

OVERCOMING THE INTERMEDIATE PLATEAU IN ESP: AI-SUPPORTED SELF-DIRECTED LEARNING FOR UKRAINIAN IT STUDENTS

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Abstract. The intermediate plateau remains a persistent challenge in second language acquisition, particularly for ESP learners who lack sustained exposure beyond the classroom. This study investigated whether self-directed learning mediated by AI tools could support Ukrainian IT students in overcoming this plateau. Using a 12-week mixed-methods design, 66 participants engaged in structured autonomous learning cycles integrating ChatGPT, NotebookLM, and ELSA Speak for vocabulary development, linguistic analysis, domain-specific comprehension, pronunciation practice, and reflective production. Quantitative data from Cambridge proficiency assessment, an IT-specific language test, IELTS-aligned speaking evaluation, and weekly pronunciation analytics revealed statistically significant improvement across all measures ($p < .001$). The largest gains were observed in pronunciation accuracy and fluency, followed by domain-specific language competence and oral communicative performance. Thematic analysis of interviews and learner logs revealed three central findings: (1) AI interaction increased learner agency, motivation, and emotional safety; (2) adaptive, judgment-free feedback strengthened persistence and confidence; and (3) initial guidance in goal setting and strategy use was essential for sustained self-regulation. While participants encountered AI hallucinations, they developed improved digital resilience and critical verification practices. The findings demonstrate that structured AI-supported autonomy can mitigate linguistic stagnation while fostering metacognitive awareness, self-efficacy, and sustained engagement. The study advances understanding of AI-enhanced self-directed learning as a scalable model for ESP instruction and underscores the need for critical AI literacy in autonomous learning ecosystems.

Keywords: AI-assisted language learning, self-directed learning, AI tools, English for specific purposes (ESP), intermediate plateau, learner autonomy, pronunciation technology, language learning motivation.

1. INTRODUCTION

Learning a foreign language has often been analogized to physical training, where consistent and purposeful practice leads to gradual mastery and growing confidence in performance. While this metaphor captures the importance of sustained engagement, many language learners encounter a period where progress appears to stall despite continued effort. This phenomenon – widely known as the *language learning plateau* or *intermediate plateau* – typically emerges at the CEFR B1-B2 levels, a stage characterized by functional competence but slower observable advancement (Council of Europe, 2020).

During the initial stages of language study, learners often experience rapid growth as they acquire foundational vocabulary, internalize core grammatical structures, and begin communicating for

authentic purposes. These observable gains align with Krashen's (1983) $i + 1$ model, which posits that acquisition occurs when learners are exposed to comprehensible input slightly beyond their current level of competence. A complementary perspective is offered by Vygotsky's (1934/1978) concept of the Zone of Proximal Development (ZPD), which similarly frames learning as progress enabled just beyond independent ability, supported through guidance, scaffolding, or mediation. While differing in mechanism – Krashen emphasizing input and Vygotsky emphasizing socially mediated development – both perspectives help explain early momentum in language learning and the learner's ability to perceive growth. Achieving initial communicative capacity often produces a strong sense of accomplishment; as Richards (2008) notes, learners frequently describe this stage as a milestone marking their transition into active language users.

However, progress beyond this point is often less linear and harder to measure. Intermediate learners may experience heightened frustration, anxiety, or reduced motivation when improvement is no longer as rapid or visible, particularly when exposure to the target language outside the classroom is limited. This challenge is especially pronounced among university students studying English in non-English-speaking environments or those completing only short-term English for Specific Purposes (ESP) coursework without ongoing real-world language use. In such contexts, external motivational pressures (e.g., coursework, exams, employment) are minimal or temporary, meaning that continued advancement relies heavily on internally sustained goals, routines, and self-regulatory learning strategies.

Students who have completed ESP instruction, achieved intermediate proficiency, and aspire toward advanced competence but feel stalled represent a growing and pedagogically significant population. In the absence of continued teacher-led instruction, these learners must redefine learning pathways, establish sustained practice routines, and develop greater autonomy. Self-directed learning has been widely recognized as an effective approach for strengthening learner agency, supporting sustained engagement, and enhancing intrinsic motivation through personalized pathways and self-regulated goal setting.

Recent advances in artificial intelligence (AI) have introduced new possibilities for supporting self-directed language learning, offering learners adaptive, scalable, and interactive environments that extend beyond traditional classroom boundaries. Tools such as ChatGPT, NotebookLM, and ELSA Speak present opportunities to provide individualized practice in vocabulary development, pronunciation, dialogue, comprehension, and feedback-driven revision, potentially addressing both the linguistic and motivational barriers associated with the intermediate plateau.

