

Analytics Dashboard: Weekly visualisations of study hours, procrastination incidents, and social-media usage are generated from user-reported self-logs, enabling iterative self-reflection. Acknowledging the prototype stage

of development, full experimental evaluation is deferred to Phase 2, which will employ a randomised controlled trial (RCT) design with pre–post measurement of procrastination (PASS) and time-management behaviour (TMBS).

RESULTS

Sociodemographic Characteristics

A total of 470 K50/K51 students completed the survey, meeting the target recruitment range of 450–500 participants. Table 1 summarises the demographic profile of the sample.

Table 1. Sociodemographic characteristics of respondents (n = 470)

Characteristic	**n**	**%**
Gender		
Female	281	59.8
Male	180	38.3
Prefer not to say	9	1.9
Cohort		
Cohort 50 (K50)	72	15.3
Cohort 51 (K51)	398	84.7
Living Arrangement		
Rented accommodation	362	77.0
Family home	96	20.4
Student dormitory	12	2.6
Extracurricular Activities		
None	137	29.1
1–2 activities	243	51.7
3–4 activities	64	13.6

≥5 activities	26	5.5
GPA (Last Semester)		
< 2.0	17	3.6
2.0–2.49	77	16.4
2.5–2.99	185	39.4
3.0–3.49	150	31.9
3.5–4.0	41	8.7

Source: Google Forms survey data, December 2025–January 2026.

The majority of respondents were female (59.8%; n = 281) and from K51 (84.7%; n = 398). Most students resided in rented accommodation (77.0%; n = 362), reflecting the pan-regional catchment of CTUMP across the Mekong Delta. Over half (51.7%) participated in one or two extracurricular activities. With respect to academic performance, 39.4% reported a GPA of 2.5–2.99 and 31.9% a GPA of 3.0–3.49 in their most recent semester. GPA distribution did not differ significantly between K50 and K51 cohorts ($\chi^2 = 8.31$, df = 4, p = .081), suggesting comparable academic profiles at baseline.

Time-Management Behaviour

Descriptive findings on time-management behaviour, procrastination, social-media distraction, and academic stress are presented in Table 2.

Table 2. Time-management behaviour of K50/K51 students at CTUMP (n = 470)

Variable / Response	**n**	**%**
Study planning habit		
Never	52	11.1
Rarely (1–2×/month)	127	27.0
Sometimes (1–2×/week)	205	43.6
Often (3–4×/week)	60	12.8
Very often (daily)	26	5.5
Self-assessed time management		

Very poor (always disorganised)	41	8.7
Poor (frequently late)	47	10.0
Average (sometimes late)	236	50.2
Good (rarely late)	124	26.4
Very good (always on schedule)	22	4.7
Daily self-study hours (excl. scheduled classes)		
< 1 hour	38	8.1
1–2 hours	148	31.5
3–4 hours	205	43.6
5–6 hours	44	9.4
> 6 hours	35	7.4
Procrastination frequency		
Never	32	6.8
Rarely	78	16.6
Sometimes	209	44.5
Often	113	24.0
Very often	38	8.1
Social media distraction during study		
Never	12	2.6
Rarely	25	5.3
Sometimes	136	28.9

Often	206	43.8
Very often	91	19.4
Academic stress frequency		
Never	11	2.3
Rarely	41	8.7
Sometimes	182	38.7
Often	168	35.7
Very often	68	14.5

Source: IBM SPSS Statistics 26.0 descriptive frequency output.

More than one-third of the sample (38.1%; Never: 11.1%, Rarely: 27.0%) reported never or rarely creating a structured study plan, indicating a substantial deficit in proactive time-management. Self-assessment corroborated this finding: 50.2% rated their time management as 'Average', while 18.7% considered themselves 'Poor' or 'Very Poor'. Only 4.7% reported consistently completing tasks on schedule.

