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Twenty Years after Griffiths: Reinvestigation of Skill-Specific Language Learning Strategies among Learners in the AI Era

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Abstract

Owing to the multidimensional nature of additional language acquisition, language learning strategies (LLS) function as crucial determinants in Language Skills Development (LSD) across all macro skills. The significance of these strategies is accentuated, given that advances in technology, specifically Artificial Intelligence (AI) over the past few years, have provided learners with more opportunities to facilitate their learning and also more challenges regarding reliable learning. Recognizing this, the present study sought to identify the most frequently used strategies, examine their correlations with end-of-term scores, and assess the role of AI in learning development among 48 Iranian upper-intermediate EFL learners. Data triangulation was achieved through a Language Skills Development questionnaire, interviews, and observations within a mixed-methods design. Quantitative data were analyzed using descriptive and inferential statistics, while qualitative data were thematically analyzed**.** The findings revealed that listening and speaking strategies were most frequently used, with a strong correlation between strategy use and language success, as measured by end-of-term scores ($R = .875$, $R^2 = .765$, $p < .001$)**.** Additionally, the interview revealed strategies used by learners beyond those reported in the questionnaire, as well as the role of AI in their learning. Finally, there was a high degree of correspondence between self-reported data and observed classroom strategies. Such findings are hoped to expedite learners' autonomy and help teachers, material developers, and course designers integrate effective and AI-assisted skill-specific strategies more purposefully.

Keywords: additional language acquisition, language skill development (LSD), macro skills, technology

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1. Introduction

Language learning strategies, defined as "specific actions taken by the learner to make learning easier, faster, more enjoyable" (Oxford, 1990, p.8), play a central role in both additional language acquisition and practice (Mitits, 2016 as cited in Mohammad Hosseinpur & Goli, 2026). They play a central role in the development of proficiency within the four macro language skills: listening, speaking, reading, and writing (Oxford, 2011). For learners of English, using language fluently and with confidence is a main objective. The frequency with which learners use specific strategies, their views on the effectiveness of these strategies, knowledge of the breadth and depth of vocabulary knowledge (Oladini et al., 2024) and the impact of strategy use on linguistic proficiency are important areas of study for gaining insights into effective learning strategies. At the same time, recent advances in technology and artificial intelligence (AI) have expanded the range of strategies available to learners by providing new opportunities for practice, feedback, interaction, and self-regulation. In addition, the validity of self-reported strategy use, often collected via questionnaires, has attracted researchers' interest when used concurrently with observed behaviors to yield a finer understanding of learners' strategy use under real-world conditions (Meter, 2020). As the use of English is increasingly recognized as the global lingua franca, it is essential to examine how learners strategically develop their linguistic skills in both conventional and AI-mediated learning environments to design instruction that supports their progress and enhances their communicative ability.

Despite the considerable body of research on language skills development through various strategies, deficiencies persist. Current literature frequently analyzes the overall frequency or effectiveness of strategies without disaggregating them by specific skill, which limits understanding of the varied approaches learners employ in listening, speaking, reading, and writing tasks. Furthermore, although the correlation between strategy use and language proficiency, including course outcomes, is extensively documented, analyses focused on individual skills are insufficient, resulting in ambiguity regarding which strategies most significantly improve performance in particular areas. In addition, the growing role of AI in language learning has not yet been sufficiently integrated into skill-specific strategy research, and exclusive reliance on self-reported data raises concerns about accuracy, as learners may underreport their use of strategies due to bias or limited self-awareness. The scarcity of observational studies, combined with interviews that could corroborate self-reports, contributes to a lack of understanding of the alignment between reported and actual strategy implementation. Thus, a clear gap remains in research that simultaneously examines skill-specific

strategies, their relationship with achievement, the emerging place of AI-related strategies within LLS, and the correspondence between reported and observed strategy use.

All things considered, this study addresses these gaps by investigating the language-learning strategies of Iranian upper-intermediate learners using a revised skill-specific Language Skills Development questionnaire originally developed by Griffiths (2004), who conducted a similar study in New Zealand 20 years ago. Revisiting Griffiths (2004) after two decades is justified because the strategic landscape of language learning has changed considerably, especially with the expansion of digital resources and AI-assisted tools, while differences in geographical and educational context may also shape strategy use. This motivated the present study in Iran to examine not only possible continuity and change in learners' strategy use across time and context, but also the extent to which AI-related strategies have become part of contemporary skill development. In this sense, the novelty of the present study lies in re-examining a well-established skill-specific framework in the AI era, within a different context, and through triangulated data rather than questionnaire data alone. Aware of that, the current study explored five central questions:

1. Which strategies do language learners report using most frequently to develop their listening, speaking, reading, and writing skills in English?
2. Is there a relationship between strategy use and success, as measured by end-of-course scores?
3. Which additional strategies do language learners report using beyond those captured in the questionnaire, and which of these do they perceive as helpful for their learning?
4. How do language learners perceive the role of AI-related strategies in supporting their language skills development?
5. How does observed strategy use compare with self-reported strategy use by language learners?

Using a questionnaire designed specifically to assess the four skills, complemented by interviews and classroom observations, this study presents a deeper investigation of the Language Skills Development strategies used by learners. It is hoped that the findings of this study will advance theories of additional language acquisition by clarifying the patterns of strategies unique to each skill and their impact on proficiency, while also showing how AI-mediated strategies are positioned within the broader framework of language learning strategies. More specifically, the study contributes by updating Griffiths's skill-specific framework for the AI era, by examining the strategy-achievement relationship, and by strengthening validity through triangulation of self-report, interview, and observational data**.** By employing an integrated

research methodology, the study seeks to advance our understanding of how strategic learning enhances English proficiency.

