

Beyond tool use: A mixed-method examination of how learners’ attitudes toward mobile assisted language learning shape self-regulatory practices

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Abstract

Mobile technologies in language education warrant further investigation into how students perceive the online tools and how their perceptions may affect self-regulated language learning (SRLL) practices. This is essential for creating a learning environment in which mobile-assisted language learning (MALL) technologies are applied effectively and promote critical and reflective learning. Theoretically, this study is framed within the ABC model of attitudes and Zimmerman’s cyclical model of self-regulation and aims to investigate how university students’ attitudes toward MALL shape their SRLL in a blended learning context. Adopting an explanatory sequential mixed-methods design, data were collected via a questionnaire administered to 191 freshmen, and semi-structured interviews were conducted with a subset of 18 students. Data analysis was performed using descriptive and inferential statistics, alongside reflexive thematic analysis. The findings revealed that freshmen held moderate yet ambivalent attitudes toward MALL, with strong interconnections among the affective, cognitive, and behavioral components of attitudes. Qualitative analysis showed that moderate attitudes supported meaningful SRLL across all phases of self-regulation, suggesting that attitudes toward MALL operate as an integrated system shaping the entire SRLL process. Based on these findings, we call for the cultivation of self-regulation processes and consideration of attitudes in technology-enhanced learning contexts.

Keywords: ABC model, Attitudes, Blended learning, Mixed methods, Mobile-assisted language learning, Self-regulated language learning.

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Contribution of this paper to the literature

This study adds to the literature on technology-enhanced language learning by examining university students' attitudes toward mobile-assisted language learning and how these attitudes shape the enactment of self-regulated language learning processes with the aim of contributing to the broader discourse on technology integration into language instruction.

1. Introduction

Within the broader technological revolution in education in the post COVID-19 era, MALL has emerged as a significant pedagogical approach to online learning, providing opportunities for authentic language learning (LL) practices (Alzieni, 2020; Liu, Yao, Tao, & Yang, 2023; Peimani & Kamalipour, 2021). MALL tools boost engagement and achievement, which support learners' autonomy and self-paced learning (Fernando & Steven, 2025; Zhang, Sun, Zhou, & Wang, 2025). More specifically, these tools provide students with polished vocabulary retention (Al-Ahdal & Alharbi, 2021), enhanced lexical and speaking fluency (Al-Abri, Ranjbaran Madiseh, & Morady Moghaddam, 2025), and ameliorated interaction and autonomy (Purwaningrum & Yusuf, 2019; Roh & Kim, 2019). Interestingly, research indicates that learners' attitudes toward MALL play a pivotal role in their effectiveness (Ashari, Ngadiman, Zainudin, & Jumaat, 2018). While positive attitudes can lead to increased involvement, persistence, and success in LL (Dörnyei, 2001), negative perceptions may reduce the potential benefits of such tools (Ushioda, 2011).

MALL not only contributes to LL success but also promotes high levels of self-regulation (SR) behaviors (Oubadi & Lamkhanter, 2024; Roh & Kim, 2019) and boosts motivation and self-efficacy while reducing anxiety (Dong, Jamal Mohammed, Ahmed Abdel-Al Ibrahim, & Rezai, 2022), allowing students to become proactive and responsible for their own progress. Yet, the efficiency of MALL depends on the extent to which students self-regulate their own learning process (Zhang et al., 2025). Self-regulated learning is contingent upon "self-generated thoughts, feelings, and actions that are planned and cyclically adapted to the attainment of personal goals" (Zimmerman, 2000). Self-regulated learners consciously regulate their learning by setting specific goals, monitoring progress, and adjusting their strategies based on feedback for better learning outcomes. LL platforms promote learners' regulation by empowering them to set personal goals, select content tailored to their preferences and levels of proficiency, and adjust the environmental conditions around them without being constrained by traditional settings, thereby strengthening self-regulated learning (Boroughani, Xodabande, & Karimpour, 2023; Guo, Zhang, & Wu, 2022).

However, despite growing interest in the effectiveness of MALL, limited research has explored the complex interplay between learners' attitudes and the enactment of SR learning behaviours among Moroccan university students. This study addresses this gap in LL apps' current state by investigating perceived attitudes toward using an LL online platform and how it shapes students' enactment of SRL. By focusing on a multilingual population, this study contributes to the current stage of knowledge by considering a context where Moroccan students encounter diverse linguistic and cultural backgrounds (Bouziiane, 2020). Furthermore, while previous studies focusing on technology-enhanced LL generally rely on models like TAM, TAM2, and UTAUT2, this study is informed by the ABC model of attitudes (Rosenberg & Hovland, 1960). This framework includes attitude constructs that are affective, behavioral, and cognitive in nature, providing a complementary theoretical approach.

This study is designed to investigate students' attitudes toward an online LL tool, examine the relationship among the components (affect, cognition, and behavior) of the ABC model, and understand how students' attitudes shape the enactment of their SRL practices in a blended learning environment. In light of these objectives, the study aims to advance the broader discourse on digital language education and inform future research on language instruction, maximizing their educational value and enhancing educational outcomes. By considering the attitudinal factors that shape experiences with LL applications, educators can understand not only the challenges in how they can effectively implement them, but also how their attitudes can shape the enactment of their self-regulated strategies in LL. Thus, this study sets out to address the following research questions:

RQ1. What are the attitudes of university students toward using Rosetta Stone as an LL tool?

