
Learner-centered scaffolding in tertiary-level ESP instruction

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Abstract: This article investigates learner-centered scaffolding as a comprehensive pedagogical framework for tertiary-level English for Specific Purposes (ESP) instruction. The study addresses the increasing demand for adaptive instructional support in higher education, where students are expected to simultaneously acquire professional knowledge and develop foreign-language communicative competence. Particular attention is devoted to the cognitive, communicative, emotional, and professional dimensions of scaffolded ESP learning, emphasizing the importance of balancing instructional assistance with the gradual development of learner autonomy.

The paper systematizes the theoretical foundations of learner-centered scaffolding and examines its principal pedagogical mechanisms within tertiary education. The study analyzes how adaptive and contingent instructional support contributes to the management of cognitive load, the reduction of language anxiety, the enhancement of communicative confidence, and the development of self-regulated learning. Special emphasis is placed on differentiated instruction, professionally contextualized tasks, metacognitive regulation, visualization, adaptive feedback, and scaffold fading as mechanisms facilitating the transition from assisted to autonomous professional communication.

The article additionally identifies major difficulties experienced by tertiary-level ESP students, including cognitive overload, communication anxiety, insufficient authentic communicative practice, fragmented acquisition of professional terminology, reduced motivation, and difficulties integrating disciplinary knowledge with foreign-language production. The practical dimension of the research is represented through a system of learner-centered scaffolded strategies that demonstrate how instructional support can be adapted to learners' cognitive readiness, communicative competence, and professional specialization.

Keywords: learner-centered scaffolding; English for Specific Purposes (ESP); tertiary education; mental strain; professional communication; adaptive instruction.

1. Introduction

Contemporary tertiary education increasingly requires future specialists to possess not only profound disciplinary expertise but also the ability to communicate effectively in international professional and academic environments. In the context of globalization, academic mobility, technological development, and expanding international cooperation, proficiency in English for Specific Purposes (ESP) has become an essential component of professional competence. Students

are expected to process professional information, participate in academic discourse, collaborate internationally, and engage in professional communication through English.

However, ESP instruction in tertiary education is associated with significant pedagogical and cognitive challenges. Learners face a steep uphill battle as they juggle complex industry knowledge with unfamiliar language mechanics, a reality that effectively doubles their mental fatigue. The complexity of professional terminology, authentic discourse patterns, analytical reasoning, and communicative production in a foreign language often leads to anxiety, reduced motivation, and difficulty in maintaining effective verbal exchange of information, intentions, and emotions.

The problem is particularly acute in non-linguistic higher education institutions, where ESP is typically taught within limited classroom hours while the expected learning outcomes remain highly demanding. In such conditions, teacher-centered instruction often proves insufficient because it does not adequately address students' individual psychological needs, communicative difficulties, emotional barriers, or professional learning trajectories. Today, some instructors still rely on teacher-fronted methods due to deep-seated institutional inertia and rigid curriculum constraints. When faced with a vast amount of specialized vocabulary to cover, lecture-based delivery often feels like the only manageable way to ensure all syllabus requirements are met on time.

Furthermore, designing and managing dynamic, student-led scaffolding activities requires extensive preparation time that overworked faculty members simply cannot afford. There is also a pervasive cultural expectation in many universities that positions the professor as the absolute authority and sole source of knowledge, making a shift toward student autonomy feel risky or counterintuitive. Finally, a lack of targeted professional development leaves many non-linguistic educators without the practical tools needed to facilitate active communication, causing them to fall back on the traditional instructional styles they themselves experienced as students.

Consequently, contemporary methodology increasingly emphasizes shifting the focus from the teacher to the student's individual needs, promoting independence and encouraging critical thinking. This shift demands that the entire curriculum structure become fundamentally flexible and tailored to the individual learner. Instruction addresses students' mental readiness, professional orientation, and individual learning needs. One of the most effective pedagogical frameworks within this perspective is learner-centered scaffolding, which combines adaptive support, intellectual guidance, emotional assistance, and gradual development of learner independence.

