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ORIGINAL CONTRIBUTION

Structural Equation Modelling of Interrelated Dimensions of Self-Regulated Learning among Saudi EFL University Students

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Abstract— Although self-regulated learning has received considerable attention in second language research, much of this work has examined individual strategies or broad strategy categories, leaving the structural relationships among specific forms of regulation less clearly understood in EFL settings. This study examined how eight self-regulated learning strategy dimensions are related among Saudi undergraduate EFL learners. A quantitative cross-sectional correlational design was employed. Following the adaptation of the questionnaire of English self-regulated learning strategies, exploratory and confirmatory factor analyses were conducted with two independent samples of 240 learners, resulting in a 41-item measurement structure comprising eight dimensions. Structural equation modelling was then conducted with a main sample of 789 undergraduate EFL learners. The findings revealed systematic relationships across reflective, cognitive, motivational, and socially oriented forms of regulation. Self-evaluation was positively associated with organising and transforming, while persistence was strongly related to rehearsing and memorising and seeking opportunities. Seeking social assistance was closely associated with the use of the native language, and organising and transforming was positively related to interpretive guessing. The analysis also identified indirect relationships linking self-evaluation to persistence through rehearsing and memorising, and organising and transforming to seeking opportunities through seeking social assistance. Persistence occupied a particularly prominent position in the model and showed a substantially stronger relationship with interpretive guessing than seeking opportunities. These findings advance a relational account of self-regulated language learning in which strategy dimensions are functionally distinct but systematically connected. More specifically, the results position persistence as an important motivational component associated with cognitive strategy use, opportunity seeking, and inferential processing. The study extends current understanding of how self-regulation is organised among Saudi EFL learners and provides a basis for instructional approaches that connect reflective appraisal, strategic action, sustained engagement, and purposeful use of social resources rather than addressing individual strategies in isolation.

Index Terms— Cognitive strategies, EFL, Persistence, Self-evaluation, Self-regulated learning, Social strategies, Structural equation modelling

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Introduction

Self-Regulated Learning (SRL) has recently gained increasing attention in Second Language (SL) research. The central notion of SRL is that successful language learning depends less on the type of instruction learners receive than on what they do with it. That is, learners evaluate their own progress, organise and structure learning activities to achieve desired ends, sustain motivation when things get difficult, seek help from others

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when needed, and control and manage the learning strategies they employ to achieve a range of learning goals. In EFL research, findings consistently show that self-regulation is significantly related to various language-related outcomes, including language achievement, learners' self-efficacy beliefs, and motivational beliefs (M. Almayez, 2025; An et al., 2021; Bai & Wang, 2023). SRL therefore helps explain what learners do with foreign language learning beyond the classroom and how they sustain meaningful progress over the long haul.

Although much research has been conducted on SRL, little is known about the internal organisation of SRL strategies. Most studies on SRL focus on learners' use of certain strategies, differences between learner groups, or the correlation between SRL and other educational outcomes. These studies have stressed the importance of learners' self-regulation, but it is still unclear how the various strategies that make up SRL are organised internally. The eight SRL strategies, namely self-evaluation, cognitive organisation, rehearsal, persistence, social assistance, opportunity seeking, first language use, and interpretive guessing, serve different regulatory functions and differ from one another in the regulatory functions they perform. In other words, the contribution of each of the eight strategies to language learning can be determined partly by the correlations with the other strategies that the learner uses for self-regulation. Therefore, it is relevant to investigate the interrelations between the different strategies. Such correlations can determine a strategy's central or intermediate position within the overall organisation of a learner's regulatory strategies.

This question warrants closer attention in EFL contexts. Existing research has documented associations between SRL and motivational beliefs, self-efficacy, emotions, strategy use, and language achievement (Bai & Wang, 2023; Shen et al., 2026), while research across conventional and technology-assisted settings has demonstrated the relevance of regulatory strategies to language learning (An et al., 2021; Zhang & Zou, 2024). Far less is known about how specific SRL strategies are structurally related across reflective, cognitive, motivational, and social domains. Evidence is particularly limited in Saudi higher education, where research has given comparatively little attention to the internal relationships among the strategies EFL learners report using to regulate their learning. Establishing these relationships is important for determining whether SRL is adequately represented as a set of parallel strategy dimensions or whether particular strategies assume distinct structural roles within learners' regulatory activity.

Against this background, the present study examines structural relationships among eight dimensions of SRL in Saudi undergraduate EFL learners: self-evaluation, organising and transforming, rehearsing and memorising, seeking social assistance, persistence, seeking opportunities, use of native language, and interpretive guessing. The analysis focuses on theoretically specified direct and indirect relationships among these dimensions rather than treating them as an undifferentiated inventory of strategy use. Structural Equation Modelling (SEM) is used to examine these relationships simultaneously while accounting for the measurement structure of the constructs. The study thus seeks to provide a more differentiated account of how regulatory strategies are organised in EFL learning, with particular attention to the roles that specific strategies occupy within the proposed structural relationships. Its contribution lies in shifting attention from whether learners use particular strategies to how different forms of regulation are related within a broader structure of self-regulated language learning.

Literature Review

Self-regulated learning

SRL is defined as learners' purposeful regulation of their own cognition, motivation, and behaviour with respect to specific learning goals, rather than learning strategies (Panadero, 2023). Zimmerman (2002) cyclical model of SRL conceptualises learners' regulation in three phases: forethought, performance, and self-reflection. In the forethought phase, learners set specific learning goals and plan how to achieve them using specific learning strategies and corresponding motivation. In the performance phase, learners regulate and monitor their learning process while executing the planned learning activity. In the phase of self-reflection, learners judge their learning results to determine how they should change their learning goals, strategies, and effort in future learning situations. Therefore, learners' regulation is recursive, i.e., learners can at any time change their set learning goals, their learning strategies, as well as their learning effort in light of the information that they gain during the execution of a task as well as after the execution of a task (Al-Khresheh et al., 2026; M. A. Almayez et al., 2025; Gambo & Shakir, 2021; T. Wang & Lajoie, 2023). From a research perspective on evaluation and adaptation, learners' judgments about their learning process and results are especially relevant for the subsequent regulation of their learning activity (Raković et al., 2022). Thus, SRL is a learning process in which strategic action is constantly regulated in light of learners' learning goals, as well as their processing of information about their learning and the specific task at hand.

Theoretical accounts of SRL also distinguish among cognitive, metacognitive, motivational, behavioural, and contextual forms of regulation (Bourzeg, 2025; Karlen et al., 2023; Panadero, 2023). Cognitive regulation concerns processing, organising, transforming, and rehearsing information, whereas metacognitive regulation concerns monitoring understanding, evaluating progress, and modifying strategy use when existing approaches prove inadequate (Alvarez et al., 2022; Ceron et al., 2020). Motivational regulation concerns initiating and maintaining effort, particularly when learning becomes difficult, while behavioural regulation concerns managing actions and learning resources (Edisherashvili et al., 2022; Lee et al., 2023). These distinctions provide analytical clarity without implying that regulatory processes operate independently. Monitoring can prompt changes in cognitive strategy use, judgments of insufficient progress can alter effort allocation, and difficulties that cannot be resolved independently can make assistance from others relevant to continued learning. These connections align with accounts that conceptualise SRL as

adaptive regulation across cognitive, motivational, behavioural, and contextual dimensions rather than as separate categories of learner activity (Karlen et al., 2023; T. Wang & Lajoie, 2023).

SRL can be addressed theoretically by referring to the various types or forms of regulation. Hence, SRL includes cognitive, metacognitive, motivational, behavioural, and contextual regulation (Bourzeg, 2025; Karlen et al., 2023; Panadero, 2023). According to these views, cognitive regulation involves processing, organising, transforming, and rehearsing information (Alvarez et al., 2022; Ceron et al., 2020). Metacognitive regulation involves monitoring and controlling the understanding the learner has gained and evaluating learning outcomes. This form of regulation involves adjusting or changing the strategies a learner uses when they are not sufficient (Alvarez et al., 2022; Ceron et al., 2020). Motivational regulation relates to initiating and sustaining motivation to learn, and it plays a critical role when learning becomes difficult and overwhelming for learners. For this reason, learners must maintain motivation to continue learning independently (Edisherashvili et al., 2022; Lee et al., 2023). Last but not least, behavioural regulation refers to managing the actions and resources learners use for learning (Edisherashvili et al., 2022; Lee et al., 2023). Various aspects of SRL are intertwined and interdependent, and in some cases learners need assistance to overcome difficulties they cannot solve on their own (Karlen et al., 2023; T. Wang & Lajoie, 2023).

This conception is particularly relevant to foreign language learning, where regulation extends across comprehension, linguistic production, vocabulary development, practice, and communication. Research has associated SRL with L2 achievement and self-efficacy (Chen et al., 2026; Yusuf, 2025), motivational beliefs and English achievement (Bai & Wang, 2023), emotional experiences in university EFL learning (Shen et al., 2026), and differences in strategy awareness across levels of EFL proficiency (Habók et al., 2022). Research on technology-supported learning further indicates the relevance of self-regulation when learners assume greater responsibility for managing learning activities across online, blended, and less directly supervised settings (Anthonysamy et al., 2020; Fayaza & Ahangama, 2024; Xu et al., 2023). More broadly in second language research, Zhang and Zou (2024) identify multiple forms of self-regulatory strategy use and consider their benefits and pedagogical support. This body of scholarship supports a conception of language learning regulation that extends beyond cognitive strategy use. Learners evaluate progress, reorganise and rehearse linguistic material, sustain effort, seek assistance, make use of learning opportunities, draw on existing linguistic resources, and infer meaning when comprehension is incomplete. Although these activities serve different regulatory functions, treating them as isolated behaviours sits uneasily with the cyclical and multidimensional foundations of SRL. A stronger theoretical account regards them as differentiated forms of regulation whose relationships are central to understanding how learners manage the demands of foreign language learning.