The purpose of this study is to investigate the effectiveness of a structured AI-assisted, self-directed learning model in supporting ESP learners in progressing beyond intermediate proficiency. Specifically, the research evaluates (1) the role of AI voice-enabled tools in improving speaking fluency and pronunciation accuracy; (2) the contribution of AI-generated content and AI-assisted knowledge integration to vocabulary growth, grammar development, and reading-listening comprehension; and (3) the capacity of AI-supported learning ecology to sustain motivation, autonomy, and consistent language engagement without ongoing teacher intervention. The study also seeks to propose an evidence-based, scalable framework for AI-enhanced autonomous ESP learning, with particular relevance to technology-oriented domains such as IT.

2. THEORETICAL BACKGROUND

The Intermediate Plateau in Second Language Acquisition

The intermediate plateau – also referred to as the language learning plateau – is a widely recognized phenomenon in second language acquisition (SLA) research, characterized by a noticeable slowdown or stagnation in learner progress despite continued study and effort (Kalashnyk et al., 2023; Torgomyan, 2022). This stage frequently occurs at the CEFR B1-B2 levels, where initial rapid gains give way to

slower, less perceptible advancement (Council of Europe, 2020; Shi, 2024).

The plateau concept is closely associated with fossilization theory in SLA. Selinker (1996) distinguished permanent fossilization, a persistent stabilization of erroneous forms, from temporary fossilization, a reversible period of stagnation that can be overcome through awareness and targeted intervention. Richards (2008) similarly conceptualized the plateau effect as a transitional and addressable phase that emerges when learners move from intermediate toward advanced proficiency. He emphasized that this stage is not a sign of failure but a developmental pause that can be mitigated through strategic pedagogical and learning interventions.

Common linguistic indicators of a plateau include: (a) a widening gap between receptive and productive competence, (b) fluency gains occurring at the expense of complexity, (c) grammatically adequate but inauthentic or non-idiomatic output, (d) limited expressive vocabulary despite strong comprehension, and (e) the reappearance of lower-level errors under cognitive load (Richards, 2008). Empirical evidence further supports these patterns; for instance, Laufer (1998) demonstrated that even after sustained instruction, learners' active vocabulary often fails to expand in sophistication, signaling a form of lexical stagnation termed vocabulary fossilization.

The plateau also manifests psychologically and behaviorally. Learners frequently report increased anxiety, reduced self-efficacy, and declining motivation, which can lead to avoidance behaviors such as reduced participation and procrastination (Yi, 2007). A central tension at this stage is the knowledge-competence paradox, whereby learners possess substantial explicit linguistic knowledge yet struggle to use it fluidly in spontaneous communication (Yi, 2007). As a result, language performance may remain grammatically accurate but unnatural, effortful, or lacking communicative authenticity.

Yi (2007) proposed two diagnostic approaches for identifying a plateau: (a) standardized proficiency assessment, which reveals stagnation through flattened learning curves, and (b) classroom-based behavioral and psychological observation, which helps instructors identify motivational and affective barriers. Given this multidimensional profile, researchers increasingly argue that learner autonomy and self-sustained learning systems play a critical role in enabling progress beyond the plateau – particularly when structured instruction alone proves insufficient.

Socio-cognitive and Input-Based Foundations for Overcoming the Plateau

To explain how learners can progress beyond intermediate stagnation, this study adopts a dual-theoretical framework grounded in Krashen's Input Hypothesis (1983) and Vygotsky's sociocultural theory of the Zone of Proximal Development (ZPD) (1934/1978). Combined, they explain both the linguistic conditions and the interactional supports necessary for continued development beyond performance plateaus.

Krashen (1983) proposed that acquisition advances when learners receive comprehensible input slightly beyond their current level ($i + 1$) – sufficiently challenging to promote growth without exceeding cognitive processing capacity. In parallel, Vygotsky (1934/1978) argued that learning is accelerated when learners receive scaffolded assistance that enables performance beyond independent capability, gradually internalizing new skills through socially mediated support.

Despite originating from distinct traditions, the theories converge in a key principle: optimal learning occurs when language input or task demands slightly exceed independent competence but remain achievable with support. This theoretical intersection holds particular relevance at the intermediate plateau, when learners can competently perform familiar routines but struggle to extend linguistic range without calibrated input and adaptive scaffolding.

Figure 1 represents the theoretical convergence of optimized input ($i+1$) and scaffolded support (ZPD), illustrating how AI can facilitate guided language growth beyond learners' independent proficiency limits.

