Tech-Assisted Language Learning (TALL) Among Khmer Students in the Mekong Delta

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ABSTRACT

This study examines the engagement of ethnic Khmer learners with Technology-Assisted Language Learning (TALL) in Vietnam's Mekong Delta, a region characterized by a complex multilingual environment and persistent socio-economic challenges. Employing a mixed-methods research design, the study integrates quantitative survey data with qualitative interviews conducted among students, teachers, and caregivers. The findings reveal a significant digital participation gap: despite high levels of learner motivation and widespread access to smartphones, the systematic adoption of TALL is constrained by infrastructural limitations, including unstable electricity supply and limited internet connectivity. Data analysis further indicates that while students engage enthusiastically with multimodal and gamified learning content, their oral language production remains restricted due to insufficiently scaffolded digital support. Although educators and caregivers strongly value English as a pathway to socio-economic mobility, they face substantial barriers, such as the lack of localized Khmer-language instructional resources, rigid curricular structures, and gaps in digital literacy. The study concludes that effective institutionalization of TALL in rural, minority-majority contexts requires approaches that move beyond technological provision alone, emphasizing inclusive bilingual design and integrated home - school support systems. These findings offer important implications for policymakers and educational technology developers seeking to promote equitable and sustainable digital learning ecosystems in Southeast Asia's multilingual regions.

Keywords: Khmer learners, digital literacy, multilingual education, Tech-Assisted Language Learning (TALL)

1. INTRODUCTION

In recent years, Tech-Assisted Language Learning (TALL) initiatives have increasingly gained traction within rural and multilingual contexts across Southeast Asia. In Vietnam, pilot projects targeting ethnic minority students particularly in the Central Highlands and Mekong Delta regions have demonstrated significant improvements in vocabulary retention, learner engagement, and home-based reinforcement (Nguyen & Pham, 2022). Specifically, mobile learning interventions involving Khmer students at Tra Vinh University provide a critical foundation for contextualizing the present research. Previous TALL implementations for Khmer learners have utilized SMS-based quizzes, localized mobile applications, and bilingual content to extend language acquisition beyond formal classroom settings. Often developed in collaboration with non-governmental organizations (NGOs) and teacher training colleges, these resources aim to mitigate gaps in instructional time and linguistic accessibility.

The efficacy of these projects has historically depended on their cultural and linguistic alignment, incorporating Khmer script, culturally familiar iconography, and examples rooted in the learners' lived environments. This study expands upon these efforts by investigating the differential effectiveness of such tools across diverse learner profiles, including variations in age, motivation, prior digital literacy, and cognitive learning preferences. Preliminary data from pilot TALL projects indicate that younger learners typically exhibit higher engagement with gamified, visually stimulating interfaces, whereas older students tend to prefer structured, trackable formats with clearly defined outcomes.

Consequently, this research examines how individual learner differences influence technological interaction, ranging from navigation strategies and time-on-task behaviors to perceived self-efficacy in language acquisition. Drawing upon Gardner's (1985) socio-educational model and Oxford's (1990) classification of language learning strategies, this study analyzes the intersection of integrative motivation, learner autonomy, and digital familiarity with the use of mobile tools. Furthermore, given the infrastructural constraints in Khmer-majority communities such as limited internet penetration and inconsistent electricity, this study evaluates the potential of offline-compatible and low-tech adaptations (e.g., audio-based content and peer-to-peer sharing) as equitable alternatives to mainstream platforms. Finally, particular emphasis is placed on the home-school nexus, exploring how parental involvement and intergenerational literacy gaps within Khmer families may shape the perception and adoption of digital learning technologies.

2. LITERATURE REVIEW

2.1. Tech-assisted language learning in Multilingual Contexts

Tech-Assisted Language Learning (TALL) has increasingly been recognized as a means to bridge educational gaps for linguistically marginalized populations (Reinders, H., and C. White, 2016). Particularly in Southeast Asia, mobile applications and localized digital content have become instrumental in providing scalable, equitable access to language resources, especially in areas where conventional classroom instruction may be limited due to language barriers, teacher shortages, or geographical isolation (Nguyen, T.M., and Q.H. Pham, 2020).

2.2. Khmer Language Apps and Mobile Tools

Several digital tools have been developed specifically for Khmer-speaking learners, most notably quiz-based mobile applications designed to promote vocabulary acquisition and general literacy. For instance, *Khmer Knowledge Quiz* (2023) and *Khmer Quiz Game* (2023) present knowledge-building content in Khmer using multiple-choice formats. These tools are particularly useful in rural areas due to their offline compatibility, intuitive interfaces, and cultural familiarity. Similarly, the *Hout* app (Hout, T.A., 2022) provides structured vocabulary modules and audio recordings, showcasing how open-source educational technology can address linguistic diversity at low cost.

These tools have been noted for enhancing learner engagement through game-based formats and community-generated content, yet their efficacy may vary based on user age, digital experience, and language proficiency - key variables that this study investigates.