RQ2. To what extent are the affective, cognitive, and behavioral components of attitudes toward Rosetta Stone as an LL tool correlated among university students?

RQ3. How do university students' attitudes toward using Rosetta Stone shape the enactment of their self-regulated learning skills in a blended context?

2. Theoretical Premises

2.1. The ABC Model of Attitudes

This study is framed by the tripartite (ABC) model of attitude proposed by Rosenberg and Hovland (1960). It has been empirically supported by Breckler (1984) and remains foundational in contemporary research, mainly informing studies in education and/or technology-enhanced learning where attitudes are commonly linked to learners' engagement and intentions (Ajlouni, Wahba, & Almahaireh, 2023; McChesney, Schunn, DeAngelo, & McGreevy, 2025). This model structures attitudes around three components: (A) Affect, (B) Behavior, and (C) Cognition. Affect is related to the emotional part, meaning it reflects one's emotional responses towards something. Behavior is actions that are affected by an attitude. It is related to attitude prediction of an attitude towards an object/situation, and cognition pertains to the beliefs, thoughts, or perceptions one holds about an object/situation (Alias, Lashari, Akasah, & Kesot, 2018; Kapse, Bala, & Sharma, 2022).

Previous research has consistently highlighted the interrelated nature of affective, cognitive, and behavioral components. For instance, technology-enhanced learning, including MALL, has shown that emotional responses, cognitive beliefs, and behavioral participation are interconnected and jointly shape learners' experiences (Boroughani et al., 2023; Guo et al., 2022; Liu et al., 2023; McChesney et al., 2025; Roh & Kim, 2019). These studies suggest that attitudes toward digital learning tools are better understood as an integrated system rather than independent components, with each dimension contributing to and shaping the others.

2.2. Self-Regulation in Language Learning

SRL is an ongoing cyclic process where individuals continuously adjust the goals they set and the strategies they use based on the feedback they obtain from previous experiences. These adjustments are necessary to reduce performance discrepancies proactively and reactively. Zimmerman (2000) explained the interrelation of learning processes at the individual level through the Cyclical Phases of self-regulation model, consisting of three cyclical phases: a forethought phase, a performance phase, and a self-reflection phase. The forethought phase refers to processes that occur before learning and preparing actions (task analysis and self-motivation beliefs). According to Zimmerman and Moylan (2009), the performance phase occurs during behavioral implementation (self-control, self-observation). Self-reflection, the last phase, occurs after learning (self-judgment and self-reaction).

In an LL context, research has demonstrated that there is a connection between SRL and MALL. Mobile learning contributes to the enhancement of students’ SRL skills and improved outcomes (Nst, Daulay, & Dewi, 2023; Wei, 2022). It has been found that mobile-based learning mainly supports the performance phase of students’ SRL rather than the other phases (Yang, Wen, & Song, 2023). MALL provides lifelong learning opportunities supporting SRL skills and contributing to increased motivation and language performance (Noori, 2025; Roy & Gandhimathi, 2025). It also has a substantial role in increasing SRL capacity and vocabulary-learning attitudes (Lei, Fathi, Noorbakhsh, & Rahimi, 2022). Remarkably, using SRL strategies in LL leads to better learning outcomes and facilitates the enactment of MALL autonomous behaviors (Nst et al., 2023). Guo et al. (2022) asserted that SRL in a collaborative context enhances MALL among undergraduate EFL students. We deduce that the relationship between self-regulated LL (SRLL) and MALL is bidirectional (Figure 1). While the MALL-based approach appears to have a significant impact on self-regulatory processes during LL, research also indicates that SRL is subsequently reinforced by effective use of MALL, positively affecting LL. This two-way relationship is captured as follows:

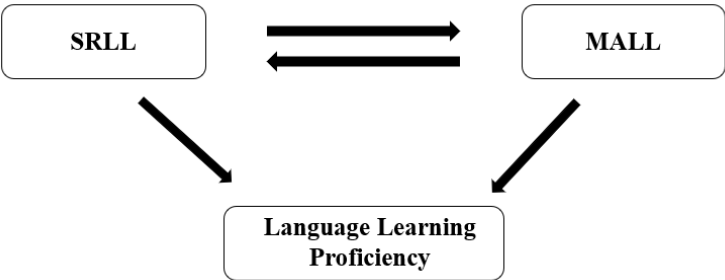


Figure 1. Interaction among SRLL, MALL, and Language Proficiency.

Integrating the ABC model of attitudes (Rosenberg & Hovland, 1960) and Zimmerman’s cyclical model of SRL (Zimmerman, 2000) provides a comprehensive framework for understanding not only what learners think and feel about MALL tools, but also how these attitudes shape the enactment of SRL strategies in technology-enhanced LL contexts. The ABC model explains learners’ affective, cognitive, and behavioral dispositions toward MALL tools, which prior research shows are strongly linked to technology acceptance, perceived usefulness, ease of use, and emotional responses such as enjoyment and anxiety (Wei, 2022; Yang et al., 2023). In parallel, Zimmerman’s model accounts for how these dispositions are translated into self-regulatory processes across the phases of forethought, performance, and self-reflection (Urbina, Villatoro, & Salinas, 2021; Zimmerman, 2000).