2. Literature Review

Language learning strategies have played a significant role in applied linguistics and second language acquisition. Research on language learning strategies has sought to explain how learners actively regulate, control, and optimize their learning since the 1970s, when scholars began to shift their attention toward learner-centered approaches to education rather than teacher-centered approaches (Rubin, 1975; Stern, 1975). At this level, learners are not merely consumers of what is delivered to them but active contributors who consciously engage in the understanding, generation, and memory of language (Oxford, 1990). At the same time, more recent reviews have shown that LLS research has undergone substantial conceptual refinement, especially in response to criticism concerning definitional ambiguity, overreliance on self-report inventories, and insufficient attention to context, task, and self-regulation (Rose et al., 2018; Thomas et al., 2021; Thomas et al., 2022). Therefore, while classic LLS scholarship remains foundational, contemporary work increasingly treats strategy use as dynamic, context-sensitive, and closely related to broader models of self-regulated learning rather than as a fixed inventory of learner behaviors.

2.1. Theoretical Foundation

The theoretical basis of language learning strategies lies in cognitive psychology and constructivist theories of learning, which imply that learning is an active process involving information processing, organization, and retrieval. Cognitive theories posit that learners employ strategies to regulate attention, encode, and recall information as needed (O'Malley & Chamot, 1990). In particular, rehearsal, elaboration, and inferencing are among the cognitive processes that enhance language learning. Language learning strategies are also based on metacognitive theory, which emphasizes learners' awareness and ability to regulate their learning. Metacognition was first introduced by Flavell (1979) as the awareness and control of mental processes and has since been applied to second language acquisition through strategies such as planning, monitoring, and assessing one's own use of language. The model proposed by Oxford (1990) also incorporated metacognitive, cognitive, affective, social, and compensation strategies, providing a unified perspective on how learners cope with their language development. Within social constructivist approaches, which are based on Vygotsky's (1978) work, strategies further focus on interaction and the social aspects of learning. Cooperation, peer support, and seeking clarification are strategies that foster socially mediated learning and the development of

communicative competence. In this way, the theoretical framework of language learning strategies is multidisciplinary, integrating knowledge from cognitive, metacognitive, and sociocultural theories of learning.

However, more recent scholarship suggests that these classic frameworks are best treated as starting points rather than closed taxonomies. Rose et al. (2018) argue that strategy research has increasingly had to respond to criticism about construct clarity and measurement, while Thomas et al. (2021) show that the very definition of LLS has shifted over time. In this newer line of work, self-regulated learning (SRL) has become especially important because it connects strategies to learners' goals, monitoring, reflection, and context-dependent decision-making. In ESL/EFL research specifically, Mazandarani (2024) notes that SRL research has expanded rapidly but remains methodologically uneven, with questionnaire-based designs still dominating the field. This development is important for the present study because it suggests that strategic behavior should be examined not only as a list of preferred techniques but also as a situated process that may vary by skill, task, and learning environment.

Recent advances in artificial intelligence introduce a new dimension to this conceptual landscape and call for a re-evaluation of how technology-mediated approaches fit within or extend existing models of language-learning strategies. From a metacognitive perspective, AI-driven tools such as chatbots, automated feedback systems, and AI-based writing assistants can be understood as externalized control mechanisms that support learners' planning, monitoring, and evaluation. Rather than diminishing learner agency, these tools often operate as scaffolds to heighten metacognitive awareness through direct feedback, progress monitoring, and adaptive suggestions. Because of this, they also fit quite well into Flavell's (1979) conception of metacognitive control and Oxford's (1990) metacognitive strategy taxonomy. The same argument has been made within the framework of self-regulated learning theory, in which digital agents are considered to support goal setting, strategic action, and reflection.

From a sociocultural perspective, AI-mediated interaction both aligns with and departs from traditional conceptions of social mediation. While Vygotskian theory emphasizes learning through interaction with more capable others within the Zone of Proximal Development (ZPD), AI chatbots and intelligent tutors are non-human yet responsive interlocutors capable of providing contingent assistance. This both challenges and extends conventional definitions of "social" interaction, as learners engage in dialogic meaning-making, the negotiation of form, and low-anxiety practice environments mediated by AI. Scholars have argued that such tools may function as forms of digital scaffolding, offering simulated social interaction that complements rather than replaces human collaboration (Lantolf & Thorne, 2006).

More importantly, AI-driven strategies diverge from prior frameworks in how strategic control is redistributed between the learner and the technological artifact. Whereas classical models have conceptualized strategies as internally initiated learner actions, AI-supported strategies often emerge through human–machine interaction, raising theoretical questions about agency, autonomy, and strategy ownership. This shift has prompted recent discussions in applied linguistics about whether AI-assisted behaviors should be conceptualized as extensions of existing strategy categories or as a qualitatively new class of technology-mediated strategies embedded within broader self-regulatory and sociocultural systems (Oxford, 2017). This issue is not merely conceptual. Recent reviews of ChatGPT and AI use in ESL/EFL education indicate that the field is expanding rapidly, but that many studies still focus on broad affordances and perceptions rather than on clearly theorized strategy use across specific language skills (Li et al., 2024; Lo et al., 2024). Therefore, a key theoretical task is to explain not only what AI can do, but how learners strategically use AI for planning, feedback seeking, rehearsal, revision, and interaction in skill-specific ways.