2.3. Bilingual Content Development and NGO Support

Beyond standalone apps, broader initiatives involving teacher training colleges and NGOs have contributed to the development of bilingual instructional resources. The Battambang Teacher Education College (BTEC) offers Khmer-English bilingual instruction in language teaching methodology, often complemented by digital literacy training and culturally responsive curriculum design (BTEC, 2023) Such initiatives play a pivotal role in ensuring that language learning resources are pedagogically sound and culturally aligned, addressing not just what is taught but how it is taught in minority language contexts.

Organizations like the Teacher Development and Support Organization (TDSO) similarly promote learner-centered approaches and equip instructors with tools to integrate TALL into their classrooms (TDSO, 2025) The Cambodia Teacher Training Project (CTTP, 2024) also emphasizes preparation for under-resourced environments, highlighting the importance of low-cost, adaptable technology for language instruction in remote and disadvantaged regions.

2.4. Pedagogical Implications and Gaps

While these tools and programs reflect a growing movement toward inclusive TALL ecosystems in Khmer-speaking contexts, few studies have examined their differentiated impact across individual learner profiles. Most evaluations focus on generalized outcomes such as vocabulary retention or access improvement without accounting for learners' motivation, cognitive strategies, or sociocultural background. Moreover, the interplay

between home-based language practices, parental involvement, and digital literacy among Khmer families remains underexplored in empirical literature.

Therefore, this study builds on these initiatives by systematically analyzing how learner differences such as age, self-efficacy, and digital familiarity mediate the experience and effectiveness of TALL tools among Khmer students in Vietnam. The findings aim to extend the field's understanding of culturally responsive digital pedagogy through an equity lens.

2.5. Learner Diversity and the Limitations of Generalized TALL Evaluations

While the expansion of TALL initiatives has yielded promising results in vocabulary acquisition, access equity, and learner engagement, much of the existing literature tends to report aggregate outcomes without disaggregating data by learner characteristics (Nguyen, T.M., and Q.H. Pham, 2020). This generalized approach overlooks how individual learner differences such as motivation, cognitive strategies, and sociocultural background mediate the effectiveness of digital language tools.

A critical review by Ishida and Sekiyama analyzed 84 empirical studies and identified six key variables influencing learning motivation: psychological values, cognitive factors, social and environmental influences, demographic background, academic habits, and exposure to interventions. Their findings underscore the interconnectedness of cultural context and learner motivation, particularly in Eastern educational settings where collectivist values and familial expectations shape engagement with technology-enhanced learning environments (Ishida, A., and T. Sekiyama, 2024). Similarly, sociocultural theory posits that learners' cultural capital, language ideologies, and home literacy practices significantly influence how they interact with educational technologies (Vygotsky, L.S., 1978), (Reinders, H., and C. White, 2016). For example, students from oral storytelling traditions may respond differently to text-heavy apps than those from print-dominant cultures. Yet, few TALL studies explicitly account for these dynamics.

Moreover, learners' cognitive strategies such as metacognitive regulation, memory rehearsal, and affective control play a pivotal role in how they navigate and benefit from digital tools (Oxford, R.L., 1990). However, these internal processes are rarely measured in TALL evaluations, which often rely on surface-level metrics like quiz scores or app usage frequency.

Socioeconomic and cultural background also shape learners' access to technology, digital confidence, and parental support. Assumptions about home internet access or device ownership can inadvertently marginalize students from low-income or rural households (Behera, B., and S. Samal., 2021). This is particularly relevant for ethnic Khmer learners in Vietnam, whose educational experiences are shaped by both linguistic minority status and infrastructural disparities. In sum, while TALL holds transformative potential, its impact is not uniform. There is a pressing need for research that foregrounds learner variability, using frameworks that integrate motivation theory, sociocultural analysis, and cognitive strategy profiling. This study responds to that gap by examining how Khmer students' individual profiles shape their engagement with and outcomes from TALL interventions.

3. METHODOLOGY

3.1. Research Design

This study employs a mixed-methods design to explore how individual learner differences among ethnic Khmer students influence their use and outcomes with tech-assisted language learning (TALL) tools. This approach integrates both quantitative and qualitative data to provide a holistic view of learners' experiences, attitudes, and contextual challenges (Creswell, J.W., and V.L. Plano Clark, 2017). A case-informed adaptation of prior mobile learning initiatives in Vietnam serves as a guiding framework (Nguyen, T.M., and Q.H. Pham, 2020).

3.2. Research Setting and Participants

The study is conducted at Tra Vinh University, which serves a large population of Khmer learners and functions as a major educational and cultural hub in the Mekong Delta. The target population, therefore, includes

individuals who are directly involved in or influenced by Khmer learners' language education. This population comprises students, language teachers, and parents or guardians (caregivers), each representing a distinct yet interconnected perspective within the educational ecosystem.

Approximately 120 students from Freshman and Senior secondary levels were included to ensure representation across different stages of academic development. This range allows the study to capture variations in language proficiency, learning challenges, and identity negotiation over time.

A purposive sampling technique was employed to select adult participants who possess direct experience and informed perspectives relevant to the research objectives. Purposive sampling is appropriate for qualitative research where the goal is depth of understanding rather than statistical generalization.