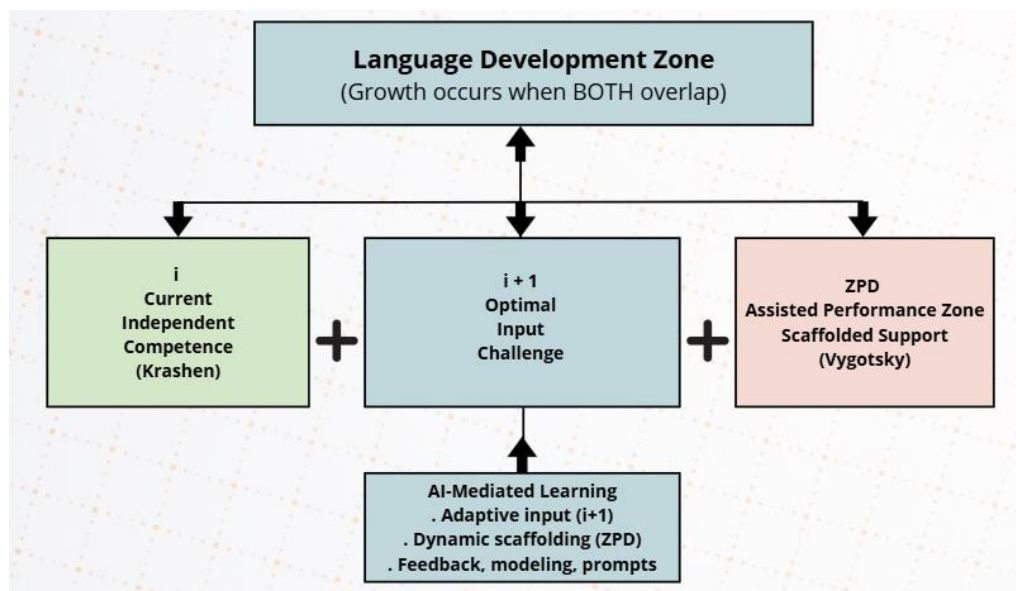


Fig. 1 AI as a Mediator of Comprehensible Input (i+1) and ZPD-Aligned Scaffolding

Source: Created by authors

AI as a Mediator of i+1 Input and ZPD Scaffolding

In AI-supported learning environments, the principles of $i + 1$ input and ZPD scaffolding can operate concurrently. AI systems dynamically modulate linguistic complexity, feedback density, and interactional support, delivering personalized input while offering contingent assistance such as corrective feedback, reformulations, metalinguage explanations, guided prompts, and dialogic modeling. These affordances parallel the adaptive responsiveness of a human scaffold operating within a learner's ZPD.

This integration is especially valuable at the intermediate level, where progress depends less on exposure volume and more on targeted difficulty calibration, strategic output support, and adaptive feedback loops. Within this framework, AI functions not simply as a source of language input but as a cognitive and interactional mediator that strengthens learners' capacity to operate beyond habitual linguistic routines.

Self-Directed Language Learning

Grounded in socio-cognitive models of mediated development, self-directed learning (SDL) provides learners with structural agency to engage deliberately with both comprehensible input ($i + 1$) and scaffolded support (ZPD) beyond classroom instruction.

Self-directed learning is a learner-centered educational approach in which individuals take primary responsibility for planning, executing, monitoring, and evaluating their learning goals and strategies (Hiemstra, 1994; Dahal & Bhat, 2024). SDL emphasizes learner agency, decision-making, and ownership of learning pathways.

In language learning, SDL is associated with increased motivation, sustained engagement, and the development of autonomous learning behaviors. The framework acknowledges internal determinants (e.g., self-efficacy, autonomy readiness, metacognition) and external enablers such as learning environments and tools that support strategic decision-making (Hiemstra, 1994; Dahal & Bhat, 2024).

A cornerstone of SDL is metacognitive regulation, enabling learners to monitor progress, evaluate learning strategies, and adjust actions responsively (Dahal & Bhat, 2024; Arboleda et al., 2024). These competencies are particularly critical at the intermediate plateau, when advancement relies less on accumulated knowledge and more on strategic intervention and performance refinement. SDL is also linked to critical thinking, problem solving, and adaptive learning behaviors—skills increasingly essential in digitally mediated learning contexts (Dmitrenko et al., 2021, 2025a).

Robinson and Persky (2020) distinguish SDL from self-paced or self-regulated learning: SDL

involves not only managing learning tasks, but designing and sustaining the learning environment itself – including goal setting, resource selection, workflow organization, and strategy evaluation.

Self-Directed Use of AI in Language Learning

AI has evolved from an institutional instructional supplement to an individual learning infrastructure integrated into learners' self-directed development systems (Dizon, 2024; Li et al., 2024; Roe & Perkins, 2024). AI operationalizes both $i + 1$ input delivery and ZPD-aligned scaffolding, enabling learners to self-manage linguistic challenge and adaptive guidance.