Based on previous studies, attitudinal models alone remain restricted to behavioral intention and do not extend to explain how positive perceptions translate into sustained SRL actions (Panadero & Alonso-Tapia, 2014; Wei, 2022). On the other hand, SRL-focused studies tend to regard motivational and affective factors as background variables, rather than explicit attitudinal structures shaping SRL cycles (Lai, Saab, & Admiraal, 2022; Yu, 2023). Integrating both frameworks enables an investigation of how certain beliefs, emotions, and behavioral tendencies toward MALL shape actual SRL practices such as goal setting, strategic monitoring, and self-evaluation (An, Wang, Li, Gan, & Li, 2021; Urbina et al., 2021). This perspective therefore offers a more comprehensive analytical lens, connecting learners’ psychological orientations toward technology with the processes by which they regulate and sustain their LL.

Moroccan research on technology-enhanced language learning, similar to international scholarship, has largely privileged attitudinal dimensions such as perceived usefulness, ease of use, motivation, and adoption (Asrif, 2024; Benzehaf, Ziad, Laaboudi, & Yeou, 2023; Houmane, Zaher, Brigui, & El Omari, 2024; Malmous, Zaidoune, & Mehdi El Hamydy, 2026; Ziad, 2016). However, limited insights into how such attitudes shape the enactment of SRLL strategies in a blended learning context were provided. Studies examining SRL have emphasized learners’ strategic behaviors and autonomy, with little systematic elaboration of the learners’ affective, cognitive, and behavioral orientations toward MALL environments (Youssefi, 2024). Hence, the reciprocal relationship between attitudes toward technology and SRLL enactment remains underexplored in the Moroccan context.

2.3. The Current Study

The existing research has mainly focused on technical aspects of MALL, such as ease of use, perceived usefulness, and satisfaction, while overlooking students’ SRL processes and the role of attitudes in shaping them. SRL-based studies, in turn, emphasize learning strategies without fully considering attitudinal factors in technology-enhanced environments. To address this gap, the present study integrates the ABC model of attitudes with Zimmerman’s SRL framework by examining learners’ affective, cognitive, and behavioral beliefs alongside their self-regulatory processes in a blended context. It further investigates how these attitudes influence the enactment of SRL strategies.

3. Methods

3.1. Research Design

The current study adopted a mixed-methods approach, specifically an explanatory sequential design to explore students' attitudes toward using a MALL tool for self-LL. The quantitative phase involved a questionnaire to measure the three components of attitudes: affective (emotions), behavioral (actions), and cognitive (beliefs); while the qualitative phase was realized through semi-structured interviews to allow a deeper insight into students' perceptions and experiences.

3.2. Participants

The sample consisted of undergraduate students from multiple departments of the Faculty of Letters and Humanities, Chouaib Doukkali University in Morocco. They were freshmen who received a blended mode of learning English and French according to the latest reforms of higher education in Morocco. The selection of this sample aligns with the study's purpose in exploring attitudes in a blended learning context. The sample was recruited through a convenience sampling technique, given students' availability and accessibility. A total of 191 students participated, and a smaller subset (18 participants) was selected for the qualitative interviews to provide richer, in-depth data. These 191 participants comprised 77.5% female and 22.5% male. Most participants (66.5%) were between the ages of 18 and 20. Table 1 presents a further detailed distribution of the participants' fields of study.

Table 1. Distribution of the participants in terms of department affiliation.

Department	Frequency	Percentage
Arabic Studies	36	18.8
English Studies	55	28.8
Sociology & Psychology	1	.5
Philosophy	18	9.4
Islamic Studies	3	1.6
French Studies	22	11.5
History & Civilisation	18	9.4
Geography	38	19.9
Total	191	100

3.3. Instruments

Rosetta Stone app was used as a MALL tool for LL. It is an interactive language-learning app that provides instruction in 30 different languages. The app was adopted by the Moroccan Ministry of Higher Education and deployed across all universities, as part of a national policy aiming at supporting language enactment among university students. The app is known for its immersive approach to language acquisition, focusing on vocabulary, pronunciation, and cultural context through interactive methods.

An online 5-point Likert scale questionnaire was used to quantitatively measure students' attitudes toward MALL and collect demographic information about the participants (age, gender, department affiliation). The questionnaire, available in three languages (English, Arabic, and French), was distributed via Google Forms with a notice that all participation was voluntary and that the material collected would not include any identifying information. Several psychometric measures were taken to ensure validity and reliability. Before administering the questionnaire, an exploratory factor analysis (EFA) was conducted to assess construct validity. Sampling adequacy was confirmed ($KMO > .7$; $Bartlett's\ test\ p < .05$). Item loadings below .40 or cross-loadings were removed, resulting in the retention of 19 out of the original 24 items related to the ABC model of attitudes: a) Affective(6 items), b) cognitive (9 items), and c) the behavioral (4 items) subscales (Appendix A). Content and face validity of the questionnaire were assessed by three researchers in the field of educational psychology and technology integration. A pilot study was conducted with 35 participants from the same population. The pilot sample responded to the questionnaire, and analysis showed that corrected item-total correlations ranged from 0.36 to 0.76, all exceeding the recommended threshold of 0.3, indicating adequate consistency. A coefficient of scale reliability was calculated independently to ensure that each subscale is internally consistent. The three components of attitudes demonstrated high reliability $\alpha > .7$. Table 2 summarizes the psychometric properties of the questionnaire.