- Language teachers (n = 8) were selected based on their active roles in teaching language subjects to Khmer learners and their years of professional experience. The number of eight teachers was considered sufficient to capture a range of pedagogical practices, beliefs, and classroom experiences while remaining manageable for in-depth qualitative analysis. In qualitative education research, a small number of expert participants is often adequate when participants are information-rich and share contextual familiarity.

- Parents or caregivers (n = 15) were included to incorporate perspectives from the home and community context, which plays a significant role in language maintenance, cultural transmission, and learners' attitudes toward schooling. A slightly larger group of caregivers was selected to reflect greater diversity in socio-economic background, language use at home, and levels of engagement with formal education. This number allows for pattern identification while still enabling detailed thematic analysis.

The selection of 8 language teachers and 15 caregivers was guided by methodological considerations of data saturation, feasibility, and triangulation. Data collection continued until recurring themes emerged and no substantially new insights were identified. Including multiple stakeholder groups strengthens the credibility of the study by enabling triangulation between student experiences, instructional practices, and familial influences. Overall, this sampling design ensures a balanced, contextually grounded, and methodologically robust examination of language learning experiences among Khmer learners at Tra Vinh University.

3.3. Data Collection Methods

The study sampled 120 student participants using purposive cluster sampling combined with total population sampling at the classroom level. Three Khmer-majority secondary school classrooms in the Mekong Delta were first purposively selected based on their ethnic composition and exposure to basic digital learning activities. All enrolled students in these classes were then invited to participate, resulting in a total sample of 120 learners. Data were collected through a structured bilingual survey adapted from Oxford's (1990) Strategy Inventory for Language Learning (SILL) and redesigned for digital contexts, administered in both Vietnamese and Khmer to ensure accessibility and comprehension. The questionnaire measured frequency of technology use, preferred learning modalities, and self-reported proficiency and motivation using Likert-scale items, and it was piloted with 10 students to enhance clarity and reliability. In addition, naturalistic classroom observations were conducted in the same classrooms to triangulate survey data, focusing on student engagement with digital tools, teacher scaffolding practices, and peer interaction during technology-based learning activities.

3.4. Data Analysis

Survey responses were analyzed using IBM SPSS Statistics (Version 26). Descriptive statistics were employed to examine relationships between learner variables (e.g., motivation, technology use, learning preferences) and reported TALL outcomes.

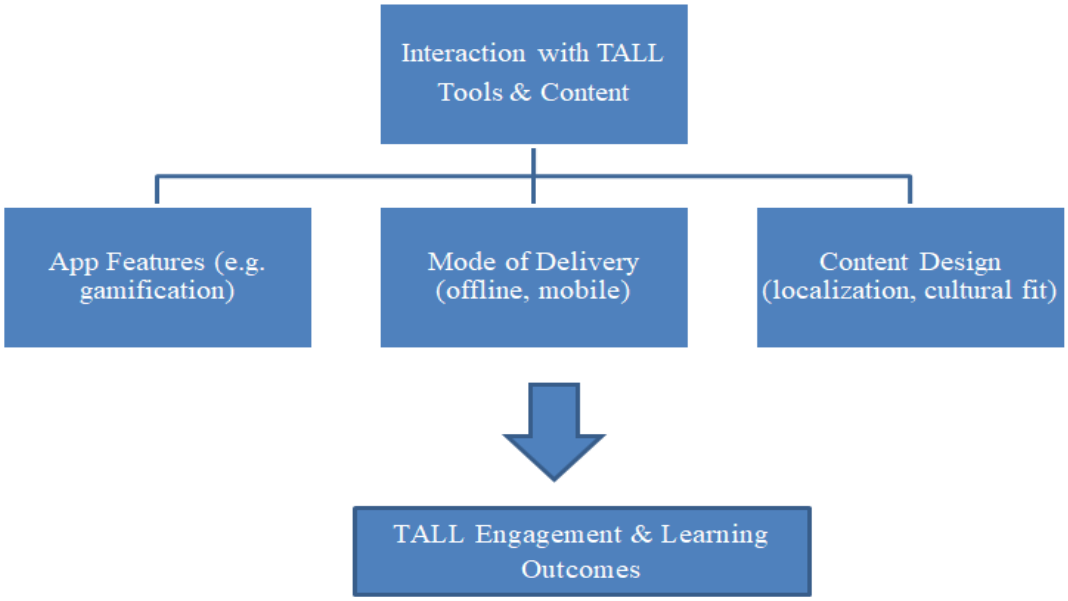
3.5. Ethical Considerations

All participants and guardians provide informed consent. Ethical approval is obtained from [Institutional Review Board or Ethics Committee]. Materials are provided in Khmer and Vietnamese. Anonymity is ensured through pseudonyms, and data is stored on encrypted devices.

