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ENGINEERING STUDENTS' PERCEPTIONS OF MOBILE-ASSISTED LANGUAGE LEARNING FOR ENGLISH TERMINOLOGICAL COMPETENCE IN KAZAKHSTAN

Abstract. This study investigates engineering students' perceptions of the contribution of Mobile-Assisted Language Learning (MALL) tools to English terminological competence in Kazakhstan. The findings are interpreted through the Technology Acceptance Model (TAM), Self-Regulated Learning (SRL) Theory, and Mobile Learning Theory as theoretical frameworks. A quantitative survey design with supplementary open-ended responses was employed. The final analytic sample comprised 132 adult first- and second-year engineering students studying at higher education institutions in Kazakhstan after all responses from participants younger than 18 were excluded. Quantitative data were analysed using descriptive statistics, while qualitative responses were examined through thematic analysis. The findings indicate that students generally perceive MALL tools as beneficial for learning technical English terminology. Nearly half of the respondents reported daily use of mobile learning applications, with ChatGPT, Quizlet, Grammarly, and Google Classroom among the most frequently used tools. Students reported perceived benefits for understanding technical definitions, using engineering terminology accurately, and supporting academic writing. However, several challenges were identified, including the linguistic complexity of AI-generated explanations, limited access to digital resources, and insufficient pedagogical guidance. Students also described planning and monitoring behaviours consistent with aspects of self-regulated learning, whereas evidence of reflective evaluation was less consistent. The study highlights the importance of integrating mobile learning tools into English for Specific Purposes (ESP) curricula and providing students with structured AI literacy training. As the study relies on self-report data and descriptive analysis, its findings concern perceived contribution rather than objectively measured development of terminological competence.

Keywords: artificial intelligence, engineering education, English terminology, mobile-assisted language learning, self-regulated learning, technology acceptance model

Introduction

Higher education has been transformed by digital content, altering how students access, process, and apply knowledge. As English becomes the primary language of instruction in technical specialisations across non-English-speaking countries, learning English becomes compulsory, and helping students acquire English terminology related to their fields is also crucial. English plays a central role in computer engineering for academic communication, programming, publications, and collaboration (Burston, 2015). In Kazakhstan, internationalisation and trilingual education require engineering students to master professional and technical English terminology (Eleshova et al., 2021). In engineering education, terminological accuracy is both a linguistic and an epistemological concern. Students must not only recognise terms but also use, define, and contextualise them within disciplinary discussions and problem-solving. The difference between terminology competence and vocabulary size is largely overlooked in current research on English for Specific Purposes (ESP). Higher education reforms in Kazakhstan currently focus on strengthening international competitiveness and introducing technical education in English. However, there is limited research

on how engineering undergraduates utilise mobile tools for discipline-specific English learning. This gap highlights the importance of the present study.

Mobile-Assisted Language Learning (MALL) is commonly understood as a form of language learning supported by smartphones, mobile applications, and portable digital devices (Kukulska-Hulme, 2020; Miangah & Nezarat, 2012). Previous studies have examined the effectiveness, advantages, and limitations of MALL in foreign language learning. MALL is considered an effective approach to foreign language learning because it enables learners to access applications anytime and anywhere and can increase motivation through interactive features (Miangah & Nezarat, 2012). In this context, MALL has become an important part of the digital shift in language education (Kukulska-Hulme, 2020). AI tools such as ChatGPT, writing aids such as Grammarly, vocabulary platforms like Quizlet and Anki, and systems such as Moodle and Google Classroom facilitate immediate access to resources, feedback, and contextual learning (Kasneci et al., 2023; Zawacki-Richter et al., 2019). For language learners, mobile applications can support vocabulary development by providing repeated exposure, immediate feedback, and flexible access to learning materials.

While digital tools are widely adopted, their specific pedagogical benefits and challenges in technical English instruction within engineering education in Kazakhstan remain insufficiently explored.

Previous studies in mobile learning and AI-assisted language education have mainly focused on general English proficiency, including vocabulary development, grammar support, and learner engagement (Burston, 2015; Godwin-Jones, 2017; Kaceti & Klimova, 2019). However, engineering students require specific language competence. This skill does not simply involve memorising words; it also involves understanding specific definitions, identifying disciplinary counterparts across languages, writing and speaking terms in an academically correct manner, and interpreting complex engineering concepts in English.

Language competence is important in engineering and technology fields, where a single misunderstood technical term can lead to serious conceptual or real-world misapplications. Unlike general language, technical terms are often context-specific, semantically dense, and embedded within specialised discourse communities. Therefore, effective learning of technical terminology requires not only exposure but also deliberate practice, metacognitive regulation, and contextual application (Zhang, 2015).