Self-regulated learning strategies in language learning

The relevance of SRL strategies for language learners pertains to their roles in regulating aspects of language learning such as managing the language knowledge that learners acquire and using language for purposes of practice, communication, receiving feedback on language use, and maintenance of engagement in learning a language. These aspects of language learning place sustained demands on learners' cognitive and communicative systems. Thus, learners need to engage in SRL in a variety of settings, including in and out of class contexts (Al-khresheh, 2025; Orak, 2025; Shen et al., 2026). Zhang and Zou (2024) position SRL strategies as a means for language learners to exercise greater control over learning processes and respond strategically to task demands. Their relevance becomes especially apparent in instructional arrangements that transfer greater responsibility to learners. Regulation in flipped learning occurs not only during classroom activities but also before they take place, creating space for teacher regulation of student learning outside teacher-directed activities (Öztürk & Çakıroğlu, 2021). Importantly in the Saudi EFL context, cultivating learner independence and strategic engagement in language education in higher education settings is paramount (Oraby & Alaraj, 2024). Thus, it is essential to conceptualise SRL strategies in terms of the regulatory functions they serve, rather than as sets of instructional practices implemented with variable frequency.

While the term 'strategies' describes both cognitive and metacognitive strategies, the two differ in the nature of the activities learners use to regulate their learning. Learners use cognitive strategies to organise, transform, and rehearse linguistic input in order to remember it. The cognitive strategies learners use in EFL contexts relate to their use of learning strategies, and evidence suggests that strategic awareness increases with language proficiency and mastery (Habók et al., 2022). In contrast, learners use metacognitive strategies to monitor their comprehension, evaluate their learning, and adjust or change their use of learning strategies when needed. Learners' self-evaluation (evaluating and judging their own learning) supports metacognitive strategies, which learners can use to decide what type of learning is required to complete certain tasks successfully (Yan, 2020). Recent research has examined how learners in digitally supported learning environments learn to monitor and regulate their own learning (Elmabaredy & Gencel, 2024).

Language learning regulation also depends on motivational, behavioural, and social resources. Sustained progress in another language requires continued investment of effort despite incomplete comprehension, recurring errors, and periods in which improvement may be difficult for learners to perceive. Bai and Wang (2023) relate motivational beliefs, including self-efficacy and intrinsic value, to SRL and English achievement, providing empirical grounds for treating motivation as part of the regulatory process rather than as a separate learner characteristic. Teng (2024) similarly examines motivational beliefs and self-regulated strategy use in EFL writing. Behavioural regulation concerns learners' management of actions and resources, including decisions to seek additional opportunities for English use or obtain assistance when individual resources are insufficient. The social dimension is especially pertinent to language learning because teachers and peers can provide feedback, linguistic

information, and opportunities for interaction. Research connecting social support with SRL and academic resilience provides a basis for locating assistance-seeking within the broader regulation of learning (Nadeak, Surbakti, et al., 2024). Teacher support has also been examined in relation to learners' self-regulation in technology-supported language learning, indicating that learner regulation remains responsive to instructional and social resources (J. Wang et al., 2024).

Several strategies acquire a distinctive function when the object of regulation is an additional language. Learners may need to reorganise unfamiliar linguistic information, rehearse unconsolidated forms, sustain effort when comprehension fails, seek assistance, pursue opportunities for language use, draw on the first language, or infer meaning from partial linguistic information (AlHroob & Al-khresheh, 2026). C. Wang et al. (2013) reflect this domain specificity in the Questionnaire of English SRL Strategies (QESRLS) through categories that include self-evaluation, organising and transforming, rehearsing and memorising, seeking social assistance, persistence, seeking opportunities, use of native language, and interpretive guessing, alongside other strategy categories in the original instrument. Evidence from EFL instruction further places SRL within contexts involving metacognitive regulation of language learning (Dong, 2024), technology-supported writing and motivation (Liu et al., 2026), and flipped instruction involving higher-order thinking (Samadi et al., 2024). Research in culturally specific EFL contexts has also revealed the educational and sociocultural conditions surrounding learners' strategic activity (Ahmad & Aljohani, 2024; Yu, 2023). The literature thus supports a functional conception of language learning strategies in which cognitive processing, reflection, motivation, persistence, social resource use, and language-specific responses represent distinguishable forms of self-regulation. Their theoretical significance lies in the regulatory problems they address and the roles they play in the broader process of learning an additional language.

Conceptual Rationale and Research Hypotheses

Self-regulated language learning encompasses cognitive, metacognitive, motivational, behavioural, and social forms of regulation. This multidimensional perspective has provided a useful basis for examining strategy use in relation to proficiency, achievement, and motivation (Bai & Wang, 2023; Chen, 2022). A less developed issue concerns how these forms of regulation are related within the learning process itself. Conceptual distinctions among strategy dimensions are necessary, but they do not imply functional independence. SRL is cyclical, with judgments about learning informing subsequent strategic decisions, effort, and adaptation (Raković et al., 2022). The present model represents selected relationships within this broader cyclical process, not the cycle itself. Because the constructs were measured at a single point in time, the direction of the specified paths reflects their theoretical ordering and does not establish that one strategy precedes another. Reciprocal relationships among the strategies remain possible and require longitudinal data to examine. For language learners, regulation may consequently involve movement across different strategic functions as they evaluate their progress, work with linguistic material, sustain effort, seek resources, and respond to incomplete comprehension.

This relational perspective is particularly relevant to the strategy dimensions represented in language-specific models of SRL. Self-evaluation concerns reflective appraisal; organising, transforming, rehearsing, and memorising concern cognitive regulation of learning material; and persistence concerns maintaining effort (Habók et al., 2022). Seeking social assistance and seeking opportunities extend regulation to learners' use of social and environmental resources, while use of native language and interpretive guessing address problems associated with processing an additional language (C. Wang et al., 2013). These strategies are conceptually distinct but not mutually exclusive. Evaluation may inform how learners subsequently organise their learning; rehearsal may provide a cognitive route through which reflective judgments are associated with sustained effort; social assistance may facilitate access to further opportunities for language use; and persistence may be particularly relevant when learners must infer meaning despite incomplete linguistic knowledge. Subsequently, the theoretical question is not whether these strategies can be distinguished, but how their different regulatory functions are related within language learning.

This question remains insufficiently resolved in the second language SRL literature. Considerable attention has focused on strategy use, motivational correlates, instructional support, and language learning outcomes, whereas the structural relations among specific regulatory strategies have received comparatively less attention (Teng, 2024; Zhang & Zou, 2024). Evidence remains limited on whether these relationships characterise Saudi EFL learners. The resulting gap is more specific than a general shortage of SRL research in Saudi Arabia. What remains unclear is how reflective, cognitive, motivational, behavioural, social, and language-specific strategies are structurally associated within this context, including whether some strategies occupy intermediate positions between other forms of regulation. Addressing this issue permits SRL to be examined as an organised set of related regulatory functions rather than as an inventory of strategies considered separately.

The proposed relationships were selected based on the different regulatory functions these strategies serve in SRL. Self-evaluation, for instance, allows learners to judge their progress and reconsider how they organise their learning, providing a theoretical basis for its association with organising and transforming (Raković et al., 2022). Persistence concerns maintaining effort, making its relationships with rehearsal and the continued pursuit of opportunities for language use theoretically plausible (Bai & Wang, 2023; Zhang & Zou, 2024). Seeking social assistance and using the native language can both serve as resources when learners encounter difficulties they cannot readily manage through their existing target-language knowledge (C. Wang et al., 2013). Organising and transforming were linked to interpretive guessing because both involve strategic processing of linguistic information. Persistence and opportunity seeking were also related to interpretive guessing because continued engagement with the language provides further occasions for learners to work through incomplete or unfamiliar input (Habók et al., 2022; Zhang & Zou, 2024). The model was thus intended to test a theoretically defined set of functional relationships rather than every possible association among the eight SRL dimensions.

Accordingly, the following research question guides the analysis:

RQ: What structural relationships exist among the SRL strategy dimensions of Saudi EFL learners?

To answer this research question, the following hypotheses were tested:

H1: Self-evaluation is positively associated with organising and transforming.

H2: Persistence is positively associated with rehearsing and memorising.

H3: Seeking social assistance is positively associated with use of native language.

H4: Organising and transforming is positively associated with interpretive guessing.

H5: Persistence is positively associated with seeking opportunities.

H6: Rehearsing and memorising mediates the relationship between self-evaluation and persistence.

H7: Seeking social assistance mediates the relationship between organising and transforming and seeking opportunities.

H8: Persistence and seeking opportunities are positively associated with interpretive guessing.

Figure 1 presents the conceptual model and the hypothesised direct and indirect relationships among the eight SRL dimensions.