Table 2. Psychometric properties of the questionnaire.

Subscales	Cronbach's alpha	Item-total correlations ranges
Affective	0.87	0.38-0.76
Cognitive	0.87	0.39-0.68
Behavioral	0.74	0.35-0.76

To complement the quantitative phase, semi-structured interviews were conducted to gain a comprehensive understanding of participants' enactment of SRL strategies, their experiences, challenges, and suggestions for improvement of the app. The design of the interview was informed by relevant literature and aligned with the theoretical models adopted. Interviews allowed for exploring how freshmen engaged emotionally with the app, their actions toward it, and what they think of it as a self-LL tool. This technique allows the researchers to acquire in-depth information and evidence from interviewees without losing the focus of the study. A total of 18 participants were recruited for the interviews to ensure methodological rigour. The interviewees were selected based on their diverse profiles of attitudes toward Rosetta Stone. That is, three distinct sets of attitude profiles were recruited: 6 representing low attitudes, 6 representing moderate attitudes, and 6 representing high attitudes to capture individualized perspectives and hidden SRL behaviours to account for any discrepancies that might have been overlooked during the quantitative phase.

3.4. Data Analysis

The results of the survey were exported from Google Forms to IBM SPSS Statistics (Version 27) for statistical analysis. The descriptive statistics, such as mean, standard deviation, and frequencies for each component (affective, behavioral, cognitive), were utilized to summarize the data obtained. Another worth-mentioning step in data analysis is that the reverse-coded items in the questionnaire were reverse-scored as well. The analysis of the frequency in this study was based on the scale delineated by Oxford (1990). Moreover, the Pearson correlation coefficient was calculated to elicit linear relationships among continuous attitude dimensions. The data met the assumptions of normality and linearity (Field, 2018; Pallant, 2020).

Regarding the interviews, they were audio-recorded with the consent of the participants and subsequently transcribed to conduct the thematic analysis. The latter was carried out to expose recurring themes and patterns related to students’ attitudes following Braun and Clarke’s (2019) reflexive thematic analysis model. Initial codes were generated from participants’ responses and grouped into broader categories according to recurring semantic patterns and latent meanings. In compliance with reflexive thematic analysis, we evaluated the adequacy of our dataset based on analytic sufficiency instead of statistical saturation. Analytical sufficiency indicates the point at which further data collection no longer yields new, conceptually meaningful insights. This was achieved through iterative coding and comparison of transcripts, supporting the sufficiency and representativeness of the sample. Since the analysis was hybrid and included a combination of inductive and deductive coding, themes were organised based on the theoretical models adopted, while it remained open for the inclusion of new insights. The analysis revealed the following themes: MALL as a language scaffold to existing habits, emotional engagement as a catalyst for self-regulation, adaptive behavior for structured SRLL, and attitudes and SRLL integration.

4. Results

4.1. Quantitative Findings

4.1.1. Students’ Attitudes Toward Rosetta Stone

To address the first research question pertaining to the attitudes of university students toward using Rosetta Stone as a LL tool, descriptive statistics were extracted, i.e., means, standard deviations, and percentages. The average score of the overall model is $M=2.97$, $SD=0.82$, suggesting that freshmen held moderate positive attitudes toward the app as a self-LL tool (Table 3). The affective component indicates moderate positive emotions ($M=3.00$, $SD=1.02$). The cognitive construct has a mean score of $M=2.94$ ($SD=0.88$), indicating a moderate level of positive belief in the tool’s effectiveness. The behavioral component is characterized by a mean value of $M=2.96$ ($SD=0.76$), representing a moderate level of intention to use the app for LL.

Table 3. Descriptive statistics of undergraduates’ responses.

Attitude Components	Mean	Std. Deviation
Affective	3.00	1.02
Cognitive	2.94	0.88
Behavioral	2.96	0.76
Total	2.97	0.82

A closer examination of the affective components reveals an underlying division in participants’ emotional engagement rather than genuine positivity (Table 4). A clear majority of participants (>80%) discern learning languages very positively, acknowledging their potential role in the labor market (Item 4). Interestingly, there was a split in students’ interest in learning via the app; equal proportions of participants felt interested (45%) and uninterested (45.1%) in using the app for LL ($M= 2.83$, $SD= 1.33$) (Item 16). Nearly half of the participants did not enjoy the app, while only 36.1% elicited positive affect, as reflected in a mean score of $M= 2.64$ ($SD= 1.39$) (Item 1). 36% of participants feel moderately motivated when using the app, aligning with a low–moderate mean ($M= 2.74$, $SD= 1.27$) (Item 13). Overall, participants’ attitudes are divided, inconsistent, and do not translate into positive emotional engagement with the app.

Table 4. Descriptive statistics for undergraduates responding on the affective subscale.

Questionnaire items	Sd+D (%)	N (%)	A+Sa (%)	M	SD
Item 1	49.2	14.7	36.1	2.64	1.39
Item 4	13.6	5.2	81.2	3.96	1.08
Item 6	45	14	40.8	2.85	1.36
Item 13	48.2	15.2	36.6	2.74	1.27
Item 16	45.1	9.9	45	2.83	1.33
Item 19	38.2	16.8	45	3.03	1.32

Note: Sd: Strongly disagree; D: Disagree; N: Neutral; A: Agree; Sa: Strongly agree; M: Mean; SD: Standard deviation.