2.2. Empirical Studies

Empirical research on language learning strategies became most prominent when instruments to measure strategy use were developed. Rubin (1975) and Stern (1975) were the first to describe a good language learner; they hypothesized that good learners employ recognizable strategies, including practice, self-monitoring, and various socialization strategies. Additionally, the Strategy Inventory of Language Learning (SILL) of Oxford (1990) was particularly influential, as it provided a framework for assessing learners' strategy use across six categories. This questionnaire has been widely applied across diverse cultural /linguistic backgrounds and has yielded substantial comparative data. The findings were consistent in that successful learners reported more frequent and diverse strategies, particularly metacognitive and social strategies in the foreground. In an attempt to integrate strategies into teaching, the Cognitive Academic Language Learning Approach (CALLA) proposed by O'Malley and Chamot (1990) linked language learning strategies with instruction design by demonstrating that the explicit teaching of the strategies, such as note-taking, summarizing, and self-monitoring, could improve the academic language performance of learners. Their contribution emphasized that instruction can be taught and transferred; therefore, it will guide the practice of teaching English to students learning English as an additional language. Nevertheless, later reviews have shown that a large proportion of LLS research remained dependent on global inventories and cross-sectional self-report data, which limited

insight into how strategies function in particular tasks, contexts, and skills (Rose et al., 2018). More recent work has consequently called for context-specific, skill-sensitive, and methodologically stronger designs (Hajar & Karakus, 2025; Thomas et al., 2021).

Whereas initial research tended to focus on general strategies, subsequent research began to examine specialized, skill-specific strategies. In listening, Vandergrift (2003) showed that predicting and monitoring metacognitive awareness are essential for enhancing understanding. The importance of interactional strategies (paraphrasing, turn-taking, and formulaic expressions) has been noted in studies regarding speaking skills (Nakatani, 2006). Inferencing and summarizing, as well as background knowledge, were considered as major strategies in reading research (Anderson, 1991). Writing studies, lastly, demonstrated that strategies such as planning and revision were closely associated with writing quality (Teng & Zhang, 2020). One of the earliest figures to construct a skill-specific questionnaire was Griffiths (2004), who provided a more detailed analysis of the difference between the strategies that learners use in listening, speaking, reading, and writing. Subsequent research using the same frameworks supported the notion that the strategy learners use depends on the task type, skill level, and learning context (Bai, 2018). Recent work has strengthened this argument by showing that strategy use in digital environments also varies by skill and by phase of self-regulation. For example, Zhou et al. (2024) developed and validated a mobile-assisted self-regulated listening strategy questionnaire, demonstrating that contemporary listening strategy use includes cognitive, motivational, and social dimensions that are closely tied to digital learning conditions. This is important because it suggests that skill-specific strategy research remains highly relevant, but that it must now account for digitally mediated and self-regulated forms of learning more explicitly.

A large part of the current literature has relied on self-report questionnaires, which has cast doubt on the validity of the findings because learners may be encouraged to overestimate or misrepresent strategy use due to biases or an inability to understand strategy use (Meter, 2020). To address this, other researchers have employed triangulation methods, combining questionnaires, interviews, and classroom observations. These studies offer a deeper understanding of how strategies are perceived and implemented in classroom contexts. This methodological issue has not disappeared in recent research. Mazandarani (2024) reports that questionnaire-based designs still dominate SRL research in ESL/EFL contexts, which reinforces the value of triangulated designs for examining what learners say they do, what they actually do, and how those behaviors relate to achievement.

As technology expands rapidly, recent studies have examined the effects of digital tools and artificial intelligence (AI) on strategy use. A more recent and better-supported strand of empirical research has begun to examine AI-mediated strategy use more directly. Belda-Medina and Calvo-Ferrer (2022) found that learners generally perceived chatbots as useful conversational partners for autonomous language practice. In writing, Yang et al. (2024) showed that students' engagement with AI-programmed automated writing evaluation was not uniform; rather, learners interacted with feedback selectively, which suggests that AI use is itself strategic and shaped by learner choices. At the review level, Li et al. (2024) and Lo et al. (2024) demonstrate that the empirical literature on ChatGPT in language education has grown rapidly, but it is still uneven: writing receives the greatest attention, while speaking, listening, and reading remain comparatively under-researched, and many studies focus on perceptions or general affordances rather than on robust evidence of skill-specific strategic behavior. Thus, the literature does not yet clearly show how AI-mediated strategies operate across the four macro skills, how they relate to achievement, or how learners' reported AI use compares with observed practice.

This gap leads directly to the present study. Our research questions do not merely revisit traditional LLS frequency patterns; they extend earlier skill-specific work by asking which strategies are most used across the four macro skills, whether those strategies relate to end-of-course success, which additional strategies learners report beyond the questionnaire, how AI-related strategies are perceived, and how observed strategy use compares with self-report. In this sense, the present study is positioned at the intersection of three lines of inquiry that have rarely been integrated in one design: skill-specific LLS research, contemporary AI-mediated language learning, and triangulated validation of reported strategy use.

3. Method

3.1. Research design

This study employed a mixed-methods design to obtain a more comprehensive understanding of language learners' strategy use in the AI era. More specifically, it followed a convergent mixed-methods design in which quantitative and qualitative data were collected within the same overall phase of the study, analyzed separately, and then integrated during interpretation. The quantitative strand addressed the frequency of skill-specific strategy use and its relationship with end-of-course scores through questionnaire data and statistical analysis. The qualitative strand, based on semi-structured interviews and classroom observations, was used to explore learners' perceptions of useful strategies, their views of AI in language

learning, and the extent to which observed strategy use corresponded with self-reports. In this way, the mixed-methods design enabled triangulation across data sources and provided both breadth and depth in addressing the research questions.

3.2. Participants

The participants in the present study were selected via purposive sampling from various language institutes in Iran and were all at the upper-intermediate (B2) level. The number of participants was 48, comprising 53% males and 47% females, aged 14-25. It is important to note that the classification level was based on the CEFR (Common European Framework of Reference), as determined by the learners' respective institutions.