AI affordances include personalized input calibration, real-time feedback, error diagnosis, dialogue simulation, pronunciation modeling, vocabulary expansion, and interactive role-play (Dizon, 2024; Leung, 2025). Learners cite benefits including increased confidence, reduced anxiety, sustained practice, and heightened motivation, particularly due to AI's non-judgmental interactional environment (Huang et al., 2021; Seddik, 2025; Song & Song, 2023).

However, limitations include AI hallucinations requiring verification literacy (Lai et al., 2023), risk of over-reliance on external feedback (Shikina, 2025), reduced development of self-monitoring skills (Dmitrenko et al., 2025b), and limited capacity to simulate socio-pragmatic nuance and authentic interaction (Dizon, 2024; Leung, 2025).

Interim Summary

Collectively, the review of literature conceptualized the intermediate plateau as a developmental phase requiring calibrated linguistic challenge, contingent scaffolding, and increased learner agency to sustain interlanguage growth. The combined frameworks of Krashen's (1983) $i + 1$ and Vygotsky's (1934/1978) Zone of Proximal Development elucidate how progression is enabled when learners engage with input that slightly exceeds their independent competence while receiving adaptive, graduated support. Within this developmental window, AI can function dually as an input optimizer and scaffolded interlocutor, dynamically regulating complexity, delivering contingent feedback, and supporting iterative restructuring of learner output. When integrated strategically, AI serves as both a linguistic input source and a mediational tool for extending L2 performance, facilitating continued development beyond the intermediate plateau in ESP contexts.

3. RESEARCH OBJECTIVE, METHODOLOGY AND DATA

This study investigated whether AI-mediated learning tools could support ESP learners in progressing beyond the intermediate proficiency plateau. A mixed-methods design was employed to capture both measurable language gains and learners' subjective experiences through quantitative performance data and qualitative self-report evidence.

Research Design

The study followed a single-group, pre-experimental design with repeated measures, administered at three points (pre-test, Week 0; mid-test, Week 6; post-test, Week 12). A single-group design was adopted deliberately rather than a randomised controlled comparison. Under the conditions of prolonged, war-related disruption to higher education in Ukraine, recruiting an equivalent matched control group that could be guaranteed comparable instructional exposure and uninterrupted study conditions across twelve weeks was neither logistically feasible nor ethically justifiable, and withholding a potentially beneficial intervention from learners already affected by displacement was considered inappropriate. The design therefore prioritised ecological validity and within-subject sensitivity to change. The authors recognise that, in the absence of a control condition, the observed gains cannot be attributed unambiguously to the AI-supported intervention alone, because maturation, repeated exposure to the testing instruments, concurrent academic study, and the self-selection of more motivated learners may also have contributed to the outcomes. To mitigate these threats to internal validity, the design incorporated an intermediate measurement point (Week 6) to model the trajectory of change rather than relying on a single endpoint, a documented and stable three-month pre-intervention

baseline to reduce the likelihood that gains merely reflected ordinary coursework progression, and triangulation of quantitative outcomes with qualitative self-report data.

Participants

The study involved 66 third-year Information Technology (IT) students from three Ukrainian universities: Berdyansk State Pedagogical University (n = 20), Vinnytsia Mykhailo Kotsiubynskyi State Pedagogical University (n = 24), and Uzhhorod National University (n = 22). Participants were aged 20–23 years (60% male, 40% female) and had maintained an intermediate (B1) English proficiency level for at least three months despite regular ESP coursework. Amid persistent educational disruptions in Ukraine, participants demonstrated strong readiness for adaptive, self-directed learning pathways.

All participants reported a comparable learning history: a minimum of eight years of formal English instruction in secondary and higher education and the completion of at least one university ESP course prior to the study, with no prior residence or study in an English-speaking country. Baseline proficiency was established at Week 0 with the Cambridge proficiency assessment, which placed every participant at CEFR level B1 according to Cambridge English Scale band (140–159). The presence of an intermediate plateau was operationalised, following Selinker's (1996) concept of temporary fossilization and Richards' (2008) account of the plateau effect, as the absence of measurable upward movement in the proficiency band for at least three consecutive months despite continued ESP coursework. The three-month criterion was adopted because it is long enough to distinguish genuine stagnation from the ordinary week-to-week variability of formative assessment, yet short enough to capture learners at a still-reversible stage rather than after permanent fossilization. Documentary evidence of the plateau was drawn from each participant's institutional assessment records across the preceding semester, which confirmed flat or statistically non-significant change in ESP performance prior to enrolment. This baseline characterisation establishes the pre-intervention state against which subsequent gains are interpreted.