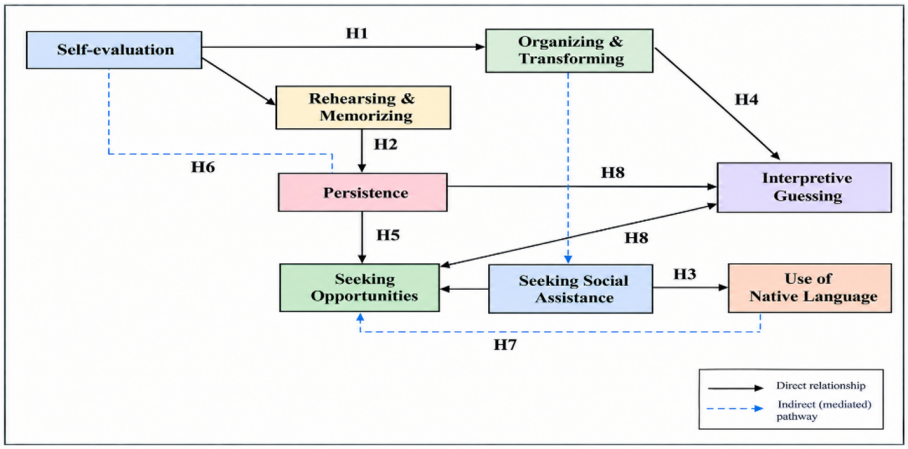


Fig. 1 *Conceptual model of the hypothesised relationships among SRL strategies*

Research Method

Research design

This study adopted a quantitative, cross-sectional correlational design to examine theoretically specified relationships among SRL constructs in undergraduate EFL students within Saudi higher education. SEM served as the principal analytical approach, permitting simultaneous estimation of the hypothesised direct and indirect relationships among latent constructs while accounting for measurement error. The cross-sectional design was appropriate because the variables were measured at a single point in time without experimental manipulation or intervention. Accordingly, the structural paths represent theoretically specified associations rather than causal effects.

Participants and sampling

The target population comprised undergraduate EFL students enrolled in higher education institutions in Saudi Arabia. Participants were eligible if they were currently registered as undergraduate students and studying English as a foreign language at the time of the study. The study excluded students outside the undergraduate level or those who did not meet these criteria. The study focused specifically on this population because the proposed structural model concerns SRL strategies used within undergraduate EFL learning. Participants were recruited using convenience sampling. This approach reflected the practical basis of recruitment, whereby eligible students who were accessible within the participating higher education context were invited to take part voluntarily. The procedure did not involve random selection from the national population of undergraduate EFL students or proportional allocation according to gender, age, or academic year. The sample should consequently be regarded as a non-probability sample rather than a nationally representative sample of undergraduate EFL students in Saudi Arabia.

The final analytical sample comprised 789 participants. Sample-size adequacy was evaluated through statistical power analysis based on the most complex structural equation specified in the hypothesised model. With a small anticipated effect size (f^2 = .02), α = .05, statistical power of .80, and three predictors, the analysis indicated a minimum required sample of approximately 550 participants. The final sample of 789 exceeded this requirement, providing adequate power to detect small effects within the specified structural relationships.

Participant characteristics are reported in Table I. The sample comprised 493 female students (62.5%) and 296 male students (37.5%). Most participants were younger than 20 years (n = 749, 94.9%); 37 (4.7%) were aged 20–25 years, two (0.3%) were aged 26–30 years, and one (0.1%)

was older than 30 years. Participants represented all four undergraduate academic years, although their distribution was markedly uneven. First-year students constituted 93.8% of the sample (*n* = 740), followed by second-year students (*n* = 26, 3.3%), fourth-year students (*n* = 18, 2.3%), and third-year students (*n* = 5, 0.6%). The demographic composition indicates that the sample primarily represents younger students in the early stage of undergraduate study rather than a proportionally distributed cross-section of undergraduate EFL students across academic years. Gender representation was less uneven, although female students constituted the majority. These characteristics define the population to which the findings can most directly be applied and warrant caution when extending the structural relationships to students in later academic years or to the wider population of undergraduate EFL students in Saudi higher education.

Table I
Demographic characteristics of the participants (*N* = 789)

Category	Subcategory	Frequency	Percent
Gender	Female	493	62.5
	Male	296	37.5
	Total	789	100.0
Age	Less than 20	749	94.9
	20 - 25	37	4.7
	26 - 30	2	0.3
	More than 30	1	0.1
	Total	789	100.0
Year	1st year	740	93.8
	2nd year	26	3.3
	3rd year	5	0.6
	4th year	18	2.3
	Total	789	100.0

Instrument

The original QESRLS comprises 67 items across 12 categories of self-regulated English learning strategies. Eight dimensions were selected because they correspond directly to the regulatory processes and structural relationships examined in the proposed model; the remaining four were excluded because they fell outside this predefined conceptual scope. The eight selected dimensions were self-evaluation, organising and transforming, rehearsing and memorising, seeking social assistance, persistence, seeking opportunities, use of native language, and interpretive guessing.

The selected dimensions represent metacognitive, cognitive, motivational, and behavioural aspects of self-regulated language learning. Self-evaluation addresses learners' monitoring and appraisal of their English learning, whereas organising and transforming involves restructuring, classifying, and organising language input. Rehearsing and memorising reflects repeated practice and retention of linguistic material, and seeking social assistance refers to obtaining support from teachers, peers, or other sources when learning difficulties arise. Persistence concerns sustained engagement despite difficulties in comprehension or task completion, while seeking opportunities reflects deliberate attempts to practise and use English beyond immediate classroom requirements. Use of native language refers to strategic reliance on the first language to facilitate English comprehension and production, and interpretive guessing involves drawing on contextual information, prior knowledge, and other available cues to infer meaning.

All items were rated on a five-point Likert-type scale ranging from Very Low (1) to Very High (5), with higher scores indicating greater reported use of the corresponding strategy. The questionnaire also collected demographic information on gender, age, and university level. Given the selection of eight dimensions from the original QESRLS and their application in the Saudi EFL context, the measurement structure and psychometric properties of the adapted instrument were examined prior to testing the structural model. Appendix provides the final version of the questionnaire following validation.

Validation procedures

The adapted QESRLS underwent a sequential validation process before testing the hypothesised structural model. The process comprised expert review for content validity, Exploratory Factor Analysis (EFA), and Confirmatory Factor Analysis (CFA). Two experts in applied linguistics and language education independently reviewed the 50-item version. The review assessed each item's relevance to its intended SRL dimension, wording clarity, conceptual appropriateness, and suitability for Saudi university EFL learners. The experts also examined the items for ambiguity, redundancy, and contextual appropriateness. Their comments informed revisions to the questionnaire prior to empirical validation.

EFA was conducted with an independent sample of 240 Saudi EFL learners. The EFA sample, the subsequent CFA sample (*n* = 240), and the main SEM sample (*N* = 789) were recruited from the same institution during the same data-collection period. The three samples were independent, with no participant included in more than one sample. The Kaiser-Meyer-Olkin measure and Bartlett's test of sphericity were used

to assess the suitability of the data for dimensional analysis. Principal component analysis with Varimax rotation was then applied to examine the structure of the adapted instrument. Component retention was guided by eigenvalues greater than one, the scree plot, parallel analysis, and the conceptual interpretability of the component solution. Item retention was determined from component loadings and the conceptual correspondence of each item with its intended SRL dimension.

CFA was subsequently conducted with a separate sample of 240 Saudi EFL learners who had not participated in the EFA. The measurement model was tested in AMOS, with the retained items specified as indicators of their respective latent dimensions. Model fit was evaluated using the chi-square statistic (χ^2), χ^2/df ratio, Comparative Fit Index (CFI), Tucker-Lewis Index (TLI), and Root Mean Square Error of Approximation (RMSEA). Internal consistency was assessed using Cronbach's alpha and Composite Reliability (CR), while convergent validity was examined through standardised factor loadings and Average Variance Extracted (AVE). After validating the measurement model, the instrument was administered to the main study sample (N = 789) to test the hypothesised structural relationships among the eight SRL dimensions.

Data collection and ethical considerations

Data were collected during the second semester of the 2025–2026 academic year using an online questionnaire administered through Qualtrics. The survey link was distributed electronically to undergraduate EFL students at the participating university. The opening page provided information about the study, participation requirements, and instructions for completing the questionnaire. Participants provided electronic informed consent before accessing the survey items. Participation was voluntary, and respondents could discontinue the survey at any point without penalty. Ethical approval was obtained from the Research Ethics Committee at Northern Border University prior to data collection. Participants were informed that their responses would remain confidential and would be used exclusively for research purposes. No personally identifying information was collected through the questionnaire, and access to the dataset was restricted to the research team.

Data analysis

Data analysis was conducted using IBM SPSS and AMOS. Prior to inferential analysis, the data were screened for missing values, outliers, normality, and multicollinearity. Univariate normality was examined through skewness and kurtosis, while multicollinearity was assessed using tolerance and variance inflation factor statistics. Descriptive statistics, including frequencies, percentages, means, and standard deviations, were computed to describe the participants and summarise the distributions of the study variables.

The dimensional structure of the adapted questionnaire was first examined through EFA in SPSS using an independent sample of 240 participants. CFA was subsequently conducted in AMOS with a separate sample of 240 participants. The procedures for factor extraction, factor retention, item evaluation, and measurement validation. Internal consistency was assessed using Cronbach's alpha and Composite Reliability (CR), while convergent validity was examined through standardised factor loadings and Average Variance Extracted (AVE). Correlations among the latent constructs were examined before estimation of the structural model.

After validating the measurement model, SEM was conducted in AMOS using the main study sample (N = 789). The structural model specified the hypothesised relationships among self-evaluation, organising and transforming, rehearsing and memorising, seeking social assistance, persistence, seeking opportunities, use of native language, and interpretive guessing. Model fit was evaluated using the chi-square statistic (χ^2), χ^2/df ratio, CFI, Tucker-Lewis Index (TLI), and RMSEA. Standardised path coefficients (β) and associated p-values were examined to test the hypothesised structural relationships. The structural model was specified in advance on theoretical grounds. Modification indices were not used to alter the proposed paths, and no alternative directional models were tested. Since the data were cross-sectional, reversing the paths would not provide evidence about the temporal ordering of the relationships.