Nonetheless, although some empirical research in Kazakhstan has examined English learners' proficiency in general education, there has been limited focus on the development of discipline-specific terminology within STEM-themed programmes (Jantassova et al., 2024). There are even fewer studies that have examined how mobile technology and AI-generated tools can contribute to learning engineering technical terms.

Reform of higher education in Kazakhstan through the Bologna Process has focused on academic mobility and the transition to English as the language of instruction. Nevertheless, issues of English proficiency and limited practice with authentic technical language remain in engineering programmes.

Mobile learning can help address these difficulties by offering portability, personalisation, and immediate access to learning resources (Kukulska-Hulme, 2020). AI tools can generate explanations, support simulated dialogues, and provide instant corrective feedback. Furthermore, apps such as Anki use spaced repetition to support the long-term retention of domain-specific vocabulary (Godwin-Jones, 2017).

However, adopting technology does not inherently ensure effective learning outcomes. Students' perceptions, motivations, and self-regulatory skills significantly influence technology use (Venkatesh & Davis, 2000).

The purpose of this research is to investigate engineering students' use of MALL applications and their perceptions of how these tools contribute to English terminological competence at Kazakhstani universities. Using a quantitative cross-sectional survey supplemented by open-ended responses, the study examines students' perceptions of MALL, the challenges they encounter, and the self-regulated learning behaviours they describe during independent use of mobile tools.

This study addresses the following three research questions:

- How do engineering students perceive the contribution of MALL to their English terminological learning?
- What technical, language-related, and pedagogical challenges do learners encounter?
- How do students describe self-regulated learning behaviours during independent use of MALL tools?

This study uses three theoretical perspectives as interpretive frameworks: Self-Regulated Learning (SRL) Theory, the Technology Acceptance Model (TAM), and Mobile Learning Theory.

These frameworks help interpret the descriptive findings, but their constructs and relationships are not formally measured or statistically tested.

Self-Regulated Learning Theory views learning as a circular process that includes forethought, performance control, and self-reflection (Zimmerman & Schunk, 2001). In this theory, successful learners regulate their learning by setting goals, monitoring performance, applying appropriate strategies, and reflecting on outcomes. Independent use of MALL tools may involve behaviours such as self-testing, planning, and metacognitive monitoring.

The second interpretive framework is TAM, which proposes that perceived usefulness and perceived ease of use influence users' intention to adopt technology (Venkatesh & Davis, 2000). In this study, TAM is used only as a framework for understanding students' experiences with MALL. Its constructs were not measured using validated scales or examined through statistical testing.

Third, Mobile Learning Theory emphasises contextual mobility, personalisation, and anytime/anywhere access (Kukulka-Hulme, 2020). However, it also acknowledges that mobile learning environments may differ in quality and require pedagogical guidance.

Together, these frameworks help explain how students perceive the role of technology, learner autonomy, and discipline-specific language learning. They are used as interpretive perspectives rather than as a causal model tested in this study.

The three frameworks are therefore used heuristically to organise interpretation of the survey findings. No causal pathway, mediation, or moderation is proposed or tested. Technical access, linguistic complexity, and pedagogical guidance are treated as contextual challenges reported by participants rather than statistical moderators.

Materials and methods

This study employed a quantitative cross-sectional survey design supplemented by open-ended responses. The main dataset consisted of structured questionnaire responses, while the open-ended items were used to clarify students' perceptions, challenges, and recommendations. Therefore, the study is not presented as a full mixed-methods design, but as a quantitative survey with supplementary qualitative comments.

Responses were initially received from 184 students in engineering programs at five higher education institutions in Kazakhstan. They were recruited through convenience sampling, as the online questionnaire link was distributed electronically to accessible groups of first- and second-year engineering students at the participating institutions. During eligibility review, 52 respondents younger than 18 (ages 16-17) were identified. Because separate parental or guardian consent had not been obtained for these respondents, all under-18 records were excluded from both the quantitative and qualitative analyses. The final analytic sample therefore comprised 132 adult first- and second-year students aged 18-21 with varying levels of self-assessed English proficiency.

Data collection relied on a structured online questionnaire. This instrument contained 26 items, divided into six distinct sections. The full structure of the 26-item questionnaire is provided in Appendix A, Table A1. These sections covered demographic details, mobile device usage alongside preferred MALL tools, how participants felt mobile tools aided their learning of technical English terms, their self-regulated learning strategies, identified technical, linguistic, and pedagogical challenges, and open-ended recommendations. The questionnaire included multiple-choice questions, yes/no questions, open-ended questions, and one five-point numerical item measuring the perceived contribution of mobile tools to English technical terminology learning. The questionnaire was

presented in English and Kazakh to ensure that students could understand the items clearly. It was administered online during the teaching semester and was completed within one week. Participants were asked to complete the questionnaire on mobile devices or personal computers. All responses were automatically recorded in a spreadsheet for statistical analysis, and calculations were conducted using spreadsheet-based statistical functions.