3.6. Conceptual Framework

This study conceptualizes the interaction between individual learner differences and the design and delivery of TALL tools, and how this dynamic influences learning outcomes among ethnic Khmer students in Vietnam. The framework (Figure 3.1) positions learner characteristics as motivation, cognitive strategies, and sociocultural background as key mediators in the use and effectiveness of tech-assisted language learning platforms. These individual factors shape how learners perceive, engage with, and benefit from TALL, ultimately affecting language acquisition and learner agency.

Figure 3.1. Conceptual Framework: TALL and Learner Variability



Source: *Author's elaboration based on Oxford (1990), Gardner (1985), and Vygotsky (1978).*

- Learner Profiles: Include internal variables (motivation, cognition) and external factors (sociocultural context).

- TALL Tools: The learner's experience depends on how well app features, content design, and mode of delivery align with these profiles.

- Outcomes: Engagement levels, self-efficacy, and language acquisition differ significantly based on the match/mismatch between learner traits and technological affordances

4. FINDINGS AND DISCUSSIONS

The analysis revealed five overarching themes: digital learning habits, preferred modalities, confidence in language use, challenges encountered, and support systems.

4.1. Patterns of technology use for language learning

Students reported using mobile phones as their primary device for accessing Khmer learning content, predominantly through platforms such as YouTube, Facebook, and various language-learning apps. Students frequently turned to short-form video content with subtitles to reinforce vocabulary retention. *"I use my phone to watch Khmer cartoons and copy the words I hear."*

However, while access to smartphones was widespread, shared device use and limited internet connectivity were common barriers, particularly in rural households. The integration of mobile technologies into language education has garnered increasing attention in Southeast Asia, particularly in multilingual and rural contexts where traditional learning resources may be limited. Among these initiatives, the engagement of Khmer students at Tra Vinh University with technology-supported language learning presents a compelling case of how digital

tools are reshaping language acquisition. Drawing on descriptive statistics and observational data, this discussion unpacks the patterns of technology use, learner behavior, and pedagogical implications within the framework of mobile-assisted language learning.

4.2. Dominance of mobile phones and digital platforms

According to the provided data, 90% of participating students reported using mobile phones as their primary device for accessing Khmer learning content. This widespread reliance on smartphones is consistent with broader regional trends in mobile-first digital engagement, particularly in Vietnam's Mekong Delta region where infrastructure development remains uneven. The portability, affordability, and user-friendly interfaces of mobile phones make them an ideal channel for accessing educational resources.

In this study, learners accessed language content predominantly through platforms such as YouTube, Facebook, and dedicated language-learning apps. The preference for short-form video content with subtitles suggests an intuitive strategy for vocabulary acquisition combining visual cues, auditory input, and textual reinforcement to enhance retention. This behavior supports prior findings that multimedia input can strengthen lexical recognition and pronunciation accuracy (Nguyen & Pham, 2022).

4.3. Interpreting usage frequencies and preferences

Table 4.1. How students engaged with specific technological mediums.

Mediums	N	Mean	Std. Deviation	Interpretation
games	120	4.58	.560	Highest engagement; strong consistency
mobile apps	120	4.10	.824	Frequently used; moderate variation
Internet	120	3.89	.960	Regular access; diverse usage patterns
videos/Youtube	120	3.27	.914	Moderate engagement; high variation
apps not paper	120	2.85	.589	Least frequent; consistent among subset

Source: *Author compilation*

The highest mean score for games (4.58), coupled with the lowest standard deviation, indicates not only strong engagement but also consistent use across learners. This suggests that gamification may play a vital role in student motivation and sustained practice. Language-learning games often embedded in apps like Duolingo or Quizlet combine repetition with reward systems, making them particularly suitable for vocabulary drilling and grammar exercises.

Meanwhile, mobile apps (4.10) continue to be central to students' language learning routines. Though slightly more variable, their popularity underscores the critical role of app design, content relevance, and ease of access in determining user engagement. Students likely vary in their app choices depending on preferred features, such as speech recognition, interactive challenges, or social components.

The use of the Internet (3.89) reflects moderate connectivity and digital literacy, whereas video platforms like YouTube (3.27) demonstrate a more fragmented usage pattern. This lower score may stem from inconsistent content quality, language accessibility, or even bandwidth limitations in rural settings. Nevertheless, the ability to pause, replay, and annotate video materials allows learners to engage with real-world language input—an important scaffold for developing listening and comprehension skills.

Interestingly, the lowest mean score was recorded for "apps not paper" (2.85), indicating limited engagement with app-based alternatives to traditional print materials. This gap could reflect a transitional phase in learner preferences or a need for more robust digital textbook offerings aligned with curriculum standards.

4.4. Sociocultural and pedagogical implications

The prominence of gaming and mobile apps in the learning environment highlights an important shift from teacher-led instruction to learner-centered strategies. Students are increasingly taking control of their language acquisition journeys, selecting resources that suit their needs, interests, and schedules. This autonomy is

particularly important for ethnic minority learners, whose linguistic environments at home may differ from the instructional medium in schools. The heavy reliance on short videos with subtitles for vocabulary retention suggests an emergent literacy strategy among Khmer learners. These learners appear to favor context-rich and multimodal input, aligning with cognitive theories that emphasize dual coding and distributed practice. When language is embedded in narrative or dialogue, learners are better equipped to infer meaning, establish semantic connections, and transfer knowledge to real-world interactions.