Learner-centered scaffolding in ESP may be defined as a dynamic system of temporary encouragement designed to help learners accomplish professional and communicative tasks that exceed their current level of independent performance in a foreign language. Unlike transmissive instructional models, learner-centered scaffolding prioritizes students' active participation, self-regulation, metacognitive reflection, and progressive independence. Within ESP instruction, scaffolding helps students manage complex professional discourse, organize cognitive activity, develop communicative confidence, and gradually internalize strategies of verbal interaction.

Its effectiveness lies in its adaptive and contingent nature. The level and type of instructional support change according to learners' immediate needs. In addition, modern educational technologies and artificial intelligence systems have significantly expanded the possibilities of learner-centered scaffolding in tertiary-level ESP instruction. AI-powered tools, intelligent tutoring systems, adaptive learning platforms, and generative technologies provide individualized feedback, visualization, interactive content, and opportunities for self-directed learning, thereby functioning as additional forms of personalized scaffolding.

2. Research object and subject

The object of this study is the pedagogical process of teaching English for Specific Purposes (ESP) to university students in a context that integrates professional content and linguistic competence. ESP instruction is a specialized branch of foreign-language education focused on

developing the communicative competence required for professional, academic, and interdisciplinary interaction in specific occupational fields.

ESP learning is interdisciplinary, and the educational process typically includes classroom interaction, project-based learning, professional simulations, case-study analysis, collaborative communication, independent extracurricular work, and digital learning activities. Its principal parameters include the development of professional communicative competence; the acquisition of specialized terminology and discourse patterns; the formation of productive and receptive foreign language skills; the integration of authentic professional materials into learning; the contextualization of communication according to professional needs; the development of participants' self-regulated learning; and the formation of intercultural communicative competence.

Despite significant methodological development, tertiary-level ESP instruction continues to exhibit several substantial limitations and operational difficulties. Many ESP programs remain focused on reproductive learning, memorization of terminology, and formal language exercises rather than authentic professional interaction. A related weakness is the insufficient integration of practice and authentic professional interaction. Students often demonstrate adequate theoretical knowledge but encounter substantial difficulties when applying English in real professional communication situations. Furthermore, the rapid integration of artificial intelligence technologies into educational environments creates new pedagogical challenges, including information overload, digital distraction, overreliance on automated systems, and insufficient critical evaluation of AI-generated content. To counteract these deficiencies and optimize the ESP learning process under modern conditions, a precise system of pedagogical intervention is required, which is the subject of this study: the functional mechanisms and tools of learner-centered scaffolding as a strategic system of temporary intellectual support that facilitates students' transition to autonomous professional dialogue.

3. Research goal and objectives

The primary goal of this research is to investigate learner-centered scaffolding as an effective pedagogical framework in tertiary-level ESP instruction and to determine its influence on professional foreign-language communication, mental support, and self-sufficient learning.

To achieve this purpose, several research objectives were denoted:

- 1) to analyze the theoretical details of learner-centered scaffolding in ESP instruction;
- 2) to identify the principal cognitive and pedagogical mechanisms of scaffolded learning;
- 3) to determine the major communicative and cognitive difficulties experienced by tertiary-level ESP students;
- 4) to investigate adaptive and differentiated strategies of instructional support;
- 5) to evaluate the practical significance of scaffolded instruction for developing communicative competence and learner autonomy.

4. Literature review

The theoretical foundations of scaffolding originate from sociocultural and cognitive theories of learning, particularly the works of Wood, Bruner, and Ross, who introduced scaffolding as temporary instructional support that enables learners to perform tasks beyond their independent abilities. Within this framework, learning is regarded as a socially mediated process in which cognitive development occurs through guided interaction, collaborative activity, and gradual internalization of cognitive and communicative strategies [1]. Their theory established the conceptual basis for understanding how instructional support can facilitate learners' transition from assisted performance to autonomous problem-solving.

Bruner further developed the concept by emphasizing learners' active role in knowledge construction. According to his theory, learning is not a passive reception of information but an active

process of inquiry, interpretation, and problem-solving [2; 3]. Knowledge is constructed through interaction with educational environments, social communication, and reflective thinking. These ideas later became fundamental to learner-centered approaches in foreign language education, shifting the methodological emphasis from the direct transmission of knowledge to guided cognitive engagement and independent meaning construction.