3.3. Instruments

Three instruments were utilized for the present study. An updated version of the 'Language Skills Development (LSD) Strategy Questionnaire' (Griffiths, 2004) was used to collect data. This questionnaire is skill-based and composed of 48 items, 12 for each macro skill. It should be noted that most of the items in the questionnaire are the same items in the original questionnaire proposed by Griffiths; however, due to the advancement of technology, specifically the advent of AI-powered chatbots and apps and their significant role in the language learning process, the researcher felt a tangible need to modify some items and convert the final version of the questionnaire into one which is more in line with the contemporary changes (see Appendix A). The reliability coefficient for the questionnaire was 0.88, piloted with a sample of 42 learners prior to the present study. Further, to evaluate the predictive validity of the language skills development strategy use questionnaire, a linear regression analysis was conducted with end-of-course scores as the dependent variable and the average frequency of language skills development strategy use (total strategy use) as the predictor. The model explained a significant proportion of variance in scores, $R = .875$, $R^2 = .765$, $F = 149.671$, $p < .001$. This indicates that 76.5% of the variability in language proficiency, as measured by end-of-course scores, was accounted for by students' reported strategy use, supporting the questionnaire's predictive validity. The overall model was statistically significant, confirming that the frequency of use of language skills development strategies reliably predicts language proficiency outcomes among language learners from institutes. The second instrument utilized for the present study was a semi-structured interview with two questions regarding the learners' language learning strategy use as well as the extent to which they use AI-related strategies in the spirit of their language skills development (see Appendix B). To ensure the

suitability of the questions, they were verified by two language experts and piloted with 42 participants prior to the main interview sessions. Each interview lasted approximately 15–20 minutes, was audio recorded with consent, and was later transcribed verbatim for thematic analysis. Additionally, using an observer guide (see Appendix C), a continuous observation of students' strategy use in the class was conducted by the teacher himself as a non-participant to analyse the situation as naturally as possible. The presence of the teacher as the observer was supported because it significantly reduced the likelihood that participants would behave unnaturally in class, whereas an outsider as the observer may influence learners' normal behavior.

3.4. Data analysis

The present study adopted a mixed-methods research design, analysing the data both quantitatively (descriptive and inferential statistics) using SPSS and qualitatively by identifying patterns and themes derived from interviews and observations. Descriptive statistics were used to answer RQ1, correlation analysis was used to address RQ2, and the independent-samples t-test was used to compare successful and less successful learners in terms of overall strategy use. Before conducting the parametric analyses, assumptions of normality and homogeneity of variances were checked. For the qualitative analysis, a thematic analysis approach (Braun & Clarke, 2006) was employed to systematically identify, analyze, and report patterns within the interview and observational data. This part of the analysis addressed RQ3–RQ5.The process involved six phases: (1) familiarization with the data through repeated reading of transcripts and field notes; (2) generating initial codes for salient features of the data; (3) searching for themes by collating relevant codes; (4) reviewing themes to ensure they cohered meaningfully and reflected the coded data; (5) defining and naming themes; and (6) producing the final report. Coding was conducted inductively, allowing themes to emerge from the data rather than being imposed by a pre-existing framework. To enhance trustworthiness, a second researcher independently coded a subset (20%) of the transcripts. An inter-coder reliability check yielded an agreement rate of 87%, with discrepancies resolved through discussion. The remaining 13% of discrepant codes were discussed jointly and resolved through consensus, and the agreed coding was then used in the final analysis.

3.5. Procedure

The questionnaire was administered online; participants accessed it via a Google Form link and were given complete discretion to respond at their convenience. Because the participants were drawn from various

language institutes, the online format and extended response window were intended to maximize participation and allow learners sufficient time to complete the questionnaire under convenient conditions. After approximately 80 days, the data were fully collected. The questionnaire was administered first because it provided the initial broad picture of learners' reported strategy use across the four macro skills and helped establish the quantitative basis of the study.

Afterwards, the learners were invited to participate in interview sessions to gather their insights on the use of strategies and the potential role of AI in their language learning. The interviews were conducted after the questionnaire in order to elaborate on, clarify, and extend the self-reported responses, particularly with regard to strategies not fully captured by the questionnaire and learners' views of AI-related strategies.

Finally, over 10 sessions, the observation component was conducted to identify potential patterns in participants' strategy use and their correspondence with self-reported data. To ensure rigor in the qualitative phase, trustworthiness was strengthened through triangulation of data sources, prolonged engagement with the data through repeated reading of transcripts and field notes, independent coding by a second researcher for a subset of the data, and discussion-based resolution of coding disagreements until consensus was achieved The observation phase was placed after the questionnaire and interviews so that reported strategy use could be compared with naturally occurring classroom behavior. The observations were carried out across 10 class sessions by the teacher as a non-participant observer, using the observation guide presented in Appendix C. The main observation criteria included instances of note-taking, reading handouts or other material, asking questions, talking to other students, using a dictionary, and other observable strategy-related behaviors. It should be stated that informed consent was obtained from all the participants, and they were reassured of the confidentiality of their responses.

4. Results and Discussion

This study sought to investigate the LSD strategies across four macro skills by posing five different research questions. Before running the main statistical analyses to address these questions, two assumptions were checked. To ensure the normality of distribution across strategies, the Kolmogorov-Smirnov test was run, and the p value was reported to be insignificant ($p = .09$), meaning no substantial deviation from the normality ($p = .09 > .05$). This signifies that the assumption of normality was met. Additionally, to verify homogeneity of variances across strategy groups, Levene's test was used, and the results showed that variances were equal ($F =$

.181, p = .673 > .05). This indicates that the second assumption was met, and we could proceed with parametric tests.