The questionnaire was researcher-developed for this study and was not a previously validated multi-item scale. Its items were organized to correspond to the three research questions and the six survey domains shown in Table 1 and Appendix A. Because the instrument consisted mainly of categorical and open-ended items and contained only one five-point numerical item, a single internal-consistency coefficient for the questionnaire as a whole was not appropriate. The English-Kazakh bilingual version was used to support comprehensibility. No factor-analytic or other formal psychometric validation was conducted. Accordingly, the questionnaire is treated as a descriptive instrument, and no claim is made that it constitutes a validated measure of TAM, SRL, or terminological competence.

Table 1
Questionnaire Structure and Survey Focus

Section	Items	Focus
Demographic information	Q1-Q6	Gender, age, year of study, major, language of instruction, English level
Mobile learning use	Q7-Q10, Q25	Time spent on mobile devices, MALL tools, frequency and mode of use
Terminological competence	Q11-Q14, Q24	Understanding, defining, using, and explaining technical terms
Self-regulated learning	Q15-Q18	Goal setting, checking understanding, error analysis, independent learning
Challenges	Q19-Q23	Technical problems, AI explanation difficulty, terminology complexity, teacher guidance
Additional comments	Q26	Recommendations for university-level MALL integration

Descriptive statistical analysis was conducted. Descriptive statistics for categorical variables were presented as frequencies and percentages. For the five-point numerical item, the mean (M) and standard deviation (SD) were calculated as measures of central tendency and dispersion. To answer the third research question, students' responses related to self-regulated learning were analysed descriptively. The closed-ended item on goal-setting behaviour was presented through frequencies and percentages.

Open-ended questionnaire items from the retained adult participants were analysed thematically to clarify students' perceptions of MALL, their terminology-learning strategies, self-regulated learning behaviours, and suggestions for improving mobile learning integration. The analysis focused mainly on Q11-Q14, which examined students' perceptions of how mobile tools supported the understanding, definition, accurate use, and explanation of technical English terminology; Q16-Q17, which examined checking understanding and mistake analysis; Q23 and Q26, which asked students to suggest improvements and provide additional recommendations.

The thematic analysis was conducted in several stages. First, the adult-only open-ended responses were exported from the online questionnaire and read several times to become familiar with the data. Since the responses were written in English, Kazakh, Russian, and transliterated Kazakh, the meanings were interpreted in context, while the original wording was retained where direct quotations were used. Second, short non-substantive answers, such as blank responses, dots, dashes, and unclear answers, were separated from meaningful responses. Third, meaningful units were identified in each response. These units included repeated ideas such as using AI for definitions,

checking terminology through examples, using Grammarly for correction, comparing explanations from different sources, difficulties with complex AI-generated explanations, the need for teacher guidance, and problems with internet access. Fourth, initial codes were developed inductively from the students' responses. Similar codes were then grouped into broader themes. For example, codes such as "definitions," "translation," "examples," and "contextual explanation" were grouped under the theme of terminology understanding. Codes such as "checking answers," "using quizzes," "comparing sources," and "correcting mistakes" were grouped under self-regulated learning behaviours. Codes related to internet access, platform difficulties, unclear AI explanations, and lack of teacher instruction were grouped under challenges. Finally, the themes were checked against the three research questions and the theoretical framework of the study, particularly the TAM, SRL theory, and Mobile Learning Theory.

All qualitative coding was conducted by one researcher. To improve within-coder consistency, the adult-only responses were reviewed twice at different stages of the analysis. After the first round, initial codes were checked against the research questions and revised where necessary. During the second review, similar responses were checked for consistent placement, and unclear responses were not forced into categories. No second independent coder was used, and no inter-rater agreement or inter-rater reliability coefficient was calculated. The repeated review therefore served as a within-coder consistency check rather than evidence of inter-rater reliability. This limitation is acknowledged in the Discussion.

Ethical approval for the study was granted by Al-Farabi Kazakh National University (IRB-A1050, 6 February 2025). Participation was voluntary, and the online questionnaire was anonymous. No identifying personal information was collected. Before completing the questionnaire, participants were informed about the academic purpose of the study, the voluntary nature of participation, and the anonymity of their responses. During post-collection eligibility review, responses from participants younger than 18 were identified. Separate parental or guardian consent had not been obtained for these participants. Therefore, all 52 responses from under-18 participants were excluded from the revised quantitative and qualitative analyses. Only data from the final adult sample ($N = 132$; ages 18-21) are reported in this manuscript.