Hammond drew on developments in sociocultural learning theories and systemic functional linguistics to analyze pedagogical practices supporting ESL learners' engagement with mainstream curricula [4]. Her research significantly expanded the understanding of scaffolding beyond simplified instructional assistance by demonstrating the importance of contextualized language support, dialogic interaction, and collaborative meaning-making. Hammond analyzed pedagogical methods to develop a more comprehensive scaffolding model that can inform future teaching practices in linguistically diverse classrooms. This perspective is particularly important for ESP instruction because professional foreign-language learning requires integration of linguistic, cognitive, and disciplinary knowledge.

Contemporary ESP methodology increasingly views scaffolding as an adaptive pedagogical mechanism that supports both linguistic and professional development. Modern studies demonstrate that scaffolded instruction contributes to the development of productive language skills, communicative confidence, cognitive regulation, professional discourse competence, and learner autonomy [5; 6; 7; 8; 9; 10]. Researchers emphasize that learner-centered scaffolding is especially effective in professionally oriented foreign-language education because it allows teachers to regulate task complexity, personalize instructional support, and gradually transfer responsibility for learning to students.

Particular attention in contemporary studies is devoted to the relationship between scaffolding and cognitive load management. Scholars emphasize that foreign-language learning in professional contexts requires learners to process multiple forms of information simultaneously, including terminology, discourse structures, professional concepts, analytical reasoning, and communicative strategies. Such multidimensional processing often places excessive cognitive strain, especially on tertiary-level ESP students with limited communicative experience. Scaffolded instruction reduces excessive cognitive pressure by organizing information progressively, simplifying task structure, activating prior knowledge, externalizing complex reasoning processes, and supporting metacognitive regulation [11; 12]. Consequently, scaffolding functions not only as instructional assistance but also as a mechanism for optimizing cognitive activity in professionally oriented foreign-language learning.

Another important direction concerns the emotional dimension of scaffolded learning. Studies demonstrate that ESP students frequently experience fear of speaking, low self-confidence, communication anxiety, and psychological discomfort when using a foreign language in professional contexts. Learner-centered scaffolding helps create supportive educational environments in which mistakes are interpreted as a natural component of learning rather than indicators of failure. Such psychologically safe learning conditions increase communicative willingness, learner engagement, and intrinsic motivation.

Pea identified two central instructional functions of scaffolding: Channeling and Focusing, which regulate learners' attention and cognitive activity, and Modeling, which provides examples of expert performance that learners later internalize and reproduce independently [13]. This interpretation significantly expanded the functional understanding of scaffolding by demonstrating that instructional support involves cognitive guidance, attention management, and strategic regulation of learning processes.

Expanding this perspective, Taber argued that scaffolded instruction should position learning tasks within the learner's Zone of Proximal Development while gradually reducing support as competence develops [14]. He additionally introduced specific instructional tools, namely PLANKs and POLES, designed to activate prior knowledge, structure cognitive operations, and guide learners through complex reasoning processes. Taber's approach is particularly relevant to tertiary-level ESP

instruction because professionally oriented communication frequently requires learners to process abstract concepts, discipline-specific terminology, and analytical discourse simultaneously.

Contemporary researchers also investigate differentiated and personalized scaffolding strategies in tertiary education. Halatsyn and Feshchuk emphasize that language acquisition among students specializing in technical disciplines presents unique methodological difficulties, including low motivation, perceived irrelevance of language learning, limited communicative experience, and insufficient prior exposure to authentic professional interaction [15]. According to the researchers, effective scaffolding in technical educational contexts requires intentional pedagogical integration of adaptive support mechanisms into foreign-language instruction. This intentional integration involves moving away from rigid, uniform teaching methods toward highly responsive and flexible classroom interventions [10]. Consequently, the central objective of scaffolded ESP instruction becomes the creation of adaptive learning environments that respond dynamically to students' cognitive needs, professional specialization, and communicative readiness. Adaptive support mechanisms allow teachers to adjust the level of instructional assistance based on learners' competence, individual learning pace, and professional orientation. In this context, scaffold fading is a key pedagogical principle because excessive support may hinder learner independence, whereas insufficient support may intensify cognitive overload and communication anxiety.