With respect to cognitive attitudes, participants exhibited a moderate to slightly positive evaluation of the app's effectiveness in skills enactment ($M= 2.94$, $SD= .88$) (Table 5). 54.4% of the participants reported positive attitudes regarding learning vocabulary via Rosetta Stone ($M= 3.28$, $SD= 1.25$) (Item 17), while 48.7% expressed favorable perceptions toward the app’s appropriateness for learning reading comprehension ($M= 3.10$, $SD= 1.22$) (Item 8). In contrast, only one third reported that Rosetta Stone is beneficial in learning listening skills ($M= 2.74$, $SD= 1.21$) (Item 11), and only 28.3% perceived the app as effective for writing enactment ($M= 2.59$, $SD= 1.24$) (Item 9).

In terms of the app’s perceived usability and overall effectiveness, participants reported a divided evaluative pattern. When compared to classroom-based LL instruction, responses were split, with 39.3% disagreeing, 37.7% agreeing, and 23% remaining neutral ($M= 2.89$, $SD= 1.18$) (Item 2). Similarly, perceptions toward the app’s overall effectiveness in LL were mixed: 45% agreeing, 41.9% disagreeing, and 13.1% reporting a neutral position ($M= 2.91$, $SD= 1.34$) (Item 5). As for usability, 49.3% reported that Rosetta Stone is complicated to use for LL ($M= 2.73$, $SD=$

1.33) (Item 12), although 47.1% found the app to be an effective tool for LL ($M= 3.10$, $SD= 1.22$) (Item 18). Overall, the results indicate a moderate yet fragmented cognitive evaluation of the app, albeit with some differences across different language skills and an equivocal assessment of usability and effectiveness.

Table 5. Descriptive statistics for undergraduates responding on the cognitive subscale.

Questionnaire items	Sd+D (%)	N (%)	A+Sa (%)	M	SD
Item 2	39.3	23	37.7	2.89	1.18
Item 5	41.9	13.1	45	2.91	1.34
Item 8	32	19.4	48.7	3.10	1.22
Item 9	52.2	19.4	28.3	2.59	1.24
Item 11	48.2	18.3	33.5	2.74	1.21
Item 12	49.3	13.6	37.2	2.73	1.33
Item 15	27.7	26.2	46.2	3.13	1.17
Item 17	25.6	19.9	54.4	3.28	1.25
Item 18	30.4	22.5	47.1	3.10	1.22

Note: Sd: Strongly disagree; D: Disagree; N: Neutral; A: Agree; Sa: Strongly agree; M: Mean; SD: Standard deviation.

The behavioral component also demonstrated moderate engagement with Rosetta Stone ($M = 2.96$, $SD = .76$), with variability across items (Table 6). The scores of the participants showed that they are committed to learning the languages and put considerable effort regularly ($M = 3.43$, $SD = 1.09$; 58.6%) (Item 3). However, mixed attitudes were observed toward repetition as a learning strategy, where one third found it useful, one third rejected it, and one third remained neutral ($M = 2.95$, $SD = 1.04$) (Item 7). Interestingly, 49.2% would recommend the app to other learners ($M = 3.06$, $SD = 1.30$) (Item 14). In sum, behavioral engagement appears moderate yet inconsistent, reflecting effort with no strategic commitment.

Table 6. Descriptive statistics for undergraduates responding to the behavioral subscale.

Questionnaire items	Sd+D(%)	N(%)	A+Sa(%)	M	SD
Item 3	19.9	21.5	58.6	3.43	1.09
Item 7	29.8	35.6	34.5	2.95	1.04
Item 10	51.8	16.8	31.4	2.58	1.27
Item 14	34	16.8	49.2	3.06	1.3

Note: Sd: Strongly disagree; D: Disagree; N: Neutral; A: Agree; Sa: Strongly agree; M: Mean; SD: Standard deviation.

In sum, the findings indicate moderate attitudes toward MALL across the ABC components: affective attitudes were ambivalent, reflecting a balance of interest and disinterest, low enjoyment, and limited motivational engagement. Cognitive attitudes were moderately positive but inconsistent, reflecting divided beliefs about the app’s effectiveness, usability, and skill benefits. Behavioral attitudes appeared moderate but inconsistent as well, characterized by sustained learning effort, mixed strategic use, and only partial willingness to recommend the app.

4.1.2. Correlations among the ABC Dimensions

The second objective of the current study was to explore the relationships within the tripartite model of attitudes. To this end, Pearson correlation coefficients were computed. Results revealed significant, positive correlations among all three components (Table 7) of the model. Affective feelings were strongly correlated with both cognitive beliefs ($r= .82$, $p< .001$, $r^2= .67$) and behavioral intentions ($r= .73$, $p< .001$, $r^2= .53$). A strong correlation was also observed between cognitive and behavioral components ($r= .73$, $p< .001$, $r^2= .53$). All the correlations portrayed large effect sizes according to Cohen (1988) guidelines, suggesting a considerable variance among the three components.

Table 7. Correlations among the ABC Components.