Procedure

The 12-week intervention implemented a cyclical, autonomous learning model structured around four AI-enabled learning functions:

1. Comprehension and Synthesis (NotebookLM): Learners selected IT-domain articles or videos, generated structured summaries, and processed AI-generated audio to reinforce multimodal comprehension.
2. Linguistic Analysis (ChatGPT): Learners constructed individualized language databases, including vocabulary, grammar explanations, and contextualized usage examples.
3. Contextualized Production (AI Content Generators): Learners produced dialogues and written tasks grounded in authentic IT workplace scenarios to enhance functional language deployment.
4. Oral Production and Pronunciation (ELSA Speak): Learners engaged in guided speaking practice with phoneme-level feedback and weekly pronunciation scoring.

Participants were encouraged to complete the cycle twice weekly, balancing structured goals with autonomy. Initial orientation sessions established methodological expectations and tool familiarity. Researchers provided technical assistance when required but minimized direct instructional involvement to preserve ecological validity and learner self-direction.

Data Collection

A convergent mixed-methods approach was used to triangulate learning outcomes. Quantitative assessments measured linguistic development, while qualitative instruments captured experiential, motivational, and self-regulatory dimensions of learning. Testing instruments, targeted constructs, and administration timelines are summarized in Table 1.

To support transparency and replicability, each instrument is specified below together with the assumptions on which it relies. Overall proficiency was measured with the Cambridge English Scale assessment, administered under standardised, proctored conditions at Weeks 0 and 12; scores are reported on the Cambridge English Scale with the corresponding CEFR band. The IT-ESP instrument was a researcher-

developed test comprising items organised into two sections – domain-specific lexis and grammatical accuracy in IT communicative contexts. Its content validity was established through expert review by independent ESP specialists who evaluated item relevance and representativeness. Oral performance was assessed against the four official IELTS Speaking band descriptors – fluency and coherence, lexical resource, grammatical range and accuracy, and pronunciation – by independent raters trained and calibrated in IELTS-aligned assessment. Pronunciation accuracy and speech fluency were captured automatically by the ELSA Speak phoneme-level scoring engine on a 0-100 scale and logged weekly. The key measurement assumptions that the Cambridge instrument provides a CEFR-aligned criterion measure, the IT-ESP test is content-valid for the IT register, human IELTS-style rating is sufficiently reliable, and ELSA Speak's automatic speech recognition yields stable phoneme-level estimates – are stated here so that readers can appraise the quality and limits of each measure.

Tab. 1

Testing Instruments, Targeted Constructs, and Assessment Schedule

Instrument	Targeted Construct	Assessment Schedule
Cambridge English Scale Test	Overall English proficiency	Weeks 0 & 12
Custom IT-ESP Assessment	IT-specific lexical and grammatical competence	Weeks 0, 6, 12
IELTS-aligned Speaking Assessment	Oral communication proficiency	Weeks 0 & 12
ELSA Speak	Pronunciation accuracy and speech fluency	Weekly
Semi-structured Interviews	Learner experiences and perceptions	Weeks 4, 8, 12
Weekly Learner Logs	Self-regulated learning behaviors	Continuous

Source: Created by authors

Quantitative performance data were gathered across proficiency, speaking fluency, pronunciation accuracy, and IT-specific linguistic competence. Qualitative data were collected through guided reflective logs and semi-structured interviews addressing perceived progress, motivational patterns, strategy use, obstacles, and agentic learning behaviors.

Analysis

Language gains were evaluated using paired-samples *t* tests and repeated-measures ANOVA to measure longitudinal change across linguistic domains. Qualitative data were subjected to thematic analysis to identify patterns in learner autonomy, affective response, strategic adaptation, and perceptions of AI-mediated learning. To strengthen credibility, 20% of participants engaged in member-checking procedures to confirm interpretive accuracy, clarify researcher inferences, and validate emerging themes.

Before inferential testing, the assumptions underlying the parametric procedures were verified. The normality of the difference scores was examined using the Shapiro-Wilk test together with inspection of Q-Q plots, and the sphericity assumption required by the repeated-measures ANOVA was tested with Mauchly's test; where sphericity was violated, the Greenhouse-Geisser correction was applied to the degrees of freedom. In accordance with APA reporting standards, every comparison reports the mean and standard deviation at each measurement point, the *t* statistic with its degrees of freedom, the exact *p* value, the standardised effect size for paired data (Cohen's *d_z*, computed as $t/\sqrt{n}$), and the 95% confidence interval of the mean difference. All analyses were performed in IBM SPSS Statistics 28, and the assumption of independence of observations is consistent with the single-group repeated-measures structure.

Ethical Considerations

Participation was voluntary and could be discontinued at any time without academic penalty. All

data were anonymized to ensure confidentiality. Given the heightened vulnerability of learners navigating prolonged educational disruption, flexible scheduling and ongoing emotional and technical support were integrated throughout the study. Ethical protocols prioritized learner well-being, autonomy, and data protection at all stages of research engagement.