A significant area of recent investigation concerns technology-enhanced and AI-mediated scaffolding. Artificial intelligence systems increasingly serve as adaptive educational tools, providing real-time feedback, automated language support, interactive communication, individualized recommendations, and guided professional practice during ESP tasks. AI-assisted learning environments create opportunities for multimodal instruction, immediate correction, visualization of professional concepts, autonomous vocabulary development, and independent communicative practice beyond classroom boundaries. Research on ChatGPT and similar generative AI systems further demonstrates the pedagogical potential of AI-mediated scaffolding. Woo, Wang, Guo, and Susanto investigated students' perceptions of learning to write with ChatGPT in EFL classrooms and reported that AI technologies can increase learner engagement, facilitate writing development, support idea generation, and reduce psychological barriers associated with foreign-language production [16]. These findings indicate that AI-mediated scaffolding may significantly expand opportunities for personalized, learner-centered ESP instruction.

At the same time, researchers emphasize that AI technologies may also create additional cognitive demands, including information processing, prompt construction, evaluation of generated content, digital multitasking, and excessive dependence on automated assistance [17]. Consequently, technological support itself requires careful pedagogical scaffolding in order to maintain cognitive balance, critical thinking, and authentic communicative development.

5. Research methods

The research is based on a combination of theoretical and analytical methods applied within the framework of contemporary ESP methodology and learner-centered pedagogy.

Given the study's methodological foundation in sociocultural learning theory, learner-centered pedagogy, communicative language teaching, competence-based education, and cognitive approaches to foreign-language instruction, the methods employed include analysis and synthesis of scientific literature on scaffolding, ESP instruction, learner-centered education, cognitive load, and communicative competence; comparative analysis of pedagogical approaches to professionally oriented foreign-language teaching in tertiary education; systematization and classification of scaffolded instructional strategies used in ESP classrooms; a descriptive method for identifying the cognitive, communicative, and emotional difficulties experienced by ESP learners; pedagogical modeling to develop an integrated framework of learner-centered scaffolding strategies; and generalization of contemporary methodological findings related to adaptive and AI-mediated instruction.

6. Research results

Learner-centeredness is critically important in English for Specific Purposes (ESP) because learners have diverse professional specializations, necessitating instruction that targets discipline-specific lexis, genres, and communicative tasks. Variability in language proficiency among ESP students renders uniform syllabi ineffective; differentiated scaffolding and adaptive sequencing are therefore required to optimize learning trajectories. Divergences in cognitive readiness demand that pedagogical designs align task complexity and cognitive load with learners' processing capacities and metacognitive strategies. Prior communicative experience shapes pragmatic competence and interactional routines, so curricula must build on and extend learners' existing workplace discourse practices. Systematic needs analysis and iterative formative assessment are central to a learner-centered ESP model, ensuring that objectives, materials, and evaluation remain tightly coupled to authentic professional outcomes. Promoting learner autonomy and reflective practice enhances motivation and facilitates transfer of classroom gains to real-world communicative contexts. When instructors adopt a facilitative role, mediate resources, provide targeted feedback, and orchestrate collaborative problem-solving, they can individualize pacing and support without sacrificing course coherence. Consequently, centering ESP instruction on the learner's distinct professional, linguistic, cognitive, and experiential profile yields more relevant, efficient, and sustainable development of occupational communicative competence.

In tertiary-level ESP classrooms, students are expected not only to understand professional terminology but also to participate actively in seminars and webinars, analyze authentic materials, solve professional problems, present arguments, and produce discipline-specific discourse. These tasks require the simultaneous activation of linguistic, cognitive, analytical, and communicative resources, which often leads to cognitive overload [18]. Therefore, learner-centered scaffolding helps balance instructional challenges with adaptive support. The pedagogical significance of this approach lies in its ability to create conditions under which learners can gradually perform increasingly complex professional tasks while maintaining motivation, confidence, and cognitive engagement.