Results

The final analytic sample comprised 132 adult undergraduate engineering students from the participating higher education institutions in Kazakhstan. Descriptive statistics were used to examine students' use of MALL tools, frequency of use, perceived usefulness, and self-reported English terminological learning.

The demographic statistics show a relatively even distribution by year of study, with a slightly larger proportion of second-year students (52.3%) than first-year students (47.7%) (Table 2). There are more male (58.3%) than female students (40.2%), while 1.5% selected another gender response. The language of instruction was divided mainly between English (52.3%) and Kazakh (47.0%), with one respondent studying in Russian. Self-reported English proficiency was concentrated at the Pre-Intermediate (36.4%) and Intermediate (28.0%) levels. This distribution provides useful context for interpreting students' experiences with AI-generated explanations and technical terminology in English.

Table 2
Demographic Characteristics of Respondents ($N = 132$)

Variable	Category	Number	Percentage
Gender	Male	77	58.3
	Female	53	40.2
	Other	2	1.5
Year of Study	1st Year	63	47.7
	2nd Year	69	52.3

Language of Instruction	English	69	52.3
	Kazakh	62	47.0
	Russian	1	0.8
Self-Assessed English Proficiency	Pre-Intermediate	48	36.4
	Intermediate	37	28.0
	Elementary	21	15.9
	Beginner	12	9.1
	Upper-Intermediate	10	7.6
	Advanced	4	3.0

In addition to demographic information, students were asked which MALL tools they used for developing English technical terminology. Since Question 8 allowed multiple responses, the percentages exceed 100% (Table 3). The results show that ChatGPT was the most frequently used tool, followed by Quizlet, Grammarly, and Google Classroom. These data describe tool use in the sample and do not indicate learning effectiveness.

Table 3
MALL Tools Used by Respondents

MALL tool	Number of students	Percentage
ChatGPT	113	85.6
Quizlet	46	34.8
Grammarly	25	18.9
Google Classroom	23	17.4
Moodle mobile version	9	6.8
Duolingo	7	5.3
Anki	4	3.0
Knowt	0	0.0

RQ1: How do engineering students perceive the contribution of MALL to their English terminological learning?

To answer the first research question, students' responses to the item measuring the perceived contribution of mobile tools to English technical terminology development were analysed using descriptive statistics.

Table 4
Descriptive Statistics for Perceived Contribution to English Technical Terminology

Question	1	2	3	4	5	M	SD
To what extent have mobile tools helped you develop English technical terminology?	7	9	49	40	27	3.54	1.06

The mean score for the item on the perceived contribution of mobile tools to English technical terminology was above the midpoint of the five-point scale ($M = 3.54$, $SD = 1.06$). This result indicates a generally positive self-reported perception of MALL's contribution, not objectively measured development of terminological competence. The standard deviation also shows variation in students' perceptions.

Frequency of app use provides additional context for understanding students' engagement with MALL (Table 5).

Table 5

Frequency of MALL Tool Use

Frequency	Number of students	Percentage
Daily	63	47.7
Several times a week	39	29.5
Occasionally	18	13.6
Only when necessary	12	9.1
Total	132	100

Nearly half of the respondents (47.7%) reported using MALL tools daily, while 29.5% used them several times a week. This indicates that MALL was regularly used by many students in the adult analytic sample. However, frequency of use should not be interpreted as evidence of competence development or as a direct measure of TAM constructs. To supplement the quantitative results, adult-only responses to Q23 and Q26 were examined thematically. Because the qualitative coding was conducted by one researcher without independent inter-rater coding, the recommendation themes are reported qualitatively rather than as reliability-tested frequency counts.

Table 6*Themes in Adult Participants' Open-Ended Recommendations*

Theme	Illustrative focus in adult-only responses
Clearer / More Accessible Explanations	Request for clearer, simpler, or more accessible explanations and tool interfaces
Access to Resources / Platforms	Requests for recommended applications, university-supported platforms, or access to licensed/paid tools
Internet / Technical Infrastructure	Requests for stable Wi-Fi, reliable access, and technical support
Teacher Guidance / Training	Requests for guidance, workshops, or training for students and instructors
Curriculum Integration	Suggests to integrate mobile/AI tools and tasks into regular coursework

The adult-only recommendations clustered around recurring concerns about clearer explanations, access to learning resources, internet and technical infrastructure, teacher guidance, and curriculum integration (Table 6). Students also described perceived benefits of mobile tools for terminology learning. One student responded: "Mobile tools help me understand technical terms by providing simple explanations, translations, and examples. I often use them to quickly check meanings and see how terms are used in IT contexts." Another respondent wrote, "Yes. They provide precise definitions, show correct usage in context, and help avoid mistakes, which improves accuracy and consistency in academic writing." These comments illustrate perceived support for understanding and using technical terminology. They should not be interpreted as direct evidence of competence development.