4.1. Questionnaire Results

Table 1 addresses the first research question by presenting the most frequently used strategies in ascending order. This indicates that writing strategy 5 (the number shows the order of items in the questionnaire regarding each skill), listening strategy, speaking strategy 4, speaking strategy 1, and listening strategy 10 were used most frequently, and there were no reading or AI-related strategies among the top five.

Table 1

Descriptive Statistics of Strategies

	Mean	Std. Deviation
If I cannot think of the correct expression, I think of another way to express my meaning (e.g., synonyms)	4.60	.610
I use the media (e.g., radio, TV, or movies) to practice my listening skills.	4.54	.617
If I am corrected while speaking, I try to remember the correction and avoid repeating the same mistake.	4.48	.618
I repeat the new language to myself in order to practice it	4.48	.618
I try to pronounce the target language like native speakers	4.48	.618

Table 2 addresses the second research question regarding the relationship between LSD strategy use and success in terms of end-of-term scores using Pearson product-moment correlation. The correlation analysis revealed several moderate-to-strong positive relationships, according to Cohen (1988), correlation coefficients can be interpreted as small when they range from .10 to less than .30, moderate when they range from .30 to less than .50, and strong when they are .50 or higher, between specific language-learning strategies and end-of-course scores. In particular, several reading- and writing-related strategies, including those supported by AI tools, demonstrated strong associations with achievement. These findings suggest that learners who reported using a wider range of cognitively and metacognitively demanding strategies—especially those involving planning, summarization, and feedback—tended to obtain higher course scores. Importantly, these correlations should be interpreted as indicators of

association rather than effectiveness. While the results highlight patterns distinguishing more successful from less successful learners, they do not establish that the use of particular strategies directly led to improved performance.

Table 2

Strategies With Moderate and Strong Correlations With End-of-Term Scores

SKILL	STRATEGY	CORRELATION	
READING	I use my background knowledge to make sense of the text	Pearson Correlation Sig.	.405 .004
READING	I make summaries of what I read, possibly using AI	Pearson Correlation Sig.	.414 .003
READING	I make predictions about what I will read next	Pearson Correlation Sig.	.749 < .001
READING	I use AI tools (like Chat GPT, Copilot, and Deep AI) to create reading passages about topics I enjoy	Pearson Correlation Sig.	.704 < .001
WRITING	I write a variety of text types in the target language (e.g., notes, messages, lists)	Pearson Correlation Sig.	.713 < .001
WRITING	I plan my writing before I start	Pearson Correlation Sig.	.511 < .001
WRITING	I use reference materials (e.g., a dictionary, thesaurus, grammar book, or AI) to check that what I am writing is correct.	Pearson Correlation Sig.	.716 < .001
WRITING	I write a diary in the target language, either on paper or online.	Pearson Correlation Sig.	.502 < .001
WRITING	I get someone to proof read my writing	Pearson Correlation Sig.	.547 < .001
WRITING	I use AI chatbots such as ChatGPT, Copilot, Deep AI, etc., to proofread my writing and receive feedback.	Pearson Correlation Sig.	.572 < .001
WRITING	I use social media apps to communicate with native speakers through text messages.	Pearson Correlation Sig.	.716 < .001
LISTENING	I use the media (e.g., radio, TV,	Pearson Correlation	.509

	or movies) to practice my listening skills	Sig.	< .001
LISTENING	I predict what the other person will say next based on context, background knowledge, or what has been said so far.	Pearson Correlation Sig.	.517 < .001
LISTENING	I use AI chatbots such as ChatGPT, Copilot, Deep AI, etc., to improve my listening by asking them to read stories that I like to me.	Pearson Correlation Sig.	.745 < .001
SPEAKING	I seek out people with whom I can speak the target language through social media.	Pearson Correlation Sig.	.495 < .001
SPEAKING	If I am corrected while speaking, I try to remember the correction and avoid making the same mistake again.	Pearson Correlation Sig.	.512 < .001
SPEAKING	I practise the target language with other students	Pearson Correlation Sig.	.608 < .001
SPEAKING	I voice message AI chatbots such as ChatGPT, Copilot, Deep AI, etc., when I have a question instead of texting them.	Pearson Correlation Sig.	.429 .002
SPEAKING	I call AI chatbots such as Copilot, Deep AI, and talk to them to improve my speaking skills	Pearson Correlation Sig.	.631 < .001

Furthermore, to complement the correlation analysis for RQ2, an independent-samples t-test was conducted to examine whether successful and less successful learners differed in their overall frequency of LSD strategy use. The results revealed a significant difference in the average mean scores of LSD strategy use between successful learners (n = 31; scores ranging from 85–100) and less successful learners (n = 17; scores ranging from 70–84), $t(46) = 8.816$, $p < .001$, with successful students reporting a higher mean use ($M = 4.14$) than less successful students ($M = 3.48$), yielding a mean difference of 0.66. These findings indicate that more successful learners reported using language skills development strategies more frequently overall than their less successful counterparts.

4.2. Interview Results

To answer the third and fourth research questions, the findings of the interview sessions were analyzed thematically. A total of 12 learners participated in the semi-structured interviews. The interview transcripts were read repeatedly, coded inductively, and then grouped into broader categories based on recurring patterns in learners' reported practices and perceptions. Similar codes were merged and refined into two final themes in order to capture both the non-questionnaire strategies learners reported and their views of AI-assisted learning. The analysis revealed two overarching themes concerning learners' strategy use beyond the questionnaire: (1) Immersive and Self-reflective Practice Strategies, and (2) AI as a Supplementary yet Ambivalent Tool. For conciseness, only the most recurrent strategy clusters and representative excerpts are presented below. Within these themes, specific strategies and perceptions were categorized, as detailed below.