4. RESULTS AND DISCUSSION

Quantitative Findings

Statistical analyses demonstrated significant gains across all measured linguistic domains from pre-test (Week 0) to mid-test (Week 6) and post-test (Week 12), indicating sustained developmental momentum beyond initial task familiarization. Performance outcomes and paired-samples t-test results are presented in Table 2.

Tab. 2

Language Performance and Paired Samples t-test Results

Test	Pre-test %	Mid-test %	Post-test %	t	p
Cambridge English Test	54	59	68	-21.32	< .001
IT Vocabulary & Grammar	58	66	78	-29.99	< .001
Speaking (IELTS criteria)	52	57	67	-22.76	< .001
ELSA Pronunciation	51	59	74	-34.33	< .001
ELSA Fluency	52	64	83	-45.89	< .001

Source: Created by authors

All five pre-to-post comparisons were statistically significant at $p < .001$, and the accompanying effect sizes were very large by Cohen's conventions. To meet full reporting standards, the mean difference, its standard deviation, the standardised paired effect size (d_z), and the 95% confidence interval of the mean difference are presented in Table 3. The gains ranged from +14 percentage points on the Cambridge measure, 95% CI [12.69, 15.31], $d_z = 2.62$, to +31 percentage points on ELSA fluency, 95% CI [29.65, 32.35], $d_z = 5.65$. Because the confidence intervals are narrow and lie well above zero, the gains are statistically robust.

Tab. 3

Effect Sizes and 95% Confidence Intervals for Pre-to-Post Gains

Measure	M diff (pp)	SD diff	t(65)	p	d_z	95% CI of M diff
Cambridge English Test	+14	5.33	21.32	< .001	2.62	[12.69, 15.31]
IT Vocabulary & Grammar	+20	5.42	29.99	< .001	3.69	[18.67, 21.33]
Speaking (IELTS criteria)	+15	5.35	22.76	< .001	2.80	[13.68, 16.32]
ELSA Pronunciation	+23	5.44	34.33	< .001	4.23	[21.66, 24.34]
ELSA Fluency	+31	5.49	45.89	< .001	5.65	[29.65, 32.35]

Note. M diff = mean post-pre gain in percentage points (pp); d_z = Cohen's d for paired samples. SD diff, d_z , and the 95% CIs were derived from the reported t statistics and $n = 66$. Source: Created by authors

Key Quantitative Insights

The quantitative findings demonstrate a clear and sustained improvement in participants' language proficiency over the course of the intervention. Overall General English proficiency increased by 14 percentage points, indicating a meaningful improvement in learners' general language competence. The most substantial gains were observed in ESP lexical-grammatical competence, which increased by 20%, highlighting the particularly strong development of domain-specific vocabulary and grammatical knowledge. Pronunciation accuracy and fluency demonstrated the largest effect sizes among the measured outcomes, suggesting that frequent exposure to automated corrective feedback, combined with systematic opportunities for oral rehearsal, contributed substantially to learners' development of spoken language performance. Importantly, performance gains continued to emerge between Weeks 6 and 12, demonstrating that learners' progress was sustained throughout the intervention rather than representing a temporary acceleration in performance. This pattern is particularly significant in the context of addressing the intermediate plateau, as it indicates continued language development beyond the initial stages of improvement.

Qualitative Results

The qualitative analysis of interview data and reflective logs revealed five primary themes that characterize learners' experiences with AI-supported autonomous language learning. First, *reclaimed learner agency* emerged as a prominent theme. Participants consistently described AI-powered tools as enabling greater control over their individual learning pathways and allowing them to prioritize personally relevant linguistic needs. One participant emphasized this shift in autonomy, stating, "*For the first time, I could learn what I actually needed, not what the textbook decided for me.*" This finding suggests that AI-supported learning environments may enhance learners' sense of ownership and provide greater flexibility in selecting learning content, activities, and areas for improvement.

The second theme concerned *lowered affective barriers*. Learners frequently characterized AI tools as "*non-judgmental*," "*patient*," and "*always available*," emphasizing the perceived psychological safety of interacting with AI during language practice. Such characteristics appeared to reduce learners' fear of making errors and encouraged greater willingness to take risks in language production. The findings therefore indicate that AI-mediated practice may contribute not only to linguistic development but also to the creation of a less threatening environment in which learners can experiment with language without immediate social evaluation.

The third theme, *motivation renewal beyond the plateau*, reflects a notable change in learners' attitudes toward continued language development. By Week 12, 78% of participants reported an intention to continue using AI-powered tools independently. Their decisions were associated with increased self-efficacy, greater confidence in their language abilities, and the ability to monitor progress more clearly. These findings suggest that visible evidence of incremental improvement and opportunities for individualized practice may help learners overcome the stagnation and declining motivation commonly associated with the intermediate plateau.