Moreover, the pervasive use of mobile platforms points to the importance of social presence and peer learning. Whether through comment threads on Facebook or collaborative playlists on YouTube, learners engage in asynchronous dialogue that supplements their formal instruction. This community-based learning may mitigate isolation and reinforce cultural identity, particularly for minority groups navigating dominant language structures. Despite these benefits, several challenges persist. The variability in Internet and YouTube engagement suggests potential barriers such as unreliable connectivity, device limitations, or digital fatigue. Educators must be mindful of these constraints when designing tech-integrated lesson plans, ensuring that activities remain inclusive and adaptable.

Additionally, while games and apps are effective for language drilling, they may lack depth in syntax, pragmatics, and cultural nuance. Without strategic guidance from instructors, students may focus disproportionately on vocabulary acquisition at the expense of more complex language skills. To address this, schools should consider blending app usage with scaffolded tasks that promote critical thinking, discourse analysis, and sociolinguistic awareness. Another consideration is the language of instruction and platform interface. If apps and content are primarily in Vietnamese or English, Khmer students may encounter comprehension challenges, particularly if they are still developing proficiency in these languages. Incorporating multilingual support and culturally relevant material is key to fostering equitable engagement.

The findings reveal a vibrant ecosystem of mobile technology use among Khmer learners, characterized by high engagement, preference for gamified learning, and reliance on short-form content for vocabulary reinforcement. While mobile apps and games dominate students' routines, variation in Internet and video usage points to nuanced individual preferences and access disparities. Going forward, educators, developers, and policymakers should collaborate to design context-aware, inclusive digital learning experiences that align with learners' linguistic backgrounds and cognitive styles. Efforts should also be directed toward improving content accessibility, localizing platforms for ethnic minority languages, and integrating TALL strategies into formal curricula. By embracing technology not just as a supplement but as a core component of the learning journey, educational institutions in Vietnam can empower students from all communities to achieve linguistic competence, academic success, and cultural affirmation.

4.5. Preferred learning modalities

A strong preference for visual (80%) and audio (65%) learning resources emerged, with many students referencing Khmer songs, cartoons, or animated games as motivating and comprehensible input. Interactive elements were appreciated, particularly when gamified, but often lacked depth beyond vocabulary recognition.*" I like learning with pictures and colors - it's easier to remember."; "Songs with lyrics help me learn how to say things."* Speaking-based tasks were less favored, with only 30% expressing confidence or enjoyment in oral practice, citing shyness or fear of mistakes.

Table 4.2. Preferred learning modalities

	N	Mean	Std. Deviation
watching	120	2.96	1.350
reading	120	3.01	1.325
speaking	120	4.53	.579
listening	120	4.54	.578
apps	120	4.57	.561
Valid N (listwise)	120		

Source: *Author compilation*

Based on the descriptive statistics gathered from 120 participants, the data reveals a strong preference for mobile-assisted language learning tools, particularly among Khmer students at Tra Vinh University. The mean scores for speaking (M = 4.53), listening (M = 4.54), and mobile app usage (M = 4.57) indicate that these activities are engaged with very frequently and consistently, as evidenced by their low standard deviations. These results reflect the prioritization of oral communication skills - likely driven by the communicative language teaching methods employed in TALL initiatives - while also underscoring the pivotal role of mobile apps in daily learning routines. In contrast, activities such as watching (M = 2.96) and reading (M = 3.01) appear less frequent and more varied among learners, suggesting that passive and text-based resources may be underutilized due to factors such as limited content accessibility, digital literacy, or lower perceived relevance. Overall, the statistics point to a high level of learner engagement with mobile technologies and a clear emphasis on interactive, auditory language practices.

4.6. Confidence in using Khmer language

Table 4.3. Confidence in Using Khmer language

	N	Mean	Std. Deviation
everyday situations	120	3.99	1.111
for job	120	3.93	1.207
personal goals	120	3.93	1.175
in school	120	3.81	1.272
outside	120	3.62	1.373
Valid N	120		

Source: *Author compilation*

Approximately 50% of students report moderate confidence in receptive Khmer skills, while productive tasks (speaking/writing) trigger anxiety, indicating a gap between passive consumption and active production. Data reveals higher confidence in everyday, job, and personal contexts (Mean ≈ 3.9) compared to outside environments, pointing to a need for Tech-assisted language learning (TALL) tools that focus on interactive, low-stakes practice. Future tool design should prioritize speech recognition, role-play, and writing support to enhance active communicative competence.*" I understand what I hear, but speaking is scary. I don't know if I say it right."* This hesitation suggests a gap between passive content consumption and active language production - a key consideration for future TALL tool design.