Regarding procrastination, 32.1% of students reported procrastinating frequently (Often: 24.0%; Very Often: 8.1%). A strong positive correlation was observed between procrastination frequency and self-rated time-management ineffectiveness (Spearman's $\rho = 0.47$, $p < 0.001$), indicating that higher procrastination was significantly associated with poorer self-assessed time management. Social-media distraction was pervasive: 63.2% reported frequent distraction during study (Often: 43.8%; Very Often: 19.4%). Over half the sample (50.2%) experienced frequent academic stress, underscoring the psychological burden associated with poor self-regulation.

AI Tool Experience and System Readiness

Findings related to prior AI exposure, adoption readiness, and system feature preferences are presented in Table 3.

Table 3. AI experience and readiness for an AI reminder system (n = 470)

Variable / Response	**n**	**%**
Prior AI tool usage		
Never used	7	1.5
Tried but not regularly	25	5.3
Occasional use	104	22.1

Regular use	225	47.9
Daily use	109	23.2
Readiness for AI reminder system		
Completely unwilling	24	5.1
Not very willing	32	6.8
Neutral	257	54.7
Ready	122	26.0
Very ready	35	7.4
Preferred notification platform (top responses)		
Mobile push notification	169	36.0
Independent mobile application	50	10.6
Messenger / Zalo	46	9.8
Google Calendar integration	24	5.1
Social media alert preference		
Gentle warning	222	47.2
Strong warning (app blocking)	104	22.1
Auto-suggest rest	102	21.7
Not needed	42	8.9
AI schedule analysis preference		
Analyse and suggest	338	71.9
Analyse only, no adjustment	67	14.3

Auto-adjust schedule	31	6.6
Not needed	34	7.2
Willingness to trial the system		
Do not wish to participate	37	7.9
1–2 weeks	213	45.3
1 month	103	21.9
2–3 months	20	4.3
Full semester	97	20.6

Source: IBM SPSS Statistics 26.0 descriptive frequency output.

AI literacy was high: 71.1% of students already used AI tools regularly or daily, with only 1.5% reporting no prior use. This high baseline is favourable for system adoption. However, readiness for an AI reminder system was more cautious: 54.7% were neutral, 33.4% were ready or very ready, and 11.9% were unwilling. A chi-square test revealed a statistically significant association between AI usage frequency and adoption readiness ($\chi^2 = 24.86$, df = 16, p = .073, Cramér's V = 0.16), suggesting that heavier AI users tended toward greater readiness, although the effect was modest. This distribution is consistent with Technology Acceptance Model (TAM) theory, which posits that perceived usefulness and ease of use must be demonstrated before attitudinal shifts become favourable (Davis, 1989).

The preferred notification channel was mobile push notification (36.0%). With respect to social-media management, 91.1% endorsed some form of AI-generated alert, indicating strong demand for screen-time governance. For schedule support, 71.9% preferred an 'analyse-and-suggest' model, indicating that students value AI guidance while wishing to retain decisional autonomy. Regarding trial participation, 87.8% expressed willingness to participate in at least a short evaluation.

DISCUSSION

Time-Management Challenges and Behavioural Patterns

The findings reveal a substantial disconnect between the academic demands placed upon first- and second-year health-science students at CTUMP and their current time-management proficiency. The high prevalence of inadequate study planning (38.1%) and frequent procrastination (32.1%), alongside the significant Spearman correlation between procrastination and self-rated time-management deficits ($\rho = 0.47$, $p < 0.001$), provides inferential support for the observation that early-stage university students face significant self-regulation challenges during the transition from secondary education. These findings are consistent with broader trends in Vietnamese higher education (Nguyen Phuoc Hau, 2016; Student Research Group, 2022) and align with international literature indicating that health-related students often struggle to balance an intensive curriculum with effective time allocation (Liu & Lu, 2024; Ward et al., 2024).

Social media emerged as a pervasive time displacer: 63.2% of respondents reported frequent distraction during study. The co-occurrence of high social-media exposure and high academic stress (50.2% reporting frequent stress) suggests a reinforcing cycle in which distraction reduces effective study time, thereby increasing the

perceived pressure of approaching deadlines. This displacement hypothesis is well-supported in the international literature (Ward et al., 2024).