The fourth theme involved *initial self-regulation challenges*. Approximately 15% of participants reported difficulties with establishing realistic learning goals, maintaining an appropriate pace, and organizing their independent practice during the early stages of the intervention. However, these difficulties diminished as learners developed more stable routines and became increasingly familiar with autonomous learning practices. This finding highlights the importance of recognizing that learner autonomy does not necessarily develop automatically through access to AI tools; rather, learners may require an initial period of adaptation and, where necessary, explicit guidance in goal setting, time management, and self-monitoring.

Finally, *AI limitations prompting the development of critical awareness* emerged as an important dimension of the qualitative data. Participants' encounters with inaccurate, incomplete, or inappropriate AI-generated outputs encouraged them to develop verification strategies rather than rely unquestioningly on AI-generated information. This experience contributed to the development of critical

AI literacy by encouraging learners to evaluate, cross-check, and critically assess AI-generated content. Thus, the findings suggest that exposure to AI limitations can serve a pedagogically productive function, transforming potential technological weaknesses into opportunities for developing more critical and responsible patterns of AI use.

Taken together, the qualitative findings indicate that AI-supported autonomous learning influenced not only learners' linguistic performance but also their agency, affective engagement, motivation, self-regulation, and critical awareness. The convergence of these themes provides further evidence that AI tools can support sustained engagement with language learning beyond the intermediate plateau, provided that their use is accompanied by the development of appropriate autonomous learning and critical evaluation strategies.

Integrated Discussion

The findings demonstrate that AI-supported self-directed ESP learning can effectively address the intermediate language learning plateau by supporting cognitive, metacognitive, and affective development. Statistically significant improvements in general and IT-specific English proficiency indicate that AI-supported learning enhanced both overall language competence and discipline-specific communication through individualized practice, specialized vocabulary, and immediate feedback. Participants also demonstrated improved metacognitive skills by engaging in planning, monitoring, adjusting, and evaluating their learning, with ELSA Speak and ChatGPT functioning as useful scaffolds through real-time feedback and on-demand language support. In addition, learners reported reduced anxiety, increased persistence, and greater confidence, while the accessible and non-judgmental nature of AI-supported practice encouraged experimentation and strengthened their sense of agency. Overall, the findings suggest that AI-supported self-directed learning can address the linguistic, metacognitive, and affective dimensions of the intermediate plateau and contribute to sustained language development.

Pedagogical Implications

Findings support a pedagogical shift from instructor-as-content-provider toward instructor-as-learning-systems designer and autonomy mentor. AI systems operationalized Vygotskian principles by providing scaffolded assistance within individualized Zones of Proximal Development, extending guided support beyond classroom boundaries and into self-directed learning cycles.

Limitations and Future Research

Although participants demonstrated emerging AI evaluation strategies, misinformation risks persisted, underscoring the need for explicit AI literacy training. Future research should examine long-term retention of AI-mediated gains, comparative effects across diverse ESP disciplines, hybrid mentorship models integrating teacher and AI scaffolding, and scalable frameworks for developing critical AI literacy in language learning.

Several methodological limitations qualify these findings and should guide their interpretation. First, the study used a single intervention group without a control or comparison condition; consequently, the observed gains cannot be attributed solely to the AI-supported programme, because maturation, the practice or testing effect arising from repeated administration of the instruments, concurrent ESP coursework, and the self-selection of motivated volunteers may have contributed to the outcomes. The mid-test, the documented stable baseline, and the qualitative triangulation reduce but do not eliminate these threats, and a future randomised or quasi-experimental design with a matched control group is needed to isolate the intervention's causal contribution. Second, the twelve-week duration was sufficient to detect substantial change but cannot establish whether the gains are durable; the absence of a delayed post-test means that retention beyond the intervention window is unknown, and the three-month plateau criterion, while justified above, was applied to a single cohort and warrants validation in larger samples. Third, the effect sizes reported here are exceptionally large for educational interventions; although they are internally consistent with the obtained *t* statistics, such magnitudes can be inflated by single-group designs, ceiling or floor characteristics of the instruments, and shared method variance, so they should be interpreted cautiously and replicated with independent measures. Fourth, the sample

comprised 66 third-year IT students from three Ukrainian universities studying under wartime conditions, which constrains generalisability to other disciplines, proficiency levels, and educational contexts.

Section Summary

AI-supported self-directed learning demonstrated considerable potential to reactivate learner motivation during plateau phases, strengthen domain-specific linguistic competence, and improve pronunciation and speech fluency. It also contributed to the development of more durable autonomous learning behaviours and encouraged learners to engage critically with AI-generated content rather than rely on it uncritically. These findings position AI-supported learner autonomy not only as a strategy for addressing language stagnation but also as a scalable framework for promoting sustainable ESP development.