4.7. Challenges with TALL tools

Device-sharing constraints (60%), app interfaces lacking local language options (45%), and digital distractions (25%) were primary obstacles identified. Students noted difficulties navigating Khmer-only applications and sometimes diverted from learning apps toward entertainment content when unsupervised. *"My brother also needs the phone, so I wait for my turn."; "I don't know what some app buttons mean - they don't have Khmer."*

4.8. Family and peer support

While 35% of students benefitted from active sibling or peer assistance, particularly for app installation and navigation, parental involvement was limited, often due to a lack of digital fluency or Khmer language proficiency. Several students expressed appreciation for moments when learning became a shared activity with family members.*"My cousin downloads the app and teaches me how to use it."; "My parents want me to study English but can't help with the apps."*

Overall, these findings underscore the importance of visual and audio-based TALL content, the need for culturally and linguistically accessible platforms, and the critical role of peer-supported learning in contexts with limited formal or parental scaffolding. While learners demonstrate high motivation, particularly when linked to aspirations for school and future employment, their engagement remains shaped by material access and socio-cultural factors.

4.9. Patterns of Technology use for Language Learning: Teacher Perspectives

Interviews with eight language teachers revealed shared practices and key constraints related to the use of technology in English instruction. All respondents acknowledged the value of digital tools in enhancing student engagement but varied significantly in the frequency, confidence, and depth of integration.

The integration of educational technology among the surveyed educators reveals a universal baseline of adoption contrasted by significant variations in implementation frequency. While 100% of the participants reported incorporating digital tools into their pedagogy at least occasionally, the nature of this integration remains predominantly centered on supplementary multimedia resources. The most prevalent instruments identified include PowerPoint presentations, YouTube videos, and mobile-assisted vocabulary applications. Despite this widespread initial adoption, only a minority of educators (37.5%) reported utilizing technology on a weekly basis or more frequently. This suggests that while teachers recognize the utility of digital tools, their systematic application within the curriculum remains inconsistent across the broader cohort.

The disparity in the frequency of technology use appears to be closely linked to geographical and infrastructural factors, with higher usage rates observed in urban settings or institutions with stable connectivity. Qualitative feedback underscores a pedagogical preference for multimedia content over traditional instructional materials; for instance, one respondent noted that short English videos from YouTube significantly enhance student engagement compared to standard textbook dialogues, provided a reliable internet signal is available.

The pedagogical application of technology among the surveyed educators is primarily functional, focusing on enhancing receptive skills and clarifying abstract linguistic concepts. Digital tools are predominantly leveraged for listening practice, such as broadcasting dialogues and music, as well as providing visual illustrations for vocabulary and grammar points. Although messaging platforms like Zalo and Facebook Messenger are occasionally utilized for distributing homework and digital worksheets, this practice is inconsistent. Qualitative data highlights significant barriers to out-of-class engagement; as one practitioner noted, the efficacy of sending digital links is often undermined by unequal student responsiveness and sporadic internet connectivity.

Furthermore, there is a marked discrepancy between basic content delivery and the adoption of sophisticated interactive platforms. While foundational tools are widely used, advanced systems such as Learning Management Systems (LMS) or gamified quiz-based applications (e.g., Kahoot, Quizizz) remain significantly underutilized. This lack of adoption is attributed to a critical deficit in technical training and restricted access to the necessary infrastructure. Consequently, technology use in this context remains largely passive and teacher-led rather than collaborative or student-centered.

The systematic implementation of Tech-assisted language learning (TALL) is significantly impeded by a triad of infrastructural, socio-economic, and curricular barriers. A primary concern involves device accessibility; educators consistently report that a substantial proportion of the student population lacks dedicated personal smartphones, often relying on shared family devices. This scarcity inherently restricts the feasibility of assigning digital homework and discourages autonomous out-of-class engagement. Furthermore, infrastructural instability characterized by inconsistent electricity and sporadic internet connectivity remains a pervasive obstacle, particularly in semi-rural contexts. These technical disruptions transform elective technology use into a logistical risk, often deterring teachers from integrating digital tools into their core lesson plans.

Beyond physical resources, pedagogical and systemic pressures further constrain technological experimentation. The current curriculum is perceived as overly rigid, leaving minimal room for the flexibility required to pilot new digital platforms. This "time poverty" is exacerbated by the technical overhead associated with traditional hardware; for instance, the disproportionate amount of time required to configure classroom projectors often outweighs the perceived instructional benefits. As one respondent highlighted, the desire to incorporate innovative applications is frequently eclipsed by a tight academic schedule and the inefficiencies of available equipment. Consequently, for technology to be effectively sustained, future interventions must address these multi-layered constraints through more streamlined, offline-compatible, and time-efficient solutions.

Educators within the study cohort generally exhibited a positive disposition toward Tech-Assisted Language Learning (TALL), identifying it as a potent catalyst for student engagement. Qualitative findings suggest that the introduction of digital tools correlates with heightened levels of learner attentiveness and intrinsic motivation compared to traditional methods. However, this enthusiasm is tempered by a pervasive sense of pedagogical uncertainty regarding software selection. Many teachers reported feeling overwhelmed by the sheer volume of available applications, expressing a critical need for professional training or curated repositories specifically tailored to the linguistic requirements of Khmer learners.