Theme 1: Immersive and Self-reflective Practice Strategies

Learners frequently reported leveraging entertainment media and private rehearsal techniques to create immersive or low-anxiety practice environments. The most commonly cited strategies included:

1. Gamified and Media-based Immersion: Playing computer games in English, watching movies and TV shows in the original language, and using English subtitles were highlighted as methods for incidental learning and exposure to authentic language.
2. Private Speaking Rehearsal: Strategies such as speaking in front of a mirror and recording one's own voice for subsequent review were used to build confidence and self-monitor pronunciation and fluency without social pressure.
3. Structured Input Engagement: Activities like studying graded readers, listening to songs while reading lyrics, and consuming English audiobooks or podcasts were used to manage input difficulty and enhance comprehension.
4. Social Learning: Talking to friends who speak English was valued for authentic, interactive practice.

Taken together, these responses suggest that learners tended to favor strategies that combined repeated exposure, reduced anxiety, and opportunities for self-monitoring. Rather than functioning as isolated techniques, these practices reflected a broader tendency toward personally manageable and confidence-building forms of language use.

Selected interview excerpts illustrate the rationale behind these strategies:

*"When I speak in front of the mirror**, I feel more confident because no one judges me**, and I can focus on my pronunciation." (Participant 7)*

*"Recording my voice helps me **notice mistakes that I do not realize while speaking**." (Participant 19)*

*"Watching movies with English subtitles helps **me learn new expressions and understand how native speakers talk**." (Participant 14)*

*"Reading graded readers is useful because they are **not too difficult**, and I can **understand the story without stress**." (Participant 22)*

Theme 2: AI as a Supplementary yet Ambivalent Tool

Interviews provided nuanced insights into the role of AI, bifurcating learners into those who integrated it and those who hesitated.

Sub-theme 2.1: AI for Accessible and Low-anxiety Practice

A significant proportion of learners (42%) acknowledged AI's role, primarily using chatbots (e.g., ChatGPT, Copilot, Grok) for speaking practice, proofreading, and generating reading materials—the perceived benefits centred on accessibility, immediate feedback, and a judgment-free space for trial and error. This percentage was calculated from the interview sample: 5 out of the 12 interviewees reported active use of AI tools for language learning, which equals 41.7% and was rounded to 42%.

*"I usually talk to AI chatbots like ChatGPT because **I can practice speaking anytime, even late at night.**" (Participant 31)*

*"Talking to AI is **less stressful than talking to classmates because I am not afraid of making mistakes**." (Participant 16)*

*"AI helps me practice speaking more because **I do not have time to meet people every day.**" (Participant 40)*

Sub-theme 2.2: Barriers to AI Adoption

However, 58% of learners expressed limited or no engagement with AI tools. Thematic analysis of their reasons identified key barriers:

1. Preference for Human Interaction: A desire for the social and emotional nuances of human communication.
2. Negative Perceptions of AI Feedback: Discomfort with the tone or impersonal nature of automated feedback.

3. Overwhelm and Lack of Literacy: Confusion due to the plethora of available tools and a lack of knowledge on how to use them effectively.
4. Access Issues: Mention of limited or unclear access to certain AI applications.

These responses indicate that non-use of AI was not based on a single factor, but on a combination of emotional, practical, and knowledge-related constraints. Analytically, this theme shows that learners' orientation toward AI ranged from active adoption to cautious distance, with hesitation often shaped by unfamiliarity and perceived impersonality rather than outright rejection of technology itself.

These barriers are exemplified in the following excerpts:

"I prefer talking to real people ***because I feel more comfortable and relaxed****." (Participant 5)*

"Sometimes the feedback from AI feels too direct, and ***it makes me discouraged****." (Participant 11)*

"There are many AI apps, but ***I do not know which one is good or how to use them properly****." (Participant 28)*

"I have not learned how to use AI tools for language learning, ***so I do not really trust them.****" (Participant 34)*

Delving into these answers, we realize that, except for the first one, which is related to learner preference, all the rest somehow converge at the point of learners' unfamiliarity with various AI-powered apps. The reasons being that not all AI apps are insensitive to the learners' feelings due to their indirect manner of feedback provision such as Copilot and Grok, some of the AI apps are indeed user-friendly as well as being free of charge such as Copilot and with the free version of this app learners can easily obviate their needs without time limit for speaking, for instance, as opposed to ChatGPT, which has very limited time of speaking in their free version. These findings necessitate AI literacy on the part of language learners.

4.3. Observation Results

Apropos of the last research question, the observation of learners' use of strategies in the class revealed that the learners used the following strategies most frequently:

1. Use of an online) dictionary
2. Note-taking
3. Peer interaction
4. Teacher assistance
5. AI assistance (for unknown words and phrases)

By comparing these strategies with those mentioned in the questionnaire, we realized that there was a match between the self-reported strategies by the learners and the observed strategies. The observation data were documented by means of the observation guide presented in Appendix C, which focused on visible classroom behaviors such as note-taking, reading handouts or other materials, asking questions, talking to other students, using a dictionary, and other observable strategy-related behaviors. The classroom observation findings are presented here as descriptive results based on recurring observed behaviors. No systematic coding framework, frequency count, or inter-rater reliability measure was applied to the observation data. It should be noted that during the keen observation process, all the learners who achieved a successful score (N=31) were observed using at least one of the above-mentioned strategies, and only 5 of the less successful learners (N=17) were observed using such strategies and the rest either did not use the strategies or just used the dictionaries and note-taking as their main strategies.This comparison is reported only as a descriptive pattern observed in the classroom, since no inferential statistical analysis was conducted on the observational data.