Mediation analysis was conducted for the two hypothesised indirect pathways involving rehearsing and memorising, and seeking social assistance. Indirect effects were tested using bias-corrected bootstrapping with 5,000 resamples and 95% confidence intervals. An indirect effect was considered statistically significant when its confidence interval did not include zero. Direct, indirect, and total effects were examined separately. Statistical significance for the remaining structural paths was set at $p < .05$.

Findings

Exploratory factor analysis

Prior to factor extraction, the suitability of the data for factor analysis was examined using the Kaiser–Meyer–Olkin (KMO) measure of sampling adequacy and Bartlett's test of sphericity. As reported in Table II, the KMO value was .801, indicating adequate sampling adequacy for factor analysis. Bartlett's test of sphericity was statistically significant, $\chi^2(1225) = 2476.834$, $p < .001$, indicating that the correlation matrix contained sufficient inter-item associations to support factor analysis. These results supported proceeding with the EFA.

Table II
Kaiser–Meyer–Olkin measure and Bartlett's test of sphericity

Test	Statistic	Value
Kaiser–Meyer–Olkin measure of sampling adequacy	KMO	.801
Bartlett's test of sphericity	Approx. χ^2	2476.834
	df	1,225
	p	< .001

As shown in Table III, principal component analysis yielded eight components with eigenvalues exceeding 1.00, which accounted for 72.74% of the total variance. The first component explained 23.61% of the variance, while the second and third accounted for 14.80% and 11.35%, respectively. Components 4–8 accounted for a further 22.98%, with individual contributions ranging from 3.41% to 6.20%. The eigenvalue declined from 1.707 for Component 8 to .641 for Component 9, providing initial support for an eight-component solution under the Kaiser criterion. Given the limitations of relying solely on the eigenvalue-greater-than-one criterion, factor retention was also evaluated using the scree plot and parallel analysis, as reported in the subsequent analyses.

Table III
Initial eigenvalues and variance explained by the components

Component	Eigenvalue	% of Variance	Cumulative %
1	11.804	23.608	23.608
2	7.399	14.798	38.406
3	5.677	11.354	49.760
4	3.098	6.195	55.955
5	2.979	5.958	61.913
6	1.905	3.809	65.722
7	1.802	3.604	69.326
8	1.707	3.414	72.740
9	.641	1.283	74.023
10	.631	1.263	75.286
11	.603	1.206	76.492
12	.551	1.102	77.594
13	.540	1.081	78.675
14	.483	.966	79.641
15	.474	.948	80.589
16	.468	.936	81.525
17	.459	.918	82.443
18	.455	.911	83.354
19	.440	.880	84.234
20	.392	.784	85.018
21	.383	.766	85.784
22	.375	.750	86.534
23	.368	.736	87.270
24	.358	.716	87.986
25	.354	.708	88.694
26	.350	.700	89.394
27	.346	.692	90.086
28	.334	.668	90.754
29	.326	.652	91.406
30	.325	.650	92.056
31	.324	.648	92.704
32	.323	.646	93.350
33	.321	.642	93.992
34	.320	.640	94.632
35	.299	.598	95.230
36	.297	.594	95.824
37	.291	.582	96.406
38	.224	.448	96.854
39	.214	.428	97.282
40	.211	.422	97.704
41	.206	.412	98.116
42	.117	.234	98.350

Cont.....

Component	Eigenvalue	% of Variance	Cumulative %
43	.114	.228	98.578
44	.113	.226	98.804
45	.112	.224	99.028
46	.111	.222	99.250
47	.109	.218	99.468
48	.108	.216	99.684
49	.107	.214	99.898
50	.051	.102	100.000

Figure 2 presents the scree plot for the 50 components. The plot shows a marked decline in eigenvalues across the initial components, followed by a substantially flatter trajectory after Component 8. This pattern supports retaining eight components and is consistent with the Kaiser criterion. Because interpretation of the scree plot involves visual judgement, the proposed eight-component structure was further assessed through parallel analysis.

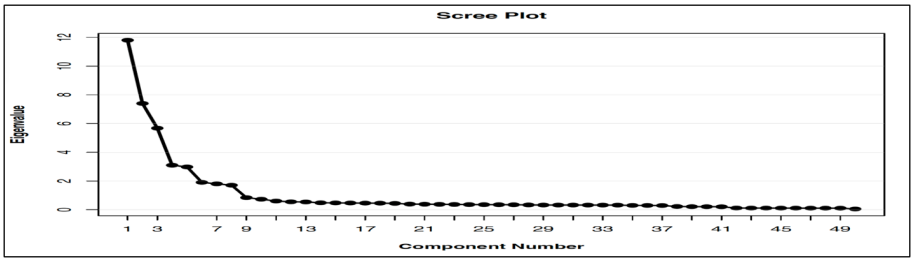


Fig. 2 *Scree plot of eigenvalues for the 50 components*

As shown in Table IV, parallel analysis supported retaining eight components. The observed PCA eigenvalues exceeded the corresponding PA eigenvalues for Components 1–8. For Component 8, the observed eigenvalue remained above the PA value (1.707 vs. 1.297), whereas Component 9 marked a clear reversal, with its observed eigenvalue (.641) falling below the PA value (1.273). This pattern continued across Components 10–50, none of which met the retention criterion. The parallel analysis provided additional statistical support for the eight-component solution indicated by the eigenvalue criterion and scree plot.

Table IV
Parallel analysis for component retention

Component	Eigenvalue from PCA	Eigenvalue from PA	Decision
1	11.804	1.521	Retain
2	7.399	1.471	Retain
3	5.677	1.433	Retain
4	3.098	1.400	Retain
5	2.979	1.372	Retain
6	1.905	1.345	Retain
7	1.802	1.319	Retain
8	1.707	1.297	Retain
9	.641	1.273	Ignore
10	.631	1.251	Ignore
11	.603	1.231	Ignore
12	.551	1.211	Ignore
13	.540	1.192	Ignore
14	.483	1.173	Ignore
15	.474	1.154	Ignore
16	.468	1.137	Ignore
17	.459	1.118	Ignore
18	.455	1.100	Ignore
19	.440	1.084	Ignore
20	.392	1.067	Ignore
21	.383	1.052	Ignore
22	.375	1.035	Ignore

Cont.....

Component	Eigenvalue from PCA	Eigenvalue from PA	Decision
23	.368	1.018	Ignore
24	.358	1.002	Ignore
25	.354	0.988	Ignore
26	.350	0.972	Ignore
27	.346	0.956	Ignore
28	.334	0.941	Ignore
29	.326	0.926	Ignore
30	.325	0.912	Ignore
31	.324	0.896	Ignore
32	.323	0.881	Ignore
33	.321	0.867	Ignore
34	.320	0.853	Ignore
35	.299	0.837	Ignore
36	.297	0.823	Ignore
37	.291	0.809	Ignore
38	.224	0.794	Ignore
39	.214	0.780	Ignore
40	.211	0.764	Ignore
41	.206	0.749	Ignore
42	.117	0.733	Ignore
43	.114	0.717	Ignore
44	.113	0.701	Ignore
45	.112	0.683	Ignore
46	.111	0.667	Ignore
47	.109	0.649	Ignore
48	.108	0.630	Ignore
49	.107	0.610	Ignore
50	.051	0.581	Ignore

The rotated solution in Table V shows a well-defined correspondence between the empirical component structure and the eight SRL dimensions specified for the instrument. Most items loaded satisfactorily on their respective components, with 41 of the 50 items meeting the .50 retention threshold. The retained loadings ranged from .516 to .859. Nine items did not meet this criterion: OTS1 (.379), OTS8 (.441), OTS14 (.377), OTS17 (.352), RMS1 (.468), SOS4 (.464), SOS8 (.396), NLS1 (.416), and IGS3 (.393). Their removal reduced the instrument from 50 to 41 items while preserving representation of all eight dimensions. The 41-item solution was subsequently evaluated through CFA using an independent sample.

Table V

Rotated component matrix for the eight-component solution

Items	Components							
	1	2	3	4	5	6	7	8
SES1						0.710		
SES2						0.643		
SES3						0.683		
SES4						0.666		
OTS1	0.379							
OTS2	0.574							
OTS3	0.671							
OTS4	0.700							
OTS5	0.662							
OTS6	0.631							
OTS7	0.637							
OTS8	0.441							
OTS9	0.671							
OTS10	0.682							
OTS11	0.675							
OTS12	0.688							
OTS13	0.644							

Cont...

Items	Components							
	1	2	3	4	5	6	7	8
OTS14	0.377							
OTS15	0.684							
OTS16	0.684							
OTS17	0.352							
OTS18	0.648							
RMS1			0.468					
RMS2			0.549					
RMS3			0.575					
RMS4			0.631					
RMS5			0.618					
SSA1								0.852
SSA2								0.859
SSA3								0.813
PS1					0.765			
PS2					0.722			
PS3					0.709			
SOS1		0.713						
SOS2		0.516						
SOS3		0.660						
SOS4		0.464						
SOS5		0.665						
SOS6		0.758						
SOS7		0.522						
SOS8		0.396						
NLS1							0.416	
NLS2							0.549	
NLS3							0.779	
NLS4							0.751	
IGS1				0.643				
IGS2				0.693				
IGS3				0.393				
IGS4				0.636				
IGS5				0.598				

Confirmatory factor analysis

The 41-item measurement structure retained from the EFA was assessed through CFA using the independent CFA sample.