One of the central principles of learner-centered scaffolding is contingency, which holds that instructional support must correspond to learners' immediate cognitive and communicative needs. In educational practice, this principle implies that pedagogical assistance should intensify when students encounter difficulties and gradually diminish as competence develops. Such adaptive regulation enables learners to operate within their Zone of Proximal Development while avoiding excessive dependence on external guidance. Consequently, contingency functions as a dynamic mechanism that balances instructional assistance with the gradual development of learner autonomy.

Within the context of English for Specific Purposes, learner-centered contingency should be operationalized through continuous diagnosis, adaptive intervention, and systematic fading of support. This process ensures that students' progress toward discipline-specific communicative competence while maintaining manageable cognitive demands. Effective implementation requires integrating classroom micro-practices, formative assessment procedures, and teacher-training strategies grounded in empirical and practitioner-oriented research [19]. To render contingency observable and measurable in classroom settings, it should be operationalized through indicators such as response latency, error frequency and type, explicit requests for assistance, and task completion time.

The practical implementation of contingency relies on several interconnected instructional strategies. First, instructors employ micro-diagnostic techniques, including brief targeted checks designed to identify real-time problems related to vocabulary acquisition, genre awareness, or pragmatic competence. Simultaneously, teachers record recurring error patterns to inform subsequent support. Second, educators construct graduated prompt sequences that progress from full modeling to cues, hints, partial solutions, and eventually independent performance. Within this framework, only the minimal effective prompt should be provided. Instructional support is intensified when learner

accuracy or fluency falls below predetermined thresholds and withdrawn once criterion performance has been achieved.

In addition, adaptive grouping strategies contribute significantly to contingent scaffolding. Temporary pairs or small groups may be organized according to learners' immediate difficulties, for example, separating students with lexical problems from those experiencing challenges in discourse organization. Such differentiation allows peer scaffolding to complement teacher-led support more effectively. Furthermore, instructors employ concise evidence-based feedback strategies, including recasts, metalinguistic cues, and elicitation techniques, while monitoring which forms of feedback produce the most efficient transfer of learning.

The effectiveness of contingent scaffolding also depends on systematic assessment and data collection practices. Teachers should monitor formative indicators, such as response latency, self-repair frequency, and overall task success rates, to determine when to intensify or reduce instructional support. Additionally, educators may conduct small-scale classroom comparisons between contingent and non-contingent instructional approaches across equivalent tasks. The analysis of such outcomes provides a basis for evaluating the impact of scaffolding on retention, transfer, and long-term communicative development, thereby supporting the continuous refinement of instructional design.

The broader implementation of learner-centered contingency requires institutional support and sustained professional development. Teacher training should therefore emphasize interactional sensitivity, particularly the ability to recognize subtle learner signals such as hesitation, repair attempts, or uncertainty during communication. Video analysis, peer observation, and collaborative reflection may contribute to the development of these competencies. Curriculum developers should identify which professional genres students are expected to master, determine learners' baseline proficiency levels, and establish procedures for documenting micro-diagnostic observations. During classroom interaction, teachers must continuously decide which learner behaviors require escalated support, what constitutes a minimal effective prompt, and when fading should occur.

Although empirical studies demonstrate the effectiveness of contingent scaffolding, they also indicate the necessity of systematic monitoring to ensure measurable learning outcomes and prevent potential limitations. In particular, the risk of learner dependence caused by excessive scaffolding may be reduced through clearly defined fading procedures and autonomy-oriented tasks, whereas the problem of excessive teacher workload may be mitigated through concise diagnostic instruments and collaboratively developed scaffold repositories.

Effective scaffolding in ESP is estimated with the learning effect, implemented through the teaching framework, and operationalized through specific methods and strategies. This concept is fulfilled in *Table 1 «Learner-centered scaffolding in tertiary-level ESP instruction»*.

1. One of the most effective learner-centered scaffolding strategies is activating prior knowledge. Before introducing complex ESP content, teachers help students connect new professional concepts with previously acquired disciplinary experience. Such activation creates cognitive "bridges" that facilitate comprehension and reduce anxiety.