4.4. Discussion

The findings revealed that the most commonly used strategies by the learners were associated with listening and speaking, which included media use, memorization of corrective feedback, repetition of language, and practicing pronunciation. These findings are in keeping with Bijani et al. (2023), who noted that repetition, correction recall, and pronunciation imitation are among the most frequent communicative strategies used by Iranian learners when speaking. Similarly, Bozorgian and Muhammadpour (2025) found that learners who practiced listening comprehension through immersive platforms employed more prediction and repetition. Rather than simply repeating the questionnaire results, these findings suggest that the learners in the present context still rely most heavily on oral/aural and interaction-oriented strategies for everyday language development. This is important when revisiting Griffiths (2004), because it indicates that, despite the emergence of AI and digital tools, the broad pattern of strong reliance on speaking- and listening-related strategies appears to remain stable across time. At the same time, the present findings extend Griffiths's skill-specific framework by showing that the strategic landscape has expanded, even if

newer AI-mediated strategies have not yet become the most frequently practiced options.

The findings of the present study, however, contrast with those of Saeedi and Soltani (2025), who reported that AI-directed pragmatic instruction led to greater adoption of digital strategies across reading and writing. A more cautious interpretation, however, is needed here. The current study does not show that learners rejected AI; rather, it suggests that AI-related strategies had not yet become normalized as routine practices for most participants. This interpretation is consistent with recent reviews showing that AI use in language learning is expanding rapidly, but adoption remains uneven across contexts, tasks, and skills, and many learners use such tools selectively rather than habitually. Digital literacy and access may explain the low use of AI tools in the Iranian context although the present study itself did not directly measure digital literacy, access, or prior AI training. Therefore, these factors should be treated as plausible interpretations rather than firm conclusions.

The correlation analysis of the second research question revealed that strategies, particularly AI-assisted ones in reading and writing, were significantly correlated with end-of-course scores. The successful learners also reported using strategies more frequently and more diversely than their less successful counterparts. This is one of the most important findings of the study and requires interpretation rather than simple restatement. The result does not mean that AI strategies were universally important across the sample. Rather, it suggests that when learners did use certain AI-supported reading and writing strategies, they may have used them in more focused, achievement-oriented ways, especially for planning, summarizing, proofreading, and feedback uptake. In other words, low frequency at the group level is not incompatible with stronger associations with achievement at the individual level. A strategy can be relatively uncommon yet still distinguish higher-performing learners if those learners use it more purposefully or effectively than others**.** This observation is consistent with recent work on AI-supported writing and feedback, which shows that learners do not engage with AI feedback uniformly; instead, uptake is selective and strategically mediated. This also aligns with broader LLS and self-regulation research, which has increasingly emphasized quality, fit, and regulation of strategy use rather than frequency alone.

At the same time, the present data do not justify claiming that AI itself caused better performance. The findings show association, not causation. A more defensible interpretation is that AI-related strategies may have functioned as part of a broader repertoire of self-regulated behavior among stronger learners. Recent reviews of ChatGPT in language education

similarly suggest that AI tends to be most beneficial when integrated into broader learning routines rather than treated as a stand-alone solution.

Interviews also found that learners appreciated the use of immersive and interactive strategies, such as games, movies, mirror speaking, self-recording, and chatting with AI bots. The use of graded readers, music, and podcasts was also mentioned as applicable, indicating a hybrid approach to both conventional and AI-assisted learning.

What is more important analytically is that these interview responses portray strategy use as hybrid rather than polarized. Learners did not describe a shift from traditional strategies to AI-based ones; instead, they described combining old and new resources depending on convenience, confidence, and task demands. This interpretation helps create a more coherent transition between the literature review and the present findings, since current scholarship increasingly treats technology-mediated strategy use as an extension of broader self-regulated learning rather than as a complete replacement for conventional strategies.

Another finding from the study was that 42 percent of learners found AI valuable in their learning, whereas 58 percent reported knowing little about or feeling uncomfortable with AI applications. This pattern should be interpreted carefully. The present study does provide evidence of uneven familiarity and mixed attitudes toward AI, but it does not directly test an intervention in AI literacy or measure the effectiveness of such training. Therefore, rather than making a strong pedagogical claim, it is more accurate to say that the findings point to a possible need for guided support in how learners evaluate and use AI tools. Recent empirical and review studies support this more cautious interpretation by showing that learners often value AI for accessibility, immediacy, and low-anxiety practice, while also expressing uncertainty about trust, feedback quality, and how to use such tools effectively.

Lastly, classroom observations were often largely consistent with self-reported data, as these were supported by dictionaries, note-taking, peer collaboration, and AI tools. Nevertheless, the difference between successful and less successful students indicates that achievement may be differentiated not only by how often strategies are used, but also by the variety and appropriateness of strategy use. Because LLS research has long been criticized for overreliance on self-report, this convergence between questionnaire, interview, and observation data is one of the more meaningful contributions of the study. In that sense, the discussion should return to the replication purpose more clearly: whereas Griffiths (2004) mainly provided a skill-specific questionnaire-based picture, the present study revisits that line of inquiry in the AI era and strengthens it by triangulating reported and observed strategy use. This does not eliminate all limitations in the

observation data, but it does make the present replication more methodologically informative than a simple re-administration of the earlier framework.

Altogether, the results support the idea that learners still use strategies based predominantly on oral/aural performance, yet some AI-assisted reading and writing strategies are positively associated with success. The main contribution of the study, therefore, is not to claim that AI has replaced traditional language learning strategies, but to show that the skill-specific framework associated with Griffiths (2004) remains useful while requiring expansion in the AI era. The present findings suggest continuity in learners' dependence on familiar oral/aural strategies, alongside selective emergence of AI-mediated strategies that may matter most for higher-performing learners. Seen this way, the study both replicates and updates Griffiths's original agenda.