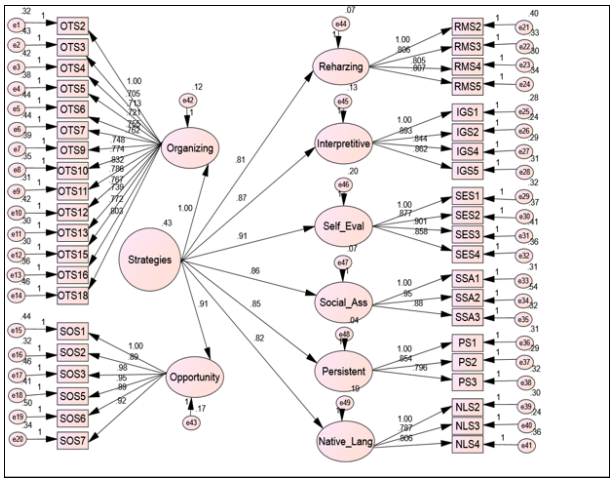


Fig. 3 *Higher-order confirmatory factor model of SRL strategies*

The model specified eight first-order SRL dimensions and a higher-order SRL construct representing the shared variance among these dimensions (Figure 3). The model showed an acceptable fit to the data, $\chi^2(771) = 1712.215$, $\chi^2/df = 2.22$, RMSEA = .040, TLI = .922, and CFI = .926. The RMSEA indicated a close approximate fit, while the CFI and TLI supported the adequacy of the specified measurement structure. All retained indicators loaded above .50 on their respective first-order constructs. The adequacy of the measurement model was examined further through construct reliability and convergent validity before testing the hypothesised structural relationships.

The measurement results demonstrated satisfactory reliability and convergent validity across the eight SRL dimensions. Cronbach's alpha coefficients ranged from .757 to .879, while composite reliability values ranged from .823 to .958. All AVE estimates exceeded the .50 criterion, ranging from .588 to .720, supporting convergent validity. The interconstruct correlations ranged from .55 to .78, indicating moderate to strong positive associations among the dimensions. The strongest correlations were observed between rehearsing and memorising and persistence (r = .78) and between seeking social assistance and persistence (r = .78), while the lowest correlation was found between self-evaluation and the use of native language (r = .55). None of the interconstruct correlations exceeded .80; these correlations were interpreted descriptively rather than as independent evidence of discriminant validity.

Table VI

Construct reliability, convergent validity, and interconstruct correlations

Construct	α	AVE	CR	1	2	3	4	5	6	7	8
1. Organising and Transforming	.757	.620	.958	1.00							
2. Seeking Opportunities	.812	.588	.895	.75	1.00						
3. Rehearsing and Memorising	.879	.658	.885	.77	.69	1.00					
4. Interpretive Guessing	.799	.720	.911	.71	.72	.73	1.00				
5. Self-Evaluation	.873	.635	.874	.76	.59	.67	.62	1.00			
6. Seeking Social Assistance	.810	.610	.823	.73	.70	.77	.71	.62	1.00		
7. Persistence	.858	.693	.871	.76	.75	.78	.77	.68	.78	1.00	
8. Use of Native Language	.875	.700	.875	.62	.58	.70	.73	.55	.67	.71	1.00

Note. α = Cronbach's alpha; AVE = average variance extracted; CR = composite reliability. Values below the diagonal are interconstruct correlations.

Structural model and hypothesis testing

SEM was conducted to test the hypothesised relationships among the eight SRL dimensions. Figure 4 presents the structural model and the estimated relationships among the latent constructs. The model demonstrated an acceptable fit to the data, χ^2 (768) = 1912.745, $\chi^2/df = 2.49$, RMSEA = .044, TLI = .913, and CFI = .919. The RMSEA indicated a close approximate fit, while the CFI and TLI exceeded .90, supporting the adequacy of the structural model for evaluating the hypothesised relationships. The individual structural paths were subsequently examined using their standardised coefficients (β) and associated significance levels.

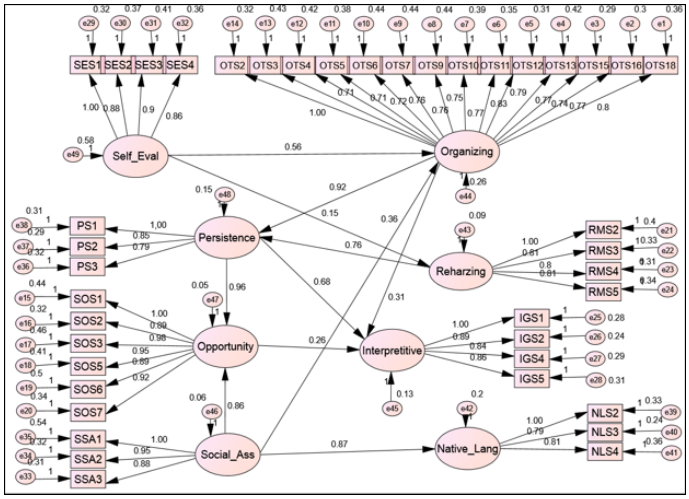


Fig. 4 *Structural equation model of the hypothesised relationships among SRL dimensions*

The structural model supported the five direct hypotheses. Self-evaluation was positively related to organising and transforming (β = .56, p < .01), while persistence showed a strong positive relationship with rehearsing and memorising (β = .76, p < .001). Seeking social assistance was strongly associated with use of native language (β = .87, p < .001). Organising and transforming was positively related to interpretive guessing (β =

.68, $p < .001$), and persistence showed the strongest direct association with seeking opportunities ($\beta = .92$, $p < .001$). These findings supported H1–H5. The study also examined the indirect pathways specified in H6 and H7. For H6, self-evaluation was positively related to rehearsing and memorising ($\beta = .15$, $p < .01$), which was subsequently related to persistence ($\beta = .76$, $p < .001$). The standardised indirect effect was .114, with a 95% bias-corrected bootstrap confidence interval of [.04, .19]. As the interval did not include zero, the indirect effect was statistically significant, supporting H6. For H7, organising and transforming was positively related to seeking social assistance ($\beta = .36$, $p < .01$), which in turn was related to seeking opportunities ($\beta = .84$, $p < .001$). The standardised indirect effect was .302, with a 95% bias-corrected bootstrap confidence interval of [.21, .40]. This interval also excluded zero, indicating a statistically significant indirect effect and supporting H7. For H8, persistence ($\beta = .68$, $p < .001$) and seeking opportunities ($\beta = .26$, $p = .006$) were positively and significantly related to interpretive guessing. Persistence showed the stronger of the two structural associations, while seeking opportunities made a smaller positive contribution. These findings supported H8.

Discussion

The findings portray self-regulated language learning as a structured system in which reflective, cognitive, motivational, and socially oriented strategies are closely connected. Self-evaluation was associated with the organisation of learning, persistence was strongly related to rehearsal and opportunity seeking, and social assistance was linked to both native-language use and the pursuit of learning opportunities. The indirect pathways further suggest that the relationship between reflective or organisational strategies and sustained engagement may operate through more immediate learning behaviours, particularly rehearsal and social assistance. Persistence also showed a strong relationship with interpretive guessing, highlighting the relevance of sustained strategic engagement when learners encounter unfamiliar linguistic input. These findings extend current understanding of SRL in EFL learning by showing how distinct strategy dimensions function as an interconnected system rather than as isolated learning behaviours.

Direct relationships among SRL strategies

The direct relationships indicate a coherent pattern linking reflective regulation, cognitive strategy use, persistence, and resource management. Self-evaluation was positively associated with organising and transforming (H1), suggesting that learners who appraise their learning more actively are also more likely to structure and reorganise learning materials strategically. Self-evaluation can identify discrepancies between current performance and intended goals, while organising and transforming provide a way to respond by changing how learning material is processed and managed. This relationship aligns with the broader conception of self-regulated language learning, in which reflective judgments are associated with subsequent strategic activity. In the Saudi EFL context, research has also documented learners' engagement in independent language learning beyond formal classroom activity (Oraby & Alaraj, 2024). The present finding suggests that greater engagement in self-evaluation is associated with greater responsibility for organising one's own learning.

Persistence occupied a prominent position in the structural model, showing strong positive relationships with rehearsing and memorising (H2) and seeking opportunities (H5). The latter was the strongest direct relationship among the hypothesised paths. This pattern suggests that persistence is closely connected with the behavioural enactment of self-regulation. Rehearsal and memorisation require sustained engagement with linguistic material, whereas opportunity seeking extends that engagement into additional occasions for exposure and practice. This interpretation is consistent with research identifying effort regulation as an important component of self-regulated English learning (Bai & Wang, 2023). The present findings extend this line of research by indicating that persistence among Saudi EFL learners is associated with both maintaining practice and actively seeking further opportunities for language use. Its particularly strong relationship with opportunity seeking suggests that persistence may be expressed through proactive engagement rather than continued effort on assigned tasks alone.

Learners' use of social assistance was also strongly associated with their use of their first language for learning purposes (H3). As noted previously, learners who relied more on social assistance to tackle learning difficulties also reported using their first language more frequently when learning various aspects of the target language. Thus, while seeking social assistance can provide learners with access to a range of external resources that can be deployed to manage academic demands, including assistance from their peers and teachers, the use of their native language for studying aspects of a target language helps learners to draw on the most developed system for processing written language that they possess. Hence, learners use these two types of strategies to manage different types of demands in the process of learning a language, and they may be situated in relation to each other within learners' broader repertoires of strategic use of resources. Findings on social support in relation to self-regulation in learning Nadeak, Surbakti, et al. (2024) suggested that learners who used a variety of external resources for learning were undertaking aspects of learning to manage their efforts to achieve academic ends.