The effectiveness of these tools is further complicated by the lack of localized instructions. As noted by one participant, the difficulty lies not just in identifying high-quality content, but in finding platforms that offer Khmer-language support or culturally relevant scaffolding. This highlights a significant gap between the availability of technology and the educators' perceived self-efficacy in evaluating its instructional value. Consequently, for TALL to be successfully institutionalized, initiatives must move beyond mere hardware provision toward providing teachers with evaluative frameworks and localized digital resources that align with the specific sociolinguistic profile of their students.

Language teachers across participating schools demonstrated a growing interest in TALL but faced infrastructural and pedagogical challenges that limited its full integration. Their use of technology was largely supplementary and opportunistic, rather than fully embedded within instructional design. The findings point to a need for context-aware professional development, localized resources, and institutional support to enable equitable and effective TALL implementation.

4.10. Findings from caregiver interviews

To better understand the home-based influences on students' engagement with Tech-assisted language learning (TALL), semi-structured interviews were conducted with 15 caregivers. The interviews revealed themes centered on attitudes toward English and technology, levels of home support, and barriers to involvement.

Caregivers in the study demonstrated a profound consensus regarding the instrumental value of English proficiency, framing it as a vital prerequisite for their children's future socioeconomic mobility. Quantitative analysis reveals that 87% of caregivers perceive English as an essential component for academic success and long-term employment prospects. While there is a nearly universal acknowledgment of the potential for technology to facilitate language acquisition, this positive orientation is contrasted by a significant deficit in digital literacy among the older generation. Specifically, only 40% of caregivers reported feeling confident in navigating or selecting appropriate educational applications, suggesting a disconnect between parental aspirations and their practical capacity to mediate their children's digital learning environments.

This tension between high educational expectations and limited technical self-efficacy underscores a critical barrier to home-based reinforcement. Qualitative feedback highlights that while parents are highly motivated by the utilitarian benefits of English, they often feel marginalized by the complexity of modern digital tools. One caregiver aptly summarized this sentiment, stating: "I want him to learn English because it helps get good jobs... but I don't know much about these apps." This indicates that for MALL initiatives to be sustainable within Khmer-majority communities, interventions must not only target the student but also provide scaffolding and simplified orientations for caregivers to bridge the intergenerational digital divide.

Despite a high level of motivation among caregivers, the practical implementation of home-based support for language learning is characterized by significant variability in both nature and intensity. Research findings indicate that only 33% of caregivers engage in active supervision, which typically involves monitoring study schedules or encouraging the use of digital tools. In contrast, the most prevalent form of assistance is indirect; 47% of respondents provide "enabling" support, such as granting access to mobile devices or financing mobile data credits to facilitate connectivity. The remaining 20% reported an inability to provide any substantive support, citing constraints such as time poverty, limited formal education, and a lack of technical proficiency.

This disparity in support practices reflects a broader intergenerational gap in pedagogical familiarity, where traditional encouragement often fails to translate into effective digital mediation. Qualitative interviews reveal a

sense of disconnection among parents who feel ill-equipped to navigate modern learning modalities. One participant remarked, “I tell her to study but don’t know how to help, it’s different now with phones,” illustrating how the shift toward mobile-assisted learning can alienate caregivers with lower digital literacy. Conversely, for those able to provide material support, the investment is seen as a direct contribution to their child's academic success, as evidenced by a parent who noted, “Sometimes I buy extra data so he can use the app the teacher recommended.” These dynamics suggest that home-school linkages in these communities are often built on material provision rather than direct instructional guidance.

The challenges hindering effective caregiver mediation in digital language learning are multifaceted, primarily revolving around a lack of technical, linguistic, and temporal resources. Analysis of caregiver feedback identifies three critical barriers that impede home-based support: digital literacy deficits, which prevent caregivers from evaluating or operating educational software; linguistic barriers, where English-only interfaces alienate non-proficient adults; and temporal constraints, particularly for those balancing long labor hours with domestic responsibilities. These systemic obstacles transform what could be a collaborative learning experience into a source of frustration. As one participant noted, “If the instructions were in Khmer, maybe I could help her more,” highlighting how a lack of localized scaffolding excludes caregivers from the instructional process.

Furthermore, the intersection of linguistic and time-related challenges creates a significant "participation gap" in the student's digital ecosystem. A caregiver summarized this double burden by stating, “I want to help but I don’t have much time after work and I don’t speak English.” Despite these substantial hurdles, the data suggests an underlying reservoir of interest in intergenerational engagement, with several respondents expressing an enthusiasm for learning alongside their children. This indicates that the current barriers are not a result of parental apathy but rather a lack of inclusive design. If TALL tools were to incorporate bilingual interfaces and time-efficient, low-threshold activities, they could potentially transform the home environment from a space of passive supervision into one of collaborative, intergenerational acquisition.