2. Visualization additionally plays a significant role in scaffolded ESP instruction. Graphic organizers, diagrams, concept maps, flowcharts, and visual representations externalize complex professional reasoning and help learners structure information more effectively. Visualization reduces working memory overload and supports comprehension of authentic materials.

3. Modeling constitutes another important mechanism of learner-centered scaffolding. Teachers demonstrate expert communicative behavior, analytical reasoning, and discourse organization as they verbalize cognitive strategies. Through observation and guided practice, students gradually internalize professional communicative patterns.

4. Contextualization through authentic professional tasks significantly increases learner engagement. Case studies, simulations, role-plays, legal analyses, technical projects, and problem-based learning activities help students understand the practical relevance of English in their future professions. Contextualized instruction also supports integrating language learning with professional identity formation.

5. Segmented presentation of complex material is aimed at preventing cognitive overload and facilitating gradual knowledge acquisition. Within this framework, complex professional content is divided into smaller instructional units with clearly defined objectives and manageable learning tasks. Such segmentation enables students to process linguistic and disciplinary information step by step without excessive cognitive strain. Each instructional segment focuses on mastering specific vocabulary, communicative patterns, or professional concepts before learners proceed to more complex material. This approach promotes deeper comprehension, improves retention of professional terminology, and increases learners' confidence during communicative tasks. Consequently, it contributes to the systematic development of discipline-specific communicative competence in ESP learning contexts.

6. Reflective metacognitive support promotes the development of self-regulated learning. Within this framework, students are encouraged to identify communicative difficulties and evaluate their problem-solving processes during professional language tasks. Such reflective practices increase learners' awareness of their cognitive and linguistic performance, enabling them to regulate their learning more effectively. Instructors support this process by guiding students to monitor their comprehension, assess the effectiveness of chosen strategies, and adjust their approaches when difficulties arise. As a result, learners gradually become more independent in managing professional communication tasks and overcoming language-related challenges. Consequently, reflective metacognitive support contributes to the long-term development of autonomous and strategically competent ESP learners.

7. Differentiation is a central feature of learner-centered scaffolding. Students receive varying degrees of instructional support depending on their communicative competence, cognitive readiness, and professional needs. Some learners may require detailed linguistic guidance and structured templates, whereas others benefit from more autonomous analytical tasks.

Emotional support should also be emphasized. ESP students frequently fear making mistakes in professional communication. Learner-centered scaffolding creates psychologically supportive learning environments in which students gradually develop communicative confidence. Constructive feedback, collaborative learning, and incremental task complexity reduce anxiety and encourage active participation.

8. One of the most important principles is scaffold fading, which ensures the gradual transition from guided performance to autonomous professional communication. In ESP contexts, scaffold fading is especially important because the ultimate objective of instruction is not merely knowledge acquisition but the ability to communicate independently within professional environments.

For this reason, students are encouraged to reflect on their learning processes, evaluate communicative strategies, analyze difficulties, and monitor their progress. Metacognitive prompting supports the development of self-regulated learning, an essential skill for lifelong professional development, without the pressure of powerlessness. In tertiary-level ESP instruction, emotional frustration, decreased motivation, inability to integrate professional concepts with foreign-language structures, avoidance of speaking activities, and difficulties understanding authentic professional texts indicate that learners experience excessive cognitive load. They also struggle to formulate responses during professional discussions, show fragmented vocabulary acquisition, and have reduced concentration during complex communicative tasks. These difficulties demonstrate the necessity of adaptive, scaffolded support that addresses the cognitive, emotional, and communicative aspects of learning.