5. CONCLUSIONS

This study provides evidence that AI-supported self-directed learning is a viable and effective approach for addressing the intermediate proficiency plateau in ESP contexts. Learners demonstrated marked linguistic gains in general proficiency, IT-specific language, and spoken fluency through iterative, learner-driven engagement with AI tools.

The integration of ChatGPT, NotebookLM, and ELSA Speak created a synergistic learning ecosystem that combined adaptability, immediate feedback, and learner control. This environment strengthened engagement, metacognitive regulation, and ownership of learning pathways.

Equally important, qualitative findings revealed the central role of affective transformation – particularly increased confidence, reduced anxiety, and renewed agency – in sustaining language development beyond stagnation. Results further showed that orientation, planning scaffolds, and structured reflection are critical enablers of successful long-term autonomy in AI-mediated learning systems.

Collectively, this study contributes to growing evidence that AI-augmented, learner-directed models can expand the boundaries of ESP pedagogy by promoting more resilient, scalable, learner-centered, and future-ready pedagogical frameworks. Continued research is needed to map long-term trajectories, refine hybrid human-AI instructional roles, and embed critical digital literacy as a core component of autonomous language learning.

The principal contribution of this study is conceptual as well as empirical: rather than treating AI merely as a supplementary classroom tool, it specifies and tests an integrated, theory-driven model in which AI simultaneously operationalises Krashen's comprehensible input ($i + 1$) and Vygotsky's zone of proximal development within a single self-directed cycle aimed specifically at the intermediate plateau – a target that has rarely been addressed through autonomous, AI-mediated ESP learning in a wartime higher-education context. Its practical value lies in a replicable four-function workflow (comprehension, linguistic analysis, contextualised production, and pronunciation practice) that institutions can adopt where continuous teacher-led instruction is not feasible. At the same time, because the evidence derives from a single-group design, these conclusions are offered as a demonstration of feasibility and a strong association rather than as proof of an isolated causal effect, and they should be confirmed through controlled, longitudinal replication before firm pedagogical prescriptions are drawn.

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Дмітренко Наталія, Школа Ірина, Салюк Богдана, Хіндман Лінн. Подолання інтермедіатного плато у вивченні англійської мови за професійним спрямуванням: самостійна робота студентів ІТ-спеціальностей з використанням інструментів штучного інтелекту. *Журнал Прикарпатського університету імені Василя Стефаника*, 13 (3) (2026), 17-30.

Інтермедіатне плато залишається постійною проблемою у вивченні другої мови, особливо для тих, хто вивчає англійську мову для професійних потреб (ESP), яким бракує постійного досвіду поза межами аудиторії. Це дослідження вивчало, чи може самостійне навчання, опосередковане інструментами штучного інтелекту, допомогти українським ІТ-студентам подолати цей стан. Протягом 12 тижнів 66 учасників взяли участь у структурованих циклах автономного навчання, що інтегрували ChatGPT, NotebookLM та ELSA Speak для розвитку словникового запасу, лінгвістичного аналізу, розуміння предметної області, практики вимови та рефлексії. Кількісні дані тестового оцінювання рівня володіння мовою та щотижневої аналітики вимови показали статистично значуще покращення за всіма показниками ($p < 0,001$). Найбільші покращення спостерігалися в точності та плавності вимови, далі йшли предметно-специфічна мовна компетентність та усна комунікативна діяльність. Тематичний аналіз інтерв'ю та журналів студентів виявив три основні висновки: (1) взаємодія зі штучним інтелектом підвищила впевненість, мотивацію та емоційну безпеку студентів; (2) адаптивний зворотний зв'язок ез осуду посилив наполегливість та впевненість; та (3) початкове керівництво щодо постановки цілей та використання стратегії було важливим для сталої саморегуляції. Хоча учасники дослідження стикалися з труднощами, пов'язаними зі штучним інтелектом, вони розвивали покращену цифрову стійкість та практики критичної перевірки. Результати дослідження демонструють, що структурована автономія, підтримувана штучним інтелектом, може пом'якшити лінгвістичну стагнацію, одночасно сприяючи метакогнітивній усвідомленості, самоефективності та постійній залученості. Дослідження покращує розуміння самостійного навчання, посиленого штучним інтелектом, як масштабованої моделі для викладання англійської мови для спеціальних цілей (ESP) та підкреслює необхідність критичної грамотності за допомогою штучного інтелекту в автономних навчальних екосистемах.

Ключові слова: вивчення мови за допомогою штучного інтелекту, самостійне навчання, інструменти штучного інтелекту, англійська мова для спеціальних цілей (ESP), проміжний рівень, автономія студента, технологія вимови, мотивація до вивчення мови.