Overall, the findings suggest a generally positive response to RQ1, namely that engineering students have positive perceptions of MALL and perceive it as useful for understanding and using English technical terminology. These findings represent students' self-reports rather than direct evidence of competence development.

RQ2: What technical, language-related, and pedagogical challenges do learners encounter?

Although students generally accepted MALL tools positively, the quantitative and open-ended responses also revealed several challenges.

Table 7

Challenges Encountered When Using MALL Tools

Challenge item	Response category	Number	Percentage
Technical problems, including internet issues, device limitations, or platform difficulties	No	67	50.8
	Yes	54	40.9
	Open-text response not recoded as Yes/No	11	8.3
Ease of understanding AI-generated explanations	Yes	62	47.0
	No	5	3.8
	Sometimes difficult	103	56.0
Technical terminology is too complex or overwhelming	Yes	31	23.5
	No	19	14.4
	Sometimes difficult	82	62.1
Sufficient instructor guidance on how to use mobile learning tools	Yes	77	58.3
	No	5	3.8
	Partially	50	37.9

Note. For Q19, 11 open-text responses could not be clearly classified as either Yes or No. Therefore, they are reported separately and were not recoded.

The results in Table 7 show that the main challenges were not limited to technical access. Almost half of the respondents (49.2%) reported that AI-generated explanations were sometimes difficult to understand, and 62.1% reported that technical terminology was sometimes complex or overwhelming. Although 58.3% reported receiving sufficient instructor guidance, 37.9% stated that guidance was only partial. These results indicate that linguistic complexity and pedagogical support remain important issues in students' use of MALL for technical English terminology.

Technical limitations, such as unreliable internet and restricted access to licensed platforms, can disrupt learning and reduce efficiency, even if they are not the primary barriers.

Language-related difficulties were also visible in the adult-only open-ended recommendations. One respondent requested "Better explanation", while another asked, "Can you humanize the speech of AI?" These comments are illustrative of concerns about accessibility and comprehensibility rather than prevalence estimates.

The predominance of Pre-Intermediate and Intermediate self-assessed proficiency levels provides useful context for interpreting students' reported difficulties with complex AI-generated explanations.

Previous research indicates that not all MALL resources meet high educational standards. Some applications emphasise entertainment rather than academic rigour, which may result in superficial learning outcomes. Furthermore, grammatical or translation inaccuracies in some language applications can contribute to increased learner errors, especially when students work with specialised terminology (Godwin-Jones, 2017; Kacetyl & Klimova, 2019; Murali et al., 2021).

Pedagogical barriers were also identified. Adult respondents requested guidance on effective use of mobile learning tools and stronger integration with coursework. One respondent wrote, "The university could provide more training on how to use mobile learning tools effectively and integrate them into courses. Better internet access and technical support would also be helpful." This comment illustrates the perceived need for institutional scaffolding alongside autonomous use.

Taken together, the adult-only qualitative comments reinforce the quantitative pattern that students' concerns involved access, comprehensibility, and instructional support. Because the qualitative analysis was conducted by a single coder, these themes are presented as interpretive patterns rather than independent frequency estimates.

These results answer RQ2 by identifying three main challenges in the adult analytic sample: technological access, the linguistic complexity of AI-generated content, and pedagogical guidance. These challenges reflect students' reported experiences with MALL rather than statistically tested causal or moderating effects.

RQ3: How do students describe self-regulated learning behaviours during independent use of MALL tools?

To answer the third research question, students' goal-setting behaviour and open-ended responses about independent mobile learning were analysed descriptively. The results show that most respondents reported behaviours consistent with some elements of self-regulated learning, but the evidence is based on self-report and should not be interpreted as a validated measure of SRL.

Table 8
Self-Regulated Learning: Goal-Setting Behaviour

Category	Count	Percentage (%)
Always set learning goals	60	45.5
Sometimes set goals	63	47.7
Rarely	8	6.1
Never	1	0.8
Total	132	100

As shown in Table 8, 45.5% of respondents reported that they always set learning goals when using mobile tools, while 47.7% stated that they sometimes set goals. Only 6.9% reported rarely or never setting goals. These self-reports suggest purposeful use for many respondents, but they do not establish the quality or effectiveness of students' goal-setting.

