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**EXPLORING CALL IN ESP SETTINGS: HOW ACADEMIC DISCIPLINES AND
LEARNER PROFILES SHAPE STUDENT PERCEPTIONS**

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Computer-Assisted Language Learning (CALL) has become an established component of English for Specific Purposes (ESP) instruction in higher education, and its relevance continues to grow with the rapid advancement of technologies, including the expansion of artificial intelligence (AI). Against this background, further research is needed to examine how students perceive the contribution of technology to specific language skills and whether such perceptions vary according to learner characteristics, particularly in tertiary-