Attitude Components		Affective	Cognitive	Behavioral
Affective	Pearson Correlation	1	0.821**	0.732**
Cognitive	Pearson Correlation	0.821**	1	0.735**
Behavioral	Pearson Correlation	0.732**	0.735**	1

Note: **. Correlation is significant at the 0.01 level (2-tailed).

4.2. Qualitative Findings

This study explored how attitudes toward Rosetta Stone shape the enactment of students’ SRLL. Reflexive thematic analysis, guided by Braun and Clarke (2019), yielded four overarching themes.

Theme 1: MALL as Language Scaffold to Existing Habits

Participants consistently acknowledged that Rosetta Stone complemented pre-existing LL routines rather than transformed learners’ previous habits (Table 8). Learners who had already engaged in planning (P09) and goal setting (P06) reported that the app was useful in supporting their current strategic practices because it offered structured guidance and self-monitoring (P03) opportunities. Some learners with limited self-regulatory skills had not shown significant improvement in these strategies (P11). The results suggest that the effectiveness of this tool is related to the prior learner’s own willingness to engage in strategic learning behaviors; the affordances seem to amplify these behaviors and do not initiate them.

Table 8. Illustrative Participant Quotes for Theme 1.

Participants	Quotes
P09	"I follow the lessons' order in the app to better plan my vocabulary practice."
P06	"It showed me the words at my level, so I set a goal above based on that, like learning 10 words each week. Without it, I wouldn't know where to start."
P03	"I can go back to my previous lessons and exercises on it. Sometimes I scroll through and realize that I learned these expressions last week; I should review them. This helped me revise what I learned."
P11	"I just use it to fulfill the faculty requirement; I don't plan or track or evaluate my progress. I just want to complete the 30 hours."

Theme 2: Emotional Engagement as Catalyst for Self-Regulation

Participants frequently highlighted how affective feelings influence SRL initiation (Table 9). Participants who expressed positive emotions toward the app were more likely to report active engagement in self-regulatory processes (P18). This suggests that emotions trigger strategic action. In contrast, neutral emotional responses were mainly associated with less consistent regulatory engagement, indicating that the influence is not stable across learners (P08, P01). Overall, these mild and responsive emotions suggest that while the tool can inspire passionate engagement, its effect on self-regulation depends on how strong and stable these emotions are.

Table 9. Illustrative Participant Quotes for Theme 2.

Participants	Quotes
P18	"Its interactive feature motivated me to practice daily."
P08	"I don't have any specific feeling about it. For me it's just a tool like the others. I don't love it or hate it."
P01	"When it teaches me exactly the lesson I needed, I feel satisfied. But when it doesn't understand my accent, I feel annoyed, not angry."

Theme 3: Adaptive Behavior for Structured SRL

Another salient theme that emerged pertained to how behavioral routines enable self-regulation processes (Table 10). Participants were found to adjust their strategies while using the app (P07), especially when their initial trials failed (P12). This suggests that learners actively adapt their approach through repeated engagement, which can support strategic competence over time. However, the findings also show that when difficulties persist, some learners may abandon the task (P02). Overall, this suggests that while adaptive effort can strengthen self-regulation, learners' ability to sustain efforts determines its success.

Table 10. Illustrative Participant Quotes for Theme 3.

Participants	Quotes
P07	"Because I used to learn through examples in the app, I've started asking my professor for examples when learning."
P12	"The first time I practiced pronunciation, it didn't recognize the word; its feedback was red. So I tried again and again until I succeeded in pronouncing it correctly."
P02	"After it corrected my sentence many times in a row, I just skipped writing activities and relied on my professor to assess my writing."

Theme 4: Attitudes and SRL Integration

The results show that self-regulation in MALL is not driven by a single attitudinal component, but rather emerges from the synergistic interaction between affective, behavioral, and cognitive dimensions. When these components are relatively aligned, learners tend to display consistent but moderate self-regulatory engagement (P14), indicating a balanced learning process (Table 11). Interestingly, the data also reveal cases of misalignment, where emotional responses, actual practices, and beliefs do not fully match (P08, P13). These affective-behavioral tension and cognitive-behavioral dissonance do not necessarily interrupt learning, but instead point to learners' continuous behavioral regulation despite internal inconsistencies. Overall, SRL appears to function as a mechanism that sustains behaviors despite some attitudinal inconsistency.

Table 11. Illustrative Participant Quotes for Theme 4.

Participants	Quotes
P14	"I used it constantly because I felt okay about it, and I think it helped me improve my language skills to some extent."
P08	"I didn't really enjoy learning languages through the app, but I used it regularly anyway because I must improve my language skills."
P13	"I know it's not the app I would choose if I wanted to learn a language, but I motivated myself to use it because it's an obligation."

5. Discussion

The present study combined quantitative and qualitative findings to provide a comprehensive understanding of students' attitudes toward Rosetta Stone, as a MALL tool, and its influence on SRL. The findings are interpreted in light of the existing literature and the theoretical models adopted, namely, the ABC model of attitudes (Rosenberg & Hovland, 1960) and the SRL model (Zimmerman, 2000). To begin with, students exhibited moderate positive attitudes across all components of attitudes toward MALL. Affectively, this showed that the app did not generally promote consistent positive feelings, leading to mixed emotions and limited investments. This finding aligns with previous work by Ushioda (2011) emphasising the importance of affective factors in determining engagement. The coexistence of both positive and negative emotions observed supports the evidence that LL emotions, such as enjoyment and anxiety, may occur at the same time (Bai, 2024). Such low affective orientations are ineffective in fostering SRL, as affect is a key driver in an autonomous learning environment (Boroughani et al., 2023; Guo et al., 2022).