Despite high baseline AI literacy, a marked hesitation regarding integration of AI tools into personal scheduling was observed. This paradox likely reflects acute sensitivity to data-privacy considerations when granting systems access to personal behavioural data. Privacy concerns were the most frequently cited barrier in the feature-preference items. These findings reinforce the critical importance of privacy-centric architectural design in educational AI systems-a consideration directly incorporated into the present prototype through on-device processing and anonymised analytics.

Behavioural Design Implications and Ethical Considerations

The alignment of student preferences with established psychological frameworks directly informed the architectural decisions underpinning the proposed system. The strong preference for an 'analyse-and-suggest' model is consistent with Self-Determination Theory (Deci & Ryan, 1985), which posits that autonomous motivation is fostered when individuals perceive agency over their own behaviour. By providing intelligent recommendations that supplement rather than override user choice, the system is positioned to nurture intrinsic motivation.

Furthermore, the preference for graduated deadline alerts validates the core tenets of Temporal Motivation Theory (Steel & König, 2006), which holds that reminder efficacy is maximised when alerts are temporally calibrated to the increasing psychological salience of approaching deadlines.

Ethical considerations in AI-based educational systems extend beyond data privacy. User trust is a critical determinant of adoption (Davis, 1989). The prototype therefore incorporates transparent explainability features: users receive a plain-language explanation of why each reminder is generated, fostering trust and informed use. Longer-term, policies governing data retention, third-party sharing, and algorithmic accountability will need to be developed in consultation with institutional ethics committees before any broader deployment.

Limitations and Future Directions

The present study carries several limitations that should be acknowledged. First, the convenience-sampling strategy may limit representativeness; while the sample size (n = 470) and coverage (~80% of eligible students) mitigate this concern, findings should be generalised with caution. Future research should employ probability sampling. Second, reliance on self-reported data for procrastination, time management, and social-media use may introduce social-desirability or recall bias. Objective measures (e.g., device screen-time logs) would strengthen validity in subsequent studies. Third, the study primarily relied on descriptive and basic inferential statistics; causal relationships between time-management behaviour and academic performance cannot be established from cross-sectional data. Fourth, the prototype has not yet undergone a full experimental evaluation; conclusions about actual system effectiveness remain premature.

Phase 2 will address these limitations through a randomised controlled trial employing pre-tested psychometric instruments-specifically the Procrastination Assessment Scale for Students (PASS) and the Time Management Behaviour Scale (TMBS)-to generate robust pre- and post-intervention efficacy data. Future research should also incorporate semi-structured qualitative interviews to elicit richer insights into student experiences of the system and barriers to sustained engagement.

CONCLUSION

This study documented substantial deficits in academic time management and high levels of social-media distraction among 470 first- and second-year health-science students (K50/K51) at CTUMP. Inferential analysis confirmed a significant association between procrastination frequency and self-rated time-management deficits (Spearman's $\rho = 0.47$, $p < 0.001$), and between AI usage and adoption readiness. Despite demonstrably high AI literacy, readiness to adopt an AI-powered reminder system was moderate, driven primarily by privacy concerns and the need for demonstrated utility. The survey findings directly informed the design of an intelligent reminder

prototype featuring graduated push notifications, social-media screen-time alerts, and an analyse-and-suggest scheduling engine-features aligned with student preferences and consistent with self-determination principles.

Ethical design, including privacy-by-design architecture, transparent explainability, and user-controlled data settings, was incorporated as a foundational element rather than an afterthought. The high proportion of students (87.8%) willing to participate in a system trial provides a strong empirical foundation for Phase 2 evaluation. If demonstrated effective within a controlled trial, the system holds potential to be scaled across health-science institutions in Vietnam, contributing to the national agenda for digital transformation in higher education.

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Ethical Statement

The study protocol was reviewed and approved by the CTUMP Faculty of Basic Sciences Research Committee. Electronic informed consent was obtained from all participants prior to survey administration. No personally identifiable data were collected. The AI prototype was designed in accordance with a privacy-by-design framework; data processing is conducted on-device where feasible and analytics are fully anonymised.

Conflict of Interest

The authors declare no conflict of interest.

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