Organising and transforming learning material also correlated positively with learners' interpretive guessing (H4). Thus, learners' management of learning material is also associated with their use of inferential processes for unfamiliar linguistic material, i.e., information that does not use lexical information directly available to the learner. This score thus reflects a broader function of cognitive control than simply compensating for unknown language. The association is specific, however, and pertains to learners' reports of using inference to derive meaning in the absence of direct lexical information, as a function of their organising of information within the linguistic code. This finding is consistent with research on EFL

learners' self-regulated learning strategies, showing that they employ a range of differentiated learning strategies in their attempt to manage the demands of learning language effectively (Habók et al., 2022).

The pattern across H1–H5 indicates functional differentiation within the broader SRL system. Reflective regulation was associated with the organisation of learning; persistence with sustained practice and opportunity seeking; social assistance with first language resource use; and cognitive organisation with inferential processing. Particularly notable is the position of persistence, which was strongly associated with both repeated engagement and the active pursuit of additional learning opportunities. The findings suggest that the SRL dimensions examined here are functionally distinct while remaining systematically related through learners' attempts to monitor, organise, sustain, and resource their language learning.

Indirect pathways among SRL strategies

The indirect pathway specified in H6 suggests that the relationship between self-evaluation and persistence may operate partly through rehearsing and memorising. Self-evaluation was positively related to rehearsing and memorising, which, in turn, was strongly related to persistence. This pattern is theoretically plausible within SRL, where evaluation of learning can inform subsequent strategic activity. Raković et al. (2022) identified evaluation and adaptation as important processes in learners' self-regulation, while Habók et al. (2022) documented differences in EFL learners' awareness and use of learning strategies across proficiency levels. The present findings specify a relationship between these processes: learners reporting greater self-evaluation also reported greater use of rehearsal and memorisation, which was associated with greater persistence. One possible interpretation is that recognising weaknesses or incomplete learning may prompt greater engagement in repeated practice, which is then associated with sustained effort. Given the cross-sectional design, this pathway represents an indirect association rather than a temporal or causal sequence.

The position of rehearsing and memorising in this pathway is particularly informative because it distinguishes reflective appraisal from direct engagement with learning material. Self-evaluation concerns learners' judgments of their learning, whereas rehearsal and memorisation involve strategies applied directly to linguistic material. Their association with persistence suggests that sustained effort is closely related to learners' reported strategic engagement with that material. Zhang and Zou (2024) similarly conceptualised self-regulated second language learning in terms of differentiated strategy types rather than a single form of regulatory activity. Within the present model, H6 specifies a more particular structural relationship: rehearsing and memorising occupies an intermediate position between self-evaluation and persistence.

H7 identifies a different indirect pathway. Organising and transforming was positively related to seeking social assistance, which in turn was strongly related to seeking opportunities. Unlike H6, where the intermediate strategy concerns direct engagement with learning material, the intermediate construct in H7 concerns learners' use of social resources. Research examining the relationship between social support and SRL has documented the relevance of social resources to self-regulation (Nadeak, Surbakti, et al., 2024). The present findings extend this perspective to a specific set of language learning strategies. Learners who reported greater organisation and transformation of their learning also reported greater use of social assistance, which was strongly associated with their tendency to seek further language-learning opportunities.

Seeking social assistance thus occupies a substantively different position from rehearsing and memorising across the two pathways. In H6, the intermediate construct concerns cognitive engagement with learning material; in H7, it concerns recourse to other people as a learning resource. This distinction indicates that relationships among SRL dimensions are not confined to individually enacted cognitive strategies. The H7 pathway connects the organisation of learning with opportunity seeking through a socially oriented form of regulation. It does not establish that social assistance causes learners to seek additional opportunities, nor does it identify which forms or sources of assistance account for the association. Rather, the model positions social assistance as an intermediate strategy dimension linking the organisation of learning with opportunity seeking.

The two indirect pathways consequently represent different forms of association within the broader SRL structure. H6 links reflective regulation to persistence through a cognitive learning strategy, whereas H7 links the organisation of learning to opportunity seeking through a social strategy. This distinction adds explanatory specificity to the direct relationships reported earlier by identifying intermediate strategy dimensions associated with different forms of learner engagement.

Persistence, opportunity seeking, and interpretive guessing

H8 revealed a clear difference in the relationships between persistence, opportunity seeking, and interpretive guessing. Both relationships were positive, but persistence showed a substantially stronger association with interpretive guessing (β = .68) than seeking opportunities (β = .26). This pattern indicates that learners who report greater persistence also tend to report greater use of interpretive guessing. The relationship is theoretically relevant because persistence and interpretive guessing represent different dimensions of SRL. The former concerns maintaining effort, whereas the latter concerns using inference when linguistic meaning is not immediately accessible. This connection suggests that motivational regulation is closely associated with the different cognitive strategies learners use when they experience comprehension difficulties. In addition, the motivational, cognitive, metacognitive and social strategies used by the EFL learners are substantially related, rather than forming separate kinds of regulation (Habók et al., 2022).

The relationship between persistence and interpretive guessing also extends research connecting motivational characteristics with SRL in language learning. Bai and Wang (2023) related motivational beliefs to SRL and English achievement, while Teng (2024) identified relationships

between motivational beliefs, self-efficacy, and self-regulated strategy use in EFL learning. More recent SEM evidence has similarly linked learners' academic emotions with several forms of SRL strategy use, including persistence, among university EFL learners (Shen et al., 2026). This finding adds a more specific structural relationship to this literature: persistence was strongly associated with a cognitive strategy used when learners could not access linguistic meaning directly. This suggests that sustained effort may be particularly relevant when language learning requires learners to continue processing incomplete or unfamiliar input rather than disengage from the task. The interpretation remains confined to the structural association observed in the model and does not imply that persistence produces greater use of interpretive guessing.

Seeking opportunities was also positively related to interpretive guessing, although its association was considerably smaller. Learners who reported greater efforts to seek opportunities for English learning also tended to report greater use of interpretive guessing. C. Wang et al. (2013) conceptualised seeking opportunities and interpretive guessing as distinct categories of self-regulated English learning strategies. Evidence from university EFL learners likewise indicates that different forms of regulatory activity coexist within broader patterns of language learning strategy use and are associated with learners' academic performance (Deng et al., 2022). The present result goes further by identifying a positive structural association between opportunity seeking and interpretive guessing. One plausible interpretation is that learners who engage with English more frequently encounter situations requiring inference from incomplete linguistic information. The current data do not test that process directly, so this explanation remains interpretive rather than demonstrated.

The relative strength of the two paths provides the central contribution of H8. Persistence was more strongly associated with interpretive guessing than seeking opportunities, indicating that these two forms of learner engagement do not occupy equivalent positions in relation to inferential strategy use. Persistence concerns continued effort in learning, while seeking opportunities concerns learners' attempts to access additional occasions for language learning. Within the structural model, the former had a considerably closer relationship with interpretive guessing. This finding supports a multidimensional account of SRL in which motivational and cognitive strategy dimensions are empirically distinct but meaningfully related. More specifically, it identifies persistence as the stronger correlate of interpretive guessing among the two dimensions examined in H8. Given the cross-sectional nature of the study, this pattern should be interpreted as evidence of structural association rather than temporal ordering or causal influence.

Although all eight hypotheses were supported, this finding needs to be considered alongside the relatively strong correlations among the SRL dimensions. Other relationships, had they been included in the model, may also have been significant. The findings thus support the relationships proposed in this study, but they do not suggest that these are the only or necessarily the strongest connections among the eight dimensions.

Theoretical and practical implications

Theoretically, the findings question an interpretation of EFL SRL in which cognitive, metacognitive, motivational, and social strategies are treated primarily as parallel categories of learner behaviour. The structural model indicates a more differentiated organisation. Self-evaluation was related to organising and transforming, while its relationship with persistence was linked through rehearsing and memorising. Organising and transforming was directly associated with interpretive guessing and was also linked with seeking opportunities through seeking social assistance. Persistence was especially prominent, showing strong relationships with rehearsing and memorising and seeking opportunities, and a substantially stronger association with interpretive guessing than seeking opportunities had. The theoretical significance lies in the roles particular strategies play within these relationships. Rehearsing and memorising connected reflective appraisal with persistence, seeking social assistance connected cognitive organisation with opportunity seeking, and persistence was closely associated with both opportunity seeking and inferential strategy use. In this model, SRL is therefore better understood in terms of relationships across strategy domains rather than the frequency or presence of individual strategies alone. This finding also gives motivational regulation a more central theoretical position. Persistence was associated with strategies involving repeated practice, access to learning opportunities, and interpretation of unfamiliar input, suggesting that sustained effort is closely connected to how learners enact cognitive and behavioural regulation in EFL learning. These conclusions remain structural rather than causal because the constructs were measured concurrently.