Students' cognitive attitudes also remained moderate, yet unsettled, manifested in competing evaluations. They appeared relatively positive about the app's support in vocabulary and reading, but noticeably less convinced of its usefulness in listening and writing. Usability adds another layer of tension: some found Rosetta Stone manageable, but others struggled to deal with it in a self-directed context. Furthermore, perceptions of overall effectiveness remained divided with respect to in-class LL. Although earlier studies have shown that Rosetta Stone enhances vocabulary usage and mastery (Debataraja & Daulay, 2024; Munthe, 2023), our results indicate that students do not fully recognize its effectiveness in LL. This gap between the app's demonstrated pedagogical value and its perceived usefulness may explain why their cognitive attitudes remained only moderate. Viewed through the ABC Model (Rosenberg & Hovland, 1960), such cognitive uncertainty may hinder their willingness to regulate their own LL independently.

A similar pattern is observed in the behavioral component, with results indicating moderate engagement with Rosetta Stone. Students make moderate learning effort but show mixed strategy use and a partial willingness to recommend the app. These findings reflect a learning pattern that is not evenly regulated. This partial engagement aligns with previous studies on MALL and SRL (Boroughani et al., 2023; Guo et al., 2022), which noted that sustained effort alone is not sufficient to ensure strategic learning behavior. Moreover, findings that technology acceptance and constant use are not only dependent on perceived usefulness but also on the learner's ability to interact effectively with learning strategies over time support the findings in this study regarding the inconsistency observed across behavioral indicators (Roh & Kim, 2019; Zyad, 2016).

Regarding the 2nd RQ, the results indicated strong positive relationships among affective, behavioral, and cognitive components (e.g., $r = .82$, $p < .01$). As predicted by the ABC model (Rosenberg & Hovland, 1960), all the ABC components are distinct yet interrelated. Participants demonstrated highly integrated, cohesive attitudes toward MALL. This cohesiveness may reflect mutual reinforcement among feelings, behaviors, and beliefs because of daily interaction, which is integrated into technology-mediated learning. The interdependence is further supported by recent studies that show that emotional engagement, cognitive beliefs, and behavioral participation tend to reinforce one another rather than operate in isolation (Boroughani et al., 2023; Liu et al., 2023; McChesney et al., 2025).

Concerning 3rd RQ, i.e., how these attitudes toward MALL shape students' SRL practices, findings uncovered four overarching themes: 1) MALL as a language scaffold to existing habits, 2) emotional engagement as a catalyst for SR, 3) adaptive behaviour as structured SRL, and 4) attitudes and SRL integration.

Consistent with prior research, participants embodied the tool as part of prior LL habits instead of adopting entirely new practices, suggesting a scaffolding role of the technology in supporting autonomy (Oubadi & Lamkhanter, 2024; Purwaningrum & Yusuf, 2019; Roh & Kim, 2019). From an ABC perspective, this informs how behavioral attitudes have been activated once the app has achieved comfortable integration into established learners' habits, demonstrating that behaviors tend toward assimilation over transformation when attitudes are moderate. In light of Zimmerman (2000) model, this theme mainly reinforced the performance phase of SR, suggesting that MALL is more effective for SRL when it can build on learners' current strategies and routines instead of forcing metacognitive changes. This finding extends both frameworks by identifying scaffolding as the characteristic of MALL's influence on SRL when attitudes are moderate.

Emotional engagement emerged as a catalyst for SR. Learners' affect, positive or negative, directly influences learning behaviour and cognitive assessments of MALL. This reinforces earlier findings that affective factors drive persistence in technology-mediated learning (Bai, 2024; Dong et al., 2022; Ushioda, 2011). Our finding supports the components' interrelatedness assumption in the ABC model and places affect as the sequence's initiator in MALL contexts. From Zimmerman (2000)'s lens, this highlights the motivational underpinnings of SR where emotional engagement promotes sustained effort, adaptive change, or disengagement. Thus, understanding SRL in MALL contexts requires equal attention to learners' emotional experiences alongside their cognitive and behavioural strategies.

Theme 3 highlighted the dynamic, iterative nature of MALL use. Centred on the behavioral component of the ABC model, illustrating how learners refine their approaches through experience (timing, adjusting, retrying, adopting and abandoning). This finding is in harmony with previous findings by Guo et al. (2022) and Boroughani et al. (2023), who reported that SRL develops through continuous adaptation and strategy refinement. This study is an elaboration of Rosenberg and Hovland (1960) model by focusing on attitude enactment. This theme vividly illustrates the cyclical model of Zimmerman (2000) and substantiates it by demonstrating that the SR cycle (reflection, forethought, performance) operates in MALL contexts. Learners gradually develop and apply effective SR strategies through a cyclical adaptation, with MALL functioning as a medium of reflection and input.