Research findings indicate that while caregivers exhibit robust motivational support for English language acquisition, their capacity for direct pedagogical intervention is frequently constrained by a lack of digital self-efficacy and linguistic resources. This creates a "support paradox" where high parental aspirations for socioeconomic mobility do not always translate into effective home-based technical mediation. Consequently, these perspectives underscore the imperative of developing inclusive TALL frameworks that incorporate localized Khmer-language support and simplified navigational interfaces. By reducing the technical and linguistic threshold for entry, developers can transform the home environment from a space of passive supervision into a proactive site for reinforced learning.

5. CONCLUSION AND RECOMMENDATIONS

This research sought to investigate the engagement of ethnic Khmer learners with Tech-Assisted Language Learning (TALL), synthesizing perspectives from students, educators, and caregivers. Employing a mixed-methods framework, the study has delineated a digital learning landscape that is simultaneously vibrant and fragmented. The findings suggest that while technology offers a significant conduit for linguistic development, its efficacy is mediated by a complex interplay of infrastructural, cultural, and socio-pedagogical determinants.

Students exhibit a marked preference for multimodal TALL resources, particularly those emphasizing visual and auditory stimuli such as videos, music, and gamified vocabulary applications. However, a significant "production-reception gap" persists; while receptive skills are bolstered by these tools, oral language production remains underdeveloped. This is largely due to a lack of structured pedagogical support and a pervasive lack of linguistic self-efficacy among learners.

Although smartphone penetration is high, the "quality of access" remains precarious. Device-sharing within families, inconsistent internet connectivity, and frequent power outages constitute significant structural barriers. These limitations transform potential "anywhere-anytime" learning into a sporadic and localized activity. Educators demonstrate high levels of intrinsic motivation to integrate TALL but are impeded by rigid curricular mandates and a lack of systematic professional development. Currently, technology integration remains largely

ad-hoc, characterized by the use of supplementary platforms like YouTube or Zalo rather than integrated pedagogical systems.

Caregivers provide strong moral and logistical support—often making financial sacrifices to provide mobile data yet feel marginalized from the instructional process. Their contribution is limited by an intergenerational digital divide and linguistic barriers, preventing them from evolving from passive supervisors into active learning mediators. Perhaps most critically, the study identifies a lack of coherence across stakeholders. While students, teachers, and parents share a unified belief in English as a vehicle for socioeconomic mobility, their efforts remain disconnected, leaving learners to navigate the digital landscape with minimal coordinated guidance.

To bridge the gap between technological potential and classroom reality, the following recommendations are proposed (1) Software developers must move beyond "one-size-fits-all" platforms. There is an urgent need for localized interfaces that incorporate Khmer and Vietnamese instructions. Designing culturally relevant content and simplified navigation can democratize access, allowing both learners and their less tech-savvy caregivers to engage with the tools more effectively. (2) Future TALL interventions should prioritize oral production. Designers and educators should implement low-stakes, asynchronous speaking tasks such as voice messaging or short video responses that allow students to build confidence in a non-threatening digital environment before transitioning to real-time classroom interaction. (3) Ministries of Education and NGOs should shift focus from hardware provision to pedagogical training. Teachers require curated repositories of digital resources that align specifically with the national curriculum, alongside training on how to manage "time-efficient" technology setup to minimize instructional disruption. (4) Schools should foster a more inclusive digital ecosystem by providing "family-friendly" tech guides. Short, bilingual video tutorials or community-based digital literacy workshops can empower caregivers to participate more meaningfully in their children's linguistic journey. (5) Recognizing the reality of rural infrastructure, developers should prioritize "offline-first" functionality. Micro-learning modules that can be downloaded during periods of stable connectivity and shared via peer-to-peer bluetooth protocols would ensure that learning is not interrupted by power outages or data exhaustion.

This study was confined to secondary-level Khmer students within a single provincial context, which may limit the generalizability of the findings. Future research should adopt longitudinal designs to track the long-term impact of TALL on language proficiency. Additionally, comparative studies across different ethnic minority groups or experimental evaluations of specific localized apps would provide a more granular understanding of TALL's efficacy in multilingual rural settings.

While TALL tools are increasingly within reach, they remain fundamentally "out of grasp" for many Khmer learners due to systemic frictions. The promise of technology is only realized when it is locally grounded, equitably distributed, and socially supported. The resilience and creativity demonstrated by students, teachers, and caregivers in this study provide a powerful foundation for future progress. It is now incumbent upon policymakers and developers to move from viewing technology as a mere supplement to treating it as a core, inclusive component of a reimagined multilingual future one where every learner is an empowered agent of change.

Conflict Of Interest

The author declares no conflict of interest in the conduct of this research. This study was carried out independently, without any financial, institutional, or personal relationships that could be perceived to influence the ethnographic investigation of Khmer cultural practices in Southern Vietnam. No funding bodies, cultural organizations, community authorities, or research institutions exerted any influence over the study's design, data collection, interpretation, or presentation of findings related to Du Ke theater, Phuoc Bien ritual, or broader Khmer environmental - cultural interactions. All engagements with Khmer communities in Tra Vinh and Soc Trang were conducted solely for academic purposes, with respect for cultural sensitivity and autonomy, and without obligations to any stakeholders that might compromise the objectivity or integrity of the research.

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