Practically, these relationships suggest that SRL instruction should be organised around strategic responses to identifiable learning problems, rather than around teaching a list of strategies independently. When learners identify a weakness through self-evaluation, instruction can require them to select and carry out a corresponding response, such as targeted rehearsal of vocabulary, structures, or language patterns, and subsequently reassess their progress. The pathway involving organising and transforming, seeking social assistance, and seeking opportunities points to a second instructional sequence: students can first identify what they cannot resolve independently, seek specific assistance from a teacher or peer, and use that assistance to locate or create further opportunities for English practice. Persistence warrants particular attention because it connects strongly across the model. Rather than treating persistence as a general exhortation to "work harder," teachers can structure tasks that require students to remain engaged when an answer is not immediately available, particularly during reading or listening activities involving unfamiliar language. Students can be required to inspect for relevant contextual information, construct an interpretation of what they have found, justify the cues that they have used, and then revise their interpretation. These practices map the observed relationship between persistence and interpretive guessing to a pedagogically useful principle: difficulty should lead to sustained strategic processing, rather than task avoidance. Consequently, SRL strategies, such as those embedded in intentional sequences of evaluation, strategic action, help-seeking, sustained engagement, and inference, can be taught as being purposefully related to particular learning demands.

Limitations and directions for further research

The findings should be considered alongside several limitations that also define priorities for further research. The cross-sectional design permits examination of structural associations among the SRL dimensions but does not establish temporal ordering or causality. This is particularly important for the indirect pathways involving rehearsing and memorising and seeking social assistance, which should not be interpreted as evidence that the proposed sequence of strategies unfolds over time. Longitudinal studies with repeated measurements could establish whether changes in one strategy precede subsequent changes in another, while intervention studies could test selected relationships under controlled instructional conditions. A second limitation concerns the exclusive use of self-report data. The questionnaire measures learners' reported strategy use rather than their regulatory behaviour during actual language tasks, and measuring all constructs through the same instrument introduces the possibility of common method variance. Future research could combine questionnaire data with learning diaries, classroom observations, think-aloud protocols, behavioural records, or task-based measures of strategy use. The sample composition also limits generalisation. First-year students represented 93.8% of the sample, and 94.9% of participants were younger than 20, making the findings more representative of students at the beginning of undergraduate study than of Saudi EFL undergraduates across academic levels. Replication with more balanced samples across years of study, age groups, institutions, and EFL settings is needed to assess the stability of the structural relationships. Measurement should also receive further attention. The study employed an adapted version of the QESRLS in which eight dimensions were selected from the original instrument and the item structure was refined during empirical validation. Although the resulting measurement structure was assessed through independent EFA and CFA samples, replicating the 41-item structure in independent EFL populations is necessary before establishing its applicability beyond the present context. The specification of the structural model also warrants some caution. Although the proposed paths were grounded in the theoretical rationale developed for this study, the eight SRL dimensions were substantially correlated. Relationships outside the proposed model may therefore have been significant had they been tested. The findings should be read as support for the relationships examined here, rather than as evidence that the model represents all possible connections among the eight dimensions. In this model, we have attempted to outline relationships between a numbers of SRL strategies. Importantly, we have not sought to include objective measures of language proficiency or of learners' academic performance. Therefore, the connections identified between a number of reported learning strategies or sets of strategies do not necessarily hold for learning languages in real life or translate into effects on learning in other subject areas. Future research could investigate whether the relationships discovered in this study affect learning in any way, and whether some SRL paths might promote better language learning than others. Standardised measures of language proficiency, performance in a course of study, or performance in language task(s) could be used to that end.

Conclusion

This study provides a structural account of how SRL strategies are related among Saudi EFL learners. Rather than operating as separate categories of learning behaviour, the eight dimensions showed systematic relationships across reflective, cognitive, motivational, and social forms of regulation. Self-evaluation was associated with organising and transforming; persistence was strongly related to rehearsing and memorising and seeking opportunities; seeking social assistance was associated with the use of the native language; and organising and transforming was related to interpretive guessing. The indirect pathways add an important dimension to this pattern. Rehearsing and memorising occupied an intermediate position between self-evaluation and persistence, while seeking social assistance occupied an intermediate position between organising and transforming and seeking opportunities. Persistence was particularly prominent, with strong relationships across several parts of the model and a markedly stronger association with interpretive guessing than seeking opportunities. The main contribution of the study lies in showing that SRL in EFL learning is better understood through relationships among strategy domains than through individual strategies considered separately. The findings place persistence in a particularly important position, linking sustained engagement with rehearsal, opportunity seeking, and inferential processing, while the indirect pathways show how cognitive and social strategies occupy distinct positions within the broader regulatory structure. For EFL pedagogy, this suggests that strategy instruction should connect learners' evaluation of their progress with appropriate cognitive responses, develop purposeful use of social assistance, and cultivate sustained engagement when linguistic difficulty interrupts immediate comprehension.

Declarations

Ethics approval and consent to participate

Ethical approval for this study was obtained from the Research Ethics Committee at Northern Border University prior to data collection. Electronic informed consent was obtained from all participants before they accessed the questionnaire. Participation was voluntary, and no personally identifying information was collected.

Consent for publication

Not applicable.

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Competing interests

The authors declare no competing interests.

Data availability

The data supporting the findings of this study are available from the corresponding author upon reasonable request.

References

Ahmad, Z., & Aljohani, O. (2024). Self-regulated Professional Development: A Case of Teacher-led EFL Class Observation. *International Journal of Language and Literary Studies*, *6*(4), 577–585. https://doi.org/10.36892/ijlls.v6i4.1961

AlHroob, B. F., & Al-khresheh, M. H. (2026). Self-regulated learning strategies among non-native arabic learners: A structural equation modelling approach. *Asian-Pacific Journal of Second and Foreign Language Education*, *11*(1), 8. https://doi.org/10.1186/s40862-025-00380-7

Al-khresheh, M. H. (2025). Exploring the role of motivation in self-regulated digital game-based vocabulary learning among Saudi EFL learners: A structural equation modelling approach to attention, relevance, confidence and satisfaction. *European Journal of Education*, *60*(4), e70335. https://doi.org/10.1111/ejed.70335

Al-Khresheh, M. H., Al-Qadri, A. H., Alanazi, S. M., & Abdelwahab, D. (2026). Motivational factors influencing english language learning among Saudi EFL Students: A structural equation model of internal relationships. *Journal of Psycholinguistic Research*, *55*(4), 66. https://doi.org/10.1007/s10936-026-10236-x

Almayez, M. (2025). Modelling the relationships among feedback engagement, writing self-efficacy, and assessment performance among EFL learners: A structural equation modelling approach. *Applied Linguistics: Research, Measurement and Practice*, *1*(1), 45–73.

Almayez, M. A., Al-Khresheh, M. H., Al-Qadri, A. H., Alkhateeb, I. A., & Alomaim, T. I. M. (2025). Motivation and english self-efficacy in online learning applications among Saudi EFL learners: Exploring the mediating role of self-regulated learning strategies. *Acta Psychologica*, *254*, 104796. https://doi.org/10.1016/j.actpsy.2025.104796

Alvarez, R. P., Jivet, I., Perez-Sanagustin, M., Scheffel, M., & Verbert, K. (2022). Tools designed to support self-regulated learning in online learning environments: A systematic review. *IEEE Transactions on Learning Technologies*, *15*(4), 508–522. https://doi.org/10.1109/TLT.2022.3193271

An, Z., Wang, C., Li, S., Gan, Z., & Li, H. (2021). Technology-assisted self-regulated English language learning: Associations with English language self-efficacy, English enjoyment, and learning outcomes. *Frontiers in Psychology*, *11*, 558466. https://doi.org/10.3389/fpsyg.2020.558466

Anthonysamy, L., Koo, A.-C., & Hew, S.-H. (2020). Self-regulated learning strategies and non-academic outcomes in higher education blended learning environments: A one decade review. *Education and Information Technologies*, *25*(5), 3677–3704. https://doi.org/10.1007/s10639-020-10134-2

Bai, B., & Wang, J. (2023). The role of growth mindset, self-efficacy and intrinsic value in self-regulated learning and English language learning achievements. *Language Teaching Research*, *27*(1), 207–228. https://doi.org/10.1177/1362168820933190

Bourzeg, M. (2025). Emotion regulation in English language learning: The roles of cognitive reappraisal and expressive suppression among Algerian EFL students. *Applied Linguistics: Research, Measurement and Practice*, *1*(1), 95–113. https://doi.org/10.65334/kkbhp157

Ceron, J., Baldiris, S., Quintero, J., Garcia, R. R., Saldarriaga, G. L. V., Graf, S., & Valentin, L. D. L. F. (2020). Self-regulated learning in massive online open courses: A state-of-the-art review. *IEEE Access*, *9*, 511–528. https://doi.org/10.1109/ACCESS.2020.3045913

Chen, J. (2022). The effectiveness of self-regulated learning (SRL) interventions on L2 learning achievement, strategy employment and self-efficacy: A meta-analytic study. *Frontiers in Psychology*, *13*, 1021101. https://doi.org/10.3389/fpsyg.2022.1021101

Chen, J., Zhang, L. J., & Chen, X. (2026). L2 learners' self-regulated learning strategies and self-efficacy for writing achievement: A latent profile analysis. *Language Teaching Rsearch*, *30*(1), 14–35. https://doi.org/10.1177/13621688221134967

Deng, X., Wang, C., & Xu, J. (2022). Self-regulated learning strategies of Macau English as a foreign language learners: Validity of responses and academic achievements. *Frontiers in Psychology*, *13*, 976330. https://doi.org/10.3389/fpsyg.2022.976330

Dong, L. (2024). Examining the relationship between socioeconomic status, self-regulated learning strategies, and writing proficiency in English as a second language learning context. *Journal of Educational Psychology*, *116*(5), 686. https://doi.org/10.1037/edu0000834

Edisherashvili, N., Saks, K., Pedaste, M., & Leijen, Ä. (2022). Supporting self-regulated learning in distance learning contexts at higher education level: Systematic literature review. *Frontiers in Psychology*, *12*, 792422. https://doi.org/10.3389/fpsyg.2021.792422

Elmabaredy, A., & Gencel, N. (2024). Exploring the integration of self-regulated learning into digital platforms to improve students' achievement and performance. *Discover Education*, *3*(1), 262. https://doi.org/10.1007/s44217-024-00233-4

Fayaza, M. F., & Ahangama, S. (2024). Systematic review of self-regulated learning with blended learning in digital space. *IEEE Access*, *12*, 143090–143105. https://doi.org/10.1109/ACCESS.2024.3470114

Gambo, Y., & Shakir, M. Z. (2021). Review on self-regulated learning in smart learning environment. *Smart Learning Environments*, *8*(1), 12.