Theme 4 addressed attitude components that worked together as an integrated system rather than individual elements to account for how they interact and influence SRL. This finding is in accordance with earlier studies (Liu et al., 2023; McChesney et al., 2025). This gives qualitative validation of the attitude components' relatedness, which is an essential assumption in the ABC model (Rosenberg & Hovland, 1960). The interviews confirmed the systemic influences across all SRL processes: affect motivated initial engagement; behavior structured SR strategy enactment and adaptation; and cognition calibrated SR engagement. This model extends (Zimmerman, 2000) pattern, suggesting that attitudes are seen as a sub-system of orientation which influences the entire regulatory cycle.

Together, the quantitative and qualitative data provided a detailed combination of learner attitudes toward an online LL tool and their influence on the enactment of SRL. Quantitatively, learners demonstrated generally positive attitudes across the affective, cognitive, and behavioral components. These attitudes were marked by ambivalence, inconsistency, and partial engagement. Correlational analyses revealed strong positive relationships among all attitude components, suggesting particularly cohesive attitudes vis-à-vis Rosetta Stone in this context. These patterns were qualitatively supported as learners embedded the app within their pre-existing LL habits and did not consider it as a source of new self-regulatory strategies. The attitudes, as consistently described by interviewees, were characterized by emotional neutrality and pragmatic usage. From this convergence, the moderate attitudes of the learners are found to be inherent, operating as an integrated system, shaping SRL practices rather than functioning in isolation, as grounded in the ABC Model of Rosenberg and Hovland (1960). On

this basis, this study expands the use of the model within the MALL context and demonstrates that attitudes can be manifested in the form of a dynamic, interdependent system that affects SRL.

6. Conclusions and Implications

This study investigated Moroccan students' attitudes toward MALL and how these attitudes shape the enactment of SRL processes in technology-enhanced environments. The integration of the ABC model of attitudes with Zimmerman's cyclical SRL model provided a holistic framework for understanding how affective, cognitive, and behavioral orientations toward MALL influence SRL practices. Findings revealed that students hold generally moderate attitudes toward MALL across the ABC model components. However, a moderate attitudinal stance does not necessarily reflect balance. Affective attitudes were characterized by ambivalence, cognitive beliefs were moderately positive but inconsistent, and behavioral engagement appeared moderate but similarly inconsistent. Strong connections were found among learners' feelings, actions, and beliefs. Qualitative results supported and elaborated quantitative findings by revealing that moderate attitudes toward MALL were characterized by emotional engagement and adaptive behavior, collectively shaping all phases of SRL. These findings contribute to the literature by showing that MALL tools function primarily as scaffolds that support, rather than initiate, SRL. Overall, the findings have important implications for attitude theory and self-regulation research. They support the ABC model of attitudes (Rosenberg & Hovland, 1960) by confirming that components are recognizable and interconnected, and extend it by highlighting the components' dynamic, evolving, and integrated nature in learners' experiences. They also extend Zimmerman (2000) cyclical model by identifying attitudes as holistic systems influencing self-regulation unevenly across all phases.

Based on these findings, several implications are offered. Instructors should assess not only the tools' use but also the quality of student attitudes, because even moderate attitudes can support effective learning habits; they should foster positive emotional technology experiences to help students enhance their SRL more effectively. For MALL designers, effective tools must adhere to scaffolding existing habits, support emotional engagement, and prompt adaptive strategies. For institutions, the findings suggest that the human dimensions of technology integration are as important as technical infrastructure for successful MALL implementation. Thus, training on tool features, learners' attitudes, and emotional responses may better support the sustainable SRL practices' enactment.

However, some limitations are worth acknowledging. The study used data collected at one point in time; longitudinal studies tracking students across multiple semesters would provide stronger evidence of how attitudes toward MALL develop and how they shape SRL. The moderate-attitude profile found may apply only to our sample; therefore, students in other educational contexts may have different experiences with MALL that may shape their relationship to SRL differently. Individual differences such as prior language ability, technology literacy, and personality traits are overlooked in this study. These factors should be considered in future research because they likely shape how attitudes form and how they shape SRL.

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Appendix A. Questionnaire Items.

Attitude Components	Item No.	Statements
Affective	Item 1	I am enjoying my language-learning experience via Rosetta Stone.
	Item 4	Learning English and French will be important to my future career plans.
	Item 6	I don't feel any benefit at all from using the Rosetta Stone app.
	Item 13	When using the Rosetta Stone app, my motivation increases.
	Item 16	I feel interested in learning English and French languages using the Rosetta Stone application.
Cognitive	Item 19	Rosetta Stone is a waste of time.
	Item 2	Learning a language via Rosetta Stone can be as effective as learning in a classroom setting.
	Item 5	Rosetta Stone I am using this semester, is helping me learn English and French.
	Item 8	Rosetta Stone is suitable for learning reading comprehension.
	Item 9	Rosetta Stone makes it easier for me to learn to write.
	Item 11	I don't feel the difference between using or not using the Rosetta Stone application in learning to listen.
	Item 12	Rosetta Stone is complicated to use in learning.
	Item 15	The topics in the app are easy to follow.
Behavioral	Item 17	I got a lot of vocabulary while using this application.
	Item 18	Overall, I believe Rosetta Stone is an excellent tool for learning English and French.
	Item 3	I put a great deal of effort into learning English and French on a regular basis.
	Item 7	I repeat the learning material that has been given using the Rosetta Stone app.
	Item 10	I became more active in studying at home when I got to know the application, Rosetta Stone.
	Item 14	I would recommend Rosetta Stone to other English/French Language Learners.