Table 1. Learner-centered scaffolding in tertiary-level ESP instruction

N	Anticipated learning effect of scaffolding	ESP teaching framework	Method
1	Facilitates comprehension, reduces anxiety, and creates cognitive connections between language and professional knowledge	Students connect new professional topics with previously studied disciplinary concepts through brainstorming, discussion prompts, visuals, and AI-supported vocabulary generation	Guided activation of prior experience
2	Improves information organization, comprehension, and retention	Learners use diagrams, flowcharts, concept maps, and graphic organizers to structure professional information and discourse	Visual arrangement of professional content
3	Students internalize professional communicative patterns and reasoning strategies	Teachers demonstrate professional communication strategies through think-aloud explanations, analytical demonstrations, and sample discourse	Modeling-based instruction with guided support
4	Increases learner motivation and professional relevance of language learning	Authentic professional tasks, case studies, simulations, and project-based activities are integrated into ESP instruction	Professionally contextualized instruction
5	Prevents cognitive overload and supports gradual knowledge acquisition	Complex professional material is divided into smaller instructional units with clearly defined objectives	Segmented presentation of complex material
6	Develops self-regulated learning and learner autonomy	Students reflect on learning strategies, communicative difficulties, and problem-solving processes	Reflective metacognitive support
7	Ensures individualized learning trajectories and adaptive support	Instructional assistance varies according to students' proficiency, specialization, and cognitive needs	Adaptive individualized assistance
8	Promotes autonomous professional communication	Teacher support gradually decreases as students develop communicative independence	Gradual withdrawal of instructional support

The strategies presented above demonstrate that learner-centered scaffolding functions not merely as isolated instructional techniques but as an integrated pedagogical system that regulates cognitive complexity, emotional support, communicative development, and professional orientation.

From this perspective, the teacher serves not only as an information provider but also as a facilitator, mediator, mentor, and adaptive guide. Instruction becomes collaborative and responsive to learners' immediate needs, thereby increasing the effectiveness of ESP education in tertiary institutions.

The implementation of learner-centered scaffolding additionally contributes to the development of higher-order cognitive skills. Students learn to analyze professional information critically, synthesize knowledge from multiple sources, solve discipline-specific problems, and construct professional arguments in English. Accordingly, ESP instruction becomes closely connected to broader educational objectives related to professional competence, intercultural communication, and lifelong learning.

7. Prospects for further research

Further investigation should focus on empirical evaluation of learner-centered scaffolding effectiveness in tertiary-level ESP classrooms, particularly in technical, legal, and medical educational contexts. Future studies may additionally examine the relationship between scaffold fading and long-term learner autonomy, the role of emotional regulation in professional foreign-language communication, and the influence of AI-mediated support on cognitive load management.

Special attention should also be devoted to developing hybrid pedagogical models that combine human instructional guidance with adaptive artificial intelligence technologies in ESP learning environments. Another promising direction of research involves the creation of discipline-specific scaffolded ESP frameworks adapted to the communicative needs of different professional specializations.

8. Conclusions

Learner-centered scaffolding should be regarded as an effective and comprehensive pedagogical framework for tertiary-level ESP instruction because it integrates adaptive support, cognitive regulation, emotional assistance, professional contextualization, and gradual development of learner autonomy.

The study demonstrates that ESP students experience significant cognitive and communicative difficulties caused by the simultaneous acquisition of professional content and foreign-language structures. Learner-centered scaffolding helps reduce excessive cognitive load, organize information progressively, support communicative confidence, and facilitate the transition from guided performance to independent professional communication.

The effectiveness of scaffolded instruction depends primarily on its adaptive and contingent nature. Guided activation of prior experience, visual arrangement of professional content, modeling-based instruction, professionally contextualized assistance, segmented presentation of complex material, and gradual withdrawal of support create conditions for sustainable professional language development while preserving learner motivation and cognitive engagement.

Therefore, learner-centered scaffolding represents not only a methodological approach but also a broader pedagogical philosophy that places students' cognitive, emotional, communicative, and professional needs at the center of ESP instruction in tertiary education.