Habók, A., Magyar, A., & Molnár, G. (2022). English as a foreign language learners' strategy awareness across proficiency levels from the perspective of self-regulated learning metafactors. *Frontiers in Psychology*, *13*, 1019561. https://doi.org/10.3389/fpsyg.2022.1019561

Karlen, Y., Hirt, C. N., Jud, J., Rosenthal, A., & Eberli, T. D. (2023). Teachers as learners and agents of self-regulated learning: The importance of different teachers competence aspects for promoting metacognition. *Teaching and Teacher Education*, *125*, 104055. https://doi.org/10.1016/j.tate.2023.104055

Lee, M., Lee, S. Y., Kim, J. E., & Lee, H. J. (2023). Domain-specific self-regulated learning interventions for elementary school students. *Learning and Instruction*, *88*, 101810.

Liu, Z.-M., Hwang, G.-J., Chen, C.-Q., Chen, X.-D., & Ye, X.-D. (2026). Integrating large language models into EFL writing instruction: Effects on performance, self-regulated learning strategies, and motivation. *Computer Assisted Language Learning*, *39*(3), 466–490. https://doi.org/10.1080/09588221.2024.2065314

Nadeak, R., Surbakti, A., et al. (2024). The impact of social support on academic resilience mediated by self-regulated learning. *Journal of Educational, Health & Community Psychology (JEHCP)*, *13*(3), 934. https://doi.org/10.12928/jehcp.v13i3.29434

Oraby, K., & Alaraj, M. (2024). Self-learning strategies for EFL acquisition among Saudi university students. *International Journal of Language and Literary Studies*, *6*(3), 226–244. https://doi.org/10.36892/ijlls.v6i3.1791

Orak, S. D. (2025). Turkish EFL teachers' perspectives on AI-generated feedback: Negotiating trust, control, and pedagogical adaptation in writing instruction. *Applied Linguistics: Research, Measurement and Practice*, *1*(1), 74–94. https://doi.org/10.65334/n40kdg46

Öztürk, M., & Çakıroğlu, Ü. (2021). Flipped learning design in EFL classrooms: implementing self-regulated learning strategies to develop language skills. *Smart Learning Environments*, *8*(1), 2. https://doi.org/10.1186/s40561-021-00146-x

Panadero, E. (2023). Toward a paradigm shift in feedback research: Five further steps influenced by self-regulated learning theory. *Educational Psychologist*, *58*(3), 193–204.

Raković, M., Bernacki, M. L., Greene, J. A., Plumley, R. D., Hogan, K. A., Gates, K. M., & Panter, A. T. (2022). Examining the critical role of evaluation and adaptation in self-regulated learning. *Contemporary Educational Psychology*, *68*, 102027. https://doi.org/10.1016/j.cedpsych.2021.102027

Samadi, F., Jafarigohar, M., Saeedi, M., Ganji, M., & Khodabandeh, F. (2024). Impact of flipped classroom on EFL learners' self-regulated learning and higher-order thinking skills during the Covid19 pandemic. *Asian-Pacific Journal of Second and Foreign Language Education*, *9*(1), 24. https://doi.org/10.1186/s40862-023-00246-w

Shen, B., Wang, Y., Yang, Y., & Yu, X. (2026). Relationships between Chinese university EFL learners' academic emotions and self-regulated learning strategies: A structural equation model. *Language Teaching Research*, *30*(1), 317–342. https://doi.org/10.1177/13621688221144832

Teng, L. S. (2024). Individual differences in self-regulated learning: Exploring the nexus of motivational beliefs, self-efficacy, and SRL strategies in EFL writing. *Language Teaching Research*, *28*(2), 366–388. https://doi.org/10.1177/13621688221134968

Wang, C., Schwab, G., Fenn, P., & Chang, M. (2013). Self-efficacy and self-regulated learning strategies for English language learners: Comparison between Chinese and German college students. *Journal of Educational and Developmental Psychology*, *3*(1), 173. https://doi.org/10.5539/jedp.v3n1p173

Wang, J., Zhou, H., Chen, S., Tong, H., & Yang, Y. (2024). How teachers support secondary school students to become self-regulated learners in technology-enhanced language learning. *System*, *123*, 103313. https://doi.org/10.1016/j.system.2024.103313

Wang, T., & Lajoie, S. P. (2023). How does cognitive load interact with self-regulated learning? A dynamic and integrative model. *Educational Psychology Review*, *35*(3). https://doi.org/10.1007/s10648-023-09794-6

Xu, Z., Zhao, Y., Zhang, B., Liew, J., & Kogut, A. (2023). A meta-analysis of the efficacy of self-regulated learning interventions on academic achievement in online and blended environments in K-12 and higher education. *Behaviour & Information Technology*, *42*(16), 2911–2931. https://doi.org/10.1080/0144929X.2022.2151935

Yan, Z. (2020). Self-assessment in the process of self-regulated learning and its relationship with academic achievement. *Assessment & Evaluation in Higher Education*, *45*(2), 224–238. https://doi.org/10.1080/02602938.2019.1629390

Yu, B. (2023). Self-regulated learning: A key factor in the effectiveness of online learning for second language learners. *Frontiers in Psychology*, *13*, 1051349.

Yusuf, A. (2025). Digital selves in the Nigerian second language classroom: Modelling the structural relationship between AI-enhanced identity expression, growth mindset, language self-efficacy, and second language grit. *Applied Linguistics: Research, Measurement and Practice*, *1*(1), 1–23. https://doi.org/10.65334/v2hm5720

Zhang, R., & Zou, D. (2024). Self-regulated second language learning: A review of types and benefits of strategies, modes of teacher support, and pedagogical implications. *Computer Assisted Language Learning*, *37*(4), 720–765.

Zimmerman, B. J. (2002). Becoming a self-regulated learner: An overview. *Theory into Practice*, *41*(2), 64–70.

Appendix

Table VII
"Questionnaire of English SRL Strategies" – Revised version after validation

Part A: Demographic information							
Gender	Male Female						
Age	Less than 20 20 - 25 More than 25						
University Level	First-year Second-year Third-year Fourth-year						
Part B: Questionnaire of English SRL Strategies							
Category	Item	Very Low	Low	Interme-diate	High	Very High	
Self-Evaluation Strategies	1. Check my English homework before turning it in. 2. Proofread my English compositions when I complete writing. 3. Adjust my reading speed according to the difficulty of the article. 4. When I finish my English composition, I have a rest and then read it again to check whether it should be revised.						
Organizing and Transforming Strategies	5. Write an outline after reading an English article. 6. Summarize the main idea of each paragraph when reading. 7. Summarize the most important points of the whole English article after I read it. 8. Pay attention to the English language structure during reading. 9. Classify new words in order to memorize them. 10. When I listen to English, I pay attention to the stressed words or phrases in order to comprehend the sentence. 11. When I read an English article, I imagine the scene described in the article in order to memorize what I have read. 12. Recite similar words all together to distinguish slight differences. 13. Memorize a new word by memorizing where I learn it. 14. Memorize meanings of words by using prefixes and suffixes. 15. Pay attention to the beginning and end of each paragraph in my English reading. 16. Underline key points during my English reading. 17. Make sure to write a topic sentence in each paragraph in writing. 18. Make sure that the content of each paragraph supports its topic sentence in English writing.						
Rehearsing and Memorizing Strategies	19. Review flashcards of new words in order to memorize them. 20. Read texts I have learned several times in order to recite them from memory. 21. Write new words many times in order to memorize the spellings. 22. Read new words repeatedly in order to memorize them.						

Cont.....

Part B: Questionnaire of English SRL Strategies						
Category	Item	Very Low	Low	Interme-diate	High	Very High
Seeking Social Assistance Strategies	23. Consult teachers when I encounter difficulties in the process of studying English.					
	24. Search related documents when I have difficulties in the process of studying English.					
	25. Ask classmates when I have questions in my English study.					
Persistence Strategies	26. Keep reading when I encounter difficulties in English reading.					
	27. Read an English article several times if I don't understand it the first time.					
	28. Listen to tape-recorded English several times if I cannot understand it the first time.					
Seeking Opportunity Strategies	29. Listen to American or British radio broadcasts to improve my pronunciation.					
	30. Send emails to friends in English on my initiative.					
	31. Try my best to find opportunities to practice my oral English.					
	32. Watch English TV programs on my initiative.					
	33. Try to use various English expressions to express the same meaning.					
	34. Use words just learned to make new sentences on my initiative.					
Use of Native Language Strategies	35. When I listen to English, I translate it into my native language to help me understand it.					
	36. Translate what I have read in English into my native language to help me understand it.					
	37. Think out a composition in my native language before writing it in English.					
Interpretive Guess Strategies	38. Guess the meaning of new words by considering the contexts.					
	39. Guess what people mean by reading their expressions and movements when watching an English movie.					
	40. When somebody speaks English, I guess what he/she will say according to what he/she has said already.					
	41. Use my background knowledge to comprehend English articles.					