The adult-only open-ended responses showed three main self-regulated learning behaviours: planning, monitoring, and evaluation. Planning was reflected in students' use of mobile tools before exams, assignments, and technical writing tasks. Monitoring appeared when students checked AI-generated explanations, compared definitions from different sources, or used tools such as Grammarly to identify language problems. Evaluation was less consistent. Some students reported that they analysed mistakes and tried to understand why an answer was incorrect, while others admitted that they corrected or copied responses without deeper reflection.

Table 9
Patterns in Adult Participants' Mistake-Analysis Responses (Q17)

Response pattern	Description	Illustrative adult response
Analytic reflection	Compared answers, reviewed feedback, or sought reasons for errors	"Yes, I compare with the correct answer"
Correction / repetition	Repeated tasks, rewrote correct forms, or practised after an error	"Flashcards"
Vague / unclear response	Affirmed analysis or named a tool without explaining a process	"with AI"
Explicit non-analysis	Reported no mistake analysis	"No"

Note. Adult-only Q17 responses are reported qualitatively because all coding was conducted by one researcher without independent or inter-rater coding. Examples reproduce participants' wording.

Table 9 illustrates the range of adult participants' mistake-analysis responses. Some described explicit analytic reflection, such as comparing an incorrect answer with a correct one or seeking reasons for an error. Others described correction or repetition without clearly articulating evaluation,

gave only brief or unclear responses, or explicitly reported that they did not analyse mistakes. Accordingly, conclusions about reflective evaluation remain tentative.

Examples of clearer reflective evaluation were present in the adult-only responses.

One student wrote, “Yes, I analyze my mistakes by reviewing corrections and comparing my answers with the correct ones.” Another explained, “Yes, I analyze my mistakes by reviewing feedback, correcting my answers, and learning from explanations provided by mobile tools.”

Other adult responses were much less informative, including brief statements such as “Yes” or “with AI,” while some respondents explicitly answered “No.” This variation limits the strength of claims about reflective evaluation.

Students reported several planning and monitoring behaviours, such as using mobile devices to prepare for exams or deadlines and checking explanations against additional sources. These examples suggest that some respondents used MALL to support metacognitive aspects of learning. Reflective evaluation was less consistently reported.

Overall, students perceived MALL as useful for independent work with English technical terminology, particularly for planning learning activities and checking their understanding. However, these findings reflect reported SRL-related behaviours and should not be interpreted as evidence that MALL directly develops self-regulated learning. Teacher guidance may help students move beyond receiving corrections toward more critical evaluation of feedback.

Discussion

The findings of this study show that MALL tools were commonly used in this sample and were generally perceived as useful for English terminological learning. This finding is consistent with previous MALL research, which has shown that mobile technologies can support language learning by providing flexible access, repeated exposure, and opportunities for autonomous practice (Burston, 2015; Godwin-Jones, 2017; Kacetyl & Klimova, 2019; Kukulska-Hulme, 2020). In the present study, students frequently used tools such as ChatGPT, Quizlet, Grammarly, Google Classroom, Moodle, and Anki. From the perspective of TAM, this pattern can be interpreted as compatible with perceived usefulness, but TAM constructs were not formally measured or statistically tested (Venkatesh & Davis, 2000).

The study extends earlier MALL research by focusing on students’ perceptions of discipline-specific English terminology in engineering education rather than general vocabulary alone. Previous studies have often examined mobile learning in relation to vocabulary development, learner engagement, grammar support, or general language proficiency (Burston, 2015; Godwin-Jones, 2017; Kacetyl & Klimova, 2019; Kukulska-Hulme, 2020; Murali et al., 2021). Engineering students need not only to understand technical definitions but also to recognise specialised terms in professional contexts and use them appropriately in academic communication. The findings of this study show how students perceive MALL as supporting these needs through definitions, examples, translations, and writing assistance. However, the results reflect students’ perceptions rather than objectively measured improvement in terminological competence.

The results also correspond with studies on English for engineering and STEM education, which emphasise the importance of technical language for academic mobility, professional communication, and access to international knowledge (Jantassova et al., 2024; Zhang, 2015). In Kazakhstan, where higher education is increasingly shaped by internationalisation and multilingual education, English terminology becomes an important academic resource for engineering students. The present findings suggest that students perceived mobile and AI-supported tools as helping them address some difficulties associated with technical English. However, this support is not automatic. Students in the study also reported difficulties with complex AI-generated explanations, limited access to reliable digital resources, and insufficient teacher guidance. These findings are consistent with earlier concerns that mobile learning may lead to superficial understanding rather than deeper conceptual learning (Godwin-Jones, 2017; Kacetyl & Klímová, 2019).