References:

- 1) Wood, D., Bruner, J. S., & Ross, G. (1976). The role of tutoring in problem-solving. *Journal of Child Psychology and Psychiatry*, 17(2), 89–100.
- 2) Bruner, J. S. (1982). The Language of Education. *Social Research*. Vol. 49, No. 4 (WINTER 1982), 835-853.
- 3) Bruner, J. S. (1986). Actual minds, possible worlds. *Series: The Jerusalem-Harvard Lectures*. Harvard University Press. 222 p.
- 4) Hammond, J. (2001). Scaffolding: Teaching and learning in language and literacy education. Primary English Teaching Assoc., PO Box 3106, Marrickville, New South Wales, 2204, Australia. <https://files.eric.ed.gov/fulltext/ED456447.pdf>. Retrieved: 11.05.2026.
- 5) Chen, S. (2018). An empirical study of scaffolding instruction in ESP teaching. *The Asian EFL Journal*. Quarterly September 2018, Vol. 20, Issue 9.2, 70.
- 6) Shirmohammadi, M., & Salehi, M. (2017). Comparative effect of scaffolding instruction and self-regulated learning on ESP learners' reading comprehension. *Studies*, 5(4), 203-213.
- 7) Afendi, A., Munir, A., & Setiawan, S. (2020). Facilitating student behavioral engagement in ESP classroom through teachers' scaffolding talk. *English Journal of Merdeka: Culture, Language, and Teaching of English*, 5(1), 41-53.

- 8) Aleksić-Hajduković, I., Sinadinović, D., & Mijomanović, S. (2019). Self-scaffolding and the role of new technologies in ESP teacher education. *ESP teaching and teacher education: Current theories and practices*, 47-62.
- 9) Moeen, A., Nejadansari, D., & Dabaghi, A. (2023). The Impact of Implicit vs. Explicit Grammar Teaching through Scaffolding on Iranian Learners' Speaking Motivation and Self-Efficacy: ESP Students in Focus. *Iranian Evolutionary Educational Psychology Journal*, 5(1), 64-73.
- 10) Arora, B., Al-Wadi, H., & Afari, E. (2024). Scaffolding instruction for improvement in learning English language skills. *International Journal of Evaluation and Research in Education*, 13(2), 1265-1275.
- 11) Coelho, M. (2017). Scaffolding Strategies in CLIL Classes – supporting learners towards autonomy. Conference: *Languages and the Market: A ReCLES.pt Selection of International Perspectives and Approaches*. https://www.researchgate.net/publication/318215436_Scaffolding. Retrieved: 10.04.2026.
- 12) Goh, C. C. M. (2017). Research into practice: Scaffolding learning processes to improve speaking performance. *Language Teaching: Surveys and Studies*. 50(2), 247-260.
- 13) Pea, R. D. (2004). The Social and Technological Dimensions of Scaffolding and Related Theoretical Concepts for Learning, Education, and Human Activity. *Journal of the Learning Sciences*, 13(3), 423-451. https://doi.org/10.1207/s15327809jls1303_6.
- 14) Taber, K. (2018). Scaffolding learning: Principles for effective teaching and the design of classroom resources. *Effective Teaching and Learning: Perspectives, Strategies and Implementation*, 9. 1-43. <https://www.researchgate.net/publication/327833000>. Retrieved: 03.05.2026.
- 15) Halatsyn, K., & Feshchuk, A. (2025). The use of scaffolding in foreign language teaching at higher technical educational institutions. *Матеріали конференції МЦНД*, (30.05.2025; Київ, Україна), 562–565.
- 16) Woo, D. J., Wang, D., Guo, K., & Susanto, H. (2024). Teaching EFL students to write with ChatGPT: Students' motivation to learn, cognitive load, and satisfaction with the learning process. *Education and information technologies*, 29(18), 24963-24990.
- 17) Held P., Heubeck T., & Meckl R. (2025). The influence of individuals' capability to use generative AI on their idea generation: the mediating role of cognitive information-processing styles. *European Journal of Innovation Management*, Vol. 28, No. 10. 5376–5399. <https://doi.org/10.1108/EJIM-06-2025-0711>.
- 18) Mariotti, C. (2024). English for Specific Purposes and problem-based learning: Strengths and opportunities. *International Journal of English Linguistics*, 14(2), 1-15.
- 19) van de Pol, J., Volman, M., Oort, F. et al. (2015). The effects of scaffolding in the classroom: support contingency and student independent working time in relation to student achievement, task effort and appreciation of support. *Instructional Science: An International Journal of the Learning Sciences*, 43, 615–641. <https://doi.org/10.1007/s11251-015-9351-z>.