5. Conclusion and Implications

The findings could be treated as valuable assets to language learners who seek autonomy by using the strategies reported most frequently and those associated with language learning success, specifically AI-assisted ones. Additionally, material developers, course designers, and instructors could benefit from these findings by including them in their material and teaching methodology so that learners are well-introduced to such learning devices for the betterment of their learning process. Having said that, the integration of AI-assisted learning strategies in the pedagogy also calls for attention to issues that go beyond the potential for the augmentation of autonomy and performance. From the pedagogical point of view, there is a need for clear teacher and material design guidance to make use of AI-assisted strategies in a strategic, rather than mechanical, way so that the learner does not remain passive in the learning process of planning, monitoring, and evaluating their learning. However, the issues of ethics and emotions, for example, learner discomfort with automated responses, feelings of being treated in an impersonal way, and the reliability and suitability of responses generated by AI, among others, also assume crucial importance and can potentially shape the intentions of the learner to use the strategy. Issues of access, for example, disparities in access to AI strategies, lack of digital literacy, and the provision of institutional supports, further add to the complexity in making the use of the AI-assisted strategies for equal learners. This integration of different issues is crucial if the use of AI is to be made as an additional strategy to the traditional approach for learning languages, and not an inhibitor to it.

Future researchers are encouraged to explore the language skills development strategies in different geographical contexts with larger sample

size due to the contextual limitation of this study (Iranian context) and within a broader area of AI-assisted apps and chatbots to detect the degree to which these strategies are addressed and focused on in their teaching approaches and methodologies as well as using various designs such as content analysis and longitudinal studies to track the language skills development strategies over the course of time.

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Appendices

Appendix A

Language Skills Development (LSD) Strategy Questionnaire

Please rate the following strategies according to how strongly you agree or disagree with how they represent your own personal use.

5=strongly agree 4=agree 3=neutral 2=disagree 1=strongly disagree

	READING SKILLS	RATING	COMMENT/EXAMPLE
1	I read extensively for information in the target language.		
2	I read for pleasure in the target language, either in book form or online		
3	I find reading material at my level, either in book form or online		
4	I use my background knowledge to make sense of the text		
5	I first skim read a text then go back and read it more carefully		
6	I look for how a text is organized and pay attention to headings and sub-headings		
7	I make summaries of what I read, possibly using AI		
8	I make predictions about what I will read next		
9	I guess the approximate meaning of vocabulary by using clues from the context		
10	I use a dictionary (either paper or online) to get the exact meaning		
11	I read the news (in newspapers or online)		
12	I use AI tools (like ChatGPT, Copilot, Deep AI) to create reading passages about topics I enjoy		
	WRITING SKILLS		
13	I write letters or e-mails to friends in the target language		
14	When my mistakes are corrected, I learn from the corrections		
15	I write a variety of text types in the target language (e.g. notes, messages, lists)		
16	I plan my writing before I start		
17	If I cannot think of the correct expression, I think of another way to express my meaning (e.g. synonyms)		
18	I use reference materials (e.g. a dictionary, thesaurus, grammar book or AI) to check that what I am writing is correct		

19	If I am unsure about something, I want to write I try to express my meaning and do not worry too much about correctness
20	I write a rough copy before writing a good copy
21	I write a diary in the target language, either on paper or online
22	I get someone to proof read my writing
23	I use AI chat bots such as ChatGPT, Copilot, Deep Ai etc., to proof read my writing and receive feedback
24	I use social media apps to communicate with native speakers through text messages
	LISTENING SKILLS
25	I use the media (e.g. radio, TV or movies) to practice my listening skills
26	I listen to music with lyrics
27	I listen to apps such as Castbox which provide target language podcasts to improve my listening.
28	I listen for key words which seem to carry most of the meaning.
29	I predict what the other person will say next based on context, background knowledge or what has been said so far
30	I ask the speaker to slow down, repeat or clarify if I do not understand
31	I avoid translating what I hear word-for-word
32	I use the speaker's tone of voice, gestures, pauses or body language as a clue to meaning
33	If I am unsure about meaning I guess in order to maintain communication
34	I listen carefully to how native speakers pronounce the language I am trying to learn.
35	I use social media apps such as You tube, Instagram, etc., to listen to video clips to improve my listening
36	I use AI chat bots such as ChatGPT, Copilot, Deep Ai etc., to improve my listening by asking them to read stories that I like to me
	SPEAKING SKILLS
37	I repeat new language to myself in order

	to practice it
38	I seek out people with whom I can speak the target language through social media.
39	I plan in advance what I want to say
40	If I am corrected while speaking, I try to remember the correction and avoid making the same mistake again
41	I ask questions in order to create conversation
42	I do not worry about correctness as long as I can communicate my meaning
43	If necessary, I use gestures to convey my meaning and keep a conversation going
44	I practise the target language with other students
45	If I do not know the vocabulary I want to use, I use similar words or phrases or make them up
46	I try to pronounce the target language like native speakers
47	I voice message AI chat bots such as ChatGPT, Copilot, Deep Ai etc., when I have a question instead of texting them
48	I call AI chat bots such as Copilot, Deep Ai and talk to them to improve my speaking

Appendix B
Interview questions

1. Are there any other strategies that you use to help develop your language skills?
2. How much do you think AI (artificial intelligence) has affected the way you learn language?

Appendix C
Observation guide

Dear Observer.
Please note down any instances which you observe of students using the following strategies:

- Note taking
- Reading handouts or other material
- Asking questions
- Talking to other students
- Using a dictionary
- Other