The SRL findings also require cautious interpretation. Many adult participants reported setting goals, checking their understanding, and using mobile tools before exams, assignments, or technical

writing tasks. These behaviours are consistent with the planning and monitoring aspects of SRL (Zimmerman & Schunk, 2001). However, the adult-only open-ended responses showed uneven evidence of reflective evaluation. Some students described comparing answers, reviewing feedback, or seeking reasons for errors, while others described simple correction or repetition, gave vague responses, or explicitly reported no mistake analysis. These findings suggest that some students engage in SRL-related behaviours when using MALL, but they do not provide sufficient evidence to conclude that MALL develops higher-level metacognitive regulation.

Overall, the findings indicate that students perceive MALL as having pedagogical potential for English terminological learning in engineering contexts. Structured integration into ESP instruction may help students use mobile tools more critically through terminology tasks, bilingual technical resources, guided AI-literacy activities, and reflection. These recommendations follow from participants' reported experiences and should be tested in future outcome-based or experimental research.

This study has several limitations. First, it relies on self-reported survey data and descriptive analysis, so it measures perceived contribution rather than actual development of terminological competence. Second, convenience sampling from five participating higher education institutions, with a sample concentrated in first- and second-year engineering students, limits generalisability to engineering students across Kazakhstan. Third, TAM and SRL constructs were used as interpretive frameworks rather than validated scales and were not statistically tested. Fourth, the researcher-developed questionnaire did not undergo formal psychometric validation; consequently, its items should be interpreted as descriptive indicators rather than validated construct measures. Fifth, the qualitative coding was conducted by one researcher, with no independent second coder and no inter-rater agreement or reliability statistic. Repeated within-coder review supported consistency but cannot establish inter-coder reliability. Future research should use broader or probability-based sampling, objective terminology measures, validated theoretical scales, and multi-coder qualitative procedures where appropriate, as well as correlational, longitudinal, or experimental designs.

Conclusion

This study examined engineering students' perceptions of MALL for learning English technical terminology in Kazakhstan. The revised analysis drew on descriptive survey data and open-ended responses from 132 adult students after all under-18 responses were excluded. Overall, students expressed positive views of mobile and AI-supported language learning. Many also reported using these tools regularly for terminology learning and academic tasks.

From a TAM perspective, students' positive perceptions and reported use of MALL are broadly compatible with perceived usefulness. However, TAM constructs were not formally measured or statistically tested. Students reported using MALL to support their understanding and use of technical terminology through definitions, examples, translations, and writing assistance. These findings reflect students' perceptions rather than objectively measured gains in terminological competence.

Students also described planning and monitoring behaviours during independent learning. Evidence of reflective evaluation was less consistent across the adult-only qualitative responses: some participants described explicit comparison and error analysis, whereas others reported only correction, repetition, vague strategies, or no analysis. The findings therefore indicate some SRL-related behaviours but do not demonstrate that MALL develops self-regulated learning.

The findings have practical implications for ESP instruction. Mobile and AI-supported tools may be incorporated into terminology-learning activities alongside appropriate teacher guidance. Students may also benefit from AI-literacy training, reliable learning resources, and opportunities to evaluate AI-generated information critically. Future studies could use objective measures of terminology learning and validated measures of technology acceptance and self-regulated learning. Longitudinal or experimental research could also provide stronger evidence of learning outcomes.

Overall, the study provides contextual evidence of how engineering students in this sample perceive and use MALL for English terminology learning. It highlights both the potential benefits and challenges of mobile and AI-supported tools in discipline-specific language learning. The

findings should be interpreted in light of the descriptive, self-reported nature of the data and the study's sampling context.

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**ҚАЗАҚСТАНДАҒЫ ИНЖЕНЕРЛІК СТУДЕНТТЕРДІҢ АҒЫЛШЫН
ТІЛІНДЕГІ ТЕРМИНОЛОГИЯЛЫҚ ҚҰЗЫРЕТТІЛІГІНЕ МОБИЛЬДІ
ОҚЫТУДЫҢ ҚАБЫЛДАНАТЫН ҮЛЕСІ**

Андатпа. Бұл зерттеу инженерлік студенттердің мобильді көмекші тілді оқыту (MALL) құралдарының Қазақстандағы ағылшын терминологиялық құзыреттілігіне қосқан үлесі туралы түсініктерін зерттейді. Зерттеу нәтижелері теориялық негіз ретінде Технологияны қабылдау моделі (ТАМ), өзін-өзі реттейтін оқыту (SRL) теориясы және мобильді оқыту теориясы арқылы түсіндіріледі. Қосымша ашық жауаптары бар сандық сауалнама дизайны қолданылды. Кәмелетке толмаған респонденттердің деректері алынып тасталғаннан кейін, соңғы талдамалық іріктеме Қазақстандағы жоғары оқу орындарында оқитын 132 кәмелетке толған бірінші және екінші курс инженерлік студенттерден тұрады. Сандық деректер сипаттамалық статистиканы қолдану арқылы талданды, ал сапалық жауаптар тақырыптық талдау арқылы қарастырылды. Зерттеу нәтижелері студенттердің MALL құралдарын техникалық ағылшын терминологиясын үйрену үшін пайдалы деп санайтынын көрсетеді. Респонденттердің жартысына жуығы мобильді оқыту қосымшаларын күнделікті пайдаланатынын хабарлады, ал ең жиі қолданылатын құралдардың қатарында ChatGPT, Quizlet, Grammarly және Google Classroom бар. Студенттер техникалық анықтамаларды түсіну, инженерлік терминологияны дәл пайдалану және академиялық жазуды қолдау тұрғысынан пайдалы екенін атап өтті. Дегенмен, жасанды интеллект жасаған түсіндірмелердің лингвистикалық күрделілігі, сандық ресурстарға шектеулі қолжетімділік және педагогикалық басшылықтың жеткіліксіздігі сияқты бірнеше қиындықтар анықталды. Студенттер сондай-ақ өзін-өзі реттейтін оқудың кейбір аспектілеріне сәйкес жоспарлау және бақылау әрекеттерін сипаттады, ал рефлексивті бағалау туралы дәлелдер біркелкі болмады. Зерттеу мобильді оқыту құралдарын арнайы мақсаттарға арналған ағылшын тілі (ESP) оқу бағдарламаларына енгізудің және студенттерге құрылымдық жасанды интеллект сауаттылығын оқытудың маңыздылығын атап көрсетеді. Зерттеу өзін-өзі бағалау деректері мен сипаттамалық талдауға негізделгендіктен, оның нәтижелері терминологиялық құзыреттіліктің объективті түрде өлшенген дамуына емес, қабылданған үлеске қатысты.

Түйін сөздер: ағылшын терминологиясы, жасанды интеллект, инженерлік білім, мобильді көмекші тілді оқыту, өзін-өзі реттейтін оқыту, технологияны қабылдау моделі

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ВОСПРИНИМАЕМЫЙ ВКЛАД МОБИЛЬНОГО ОБУЧЕНИЯ В АНГЛОЯЗЫЧНУЮ ТЕРМИНОЛОГИЧЕСКУЮ КОМПЕТЕНЦИЮ СТУДЕНТОВ ИНЖЕНЕРНЫХ СПЕЦИАЛЬНОСТЕЙ В КАЗАХСТАНЕ

Аннотация. В данном исследовании изучаются представления студентов инженерных специальностей о вкладе мобильных приложений для изучения языков (MALL) в развитие англоязычной терминологической компетенции в Казахстане. Результаты интерпретируются с использованием модели принятия технологий (ТАМ), теории саморегулируемого обучения (SRL) и теории мобильного обучения в качестве теоретических основ. Использовался количественный опрос с дополнительными открытыми вопросами. После исключения данных всех несовершеннолетних респондентов итоговая аналитическая выборка составила 132 совершеннолетних студента первого и второго курсов инженерных специальностей, обучающихся в высших учебных заведениях Казахстана. Количественные данные анализировались с помощью описательной статистики, а качественные ответы изучались с помощью тематического анализа. Результаты показывают, что студенты в целом считают приложения MALL полезными для изучения технической терминологии на английском языке. Около половины респондентов сообщили о ежедневном использовании мобильных

обучающих приложений, среди которых наиболее часто использовались ChatGPT, Quizlet, Grammarly и Google Classroom. Студенты отметили преимущества для понимания технических определений, точного использования инженерной терминологии и поддержки академического письма. Однако был выявлен ряд проблем, включая лингвистическую сложность объяснений, сгенерированных ИИ, ограниченный доступ к цифровым ресурсам и недостаточное педагогическое руководство. Студенты также описывали поведение, связанное с планированием и мониторингом и соответствующее отдельным аспектам саморегулируемого обучения, в то время как свидетельства рефлексивной оценки были менее последовательными. Исследование подчеркивает важность интеграции мобильных инструментов обучения в учебные программы по английскому языку для специальных целей (ESP) и предоставления студентам структурированного обучения грамотности в области ИИ. Поскольку исследование основано на данных самоотчета и описательном анализе, его результаты касаются воспринимаемого вклада, а не объективно измеренного развития терминологической компетенции.

Ключевые слова: английская терминология, инженерное образование, искусственный интеллект, мобильное обучение языку, модель принятия технологий, саморегулируемое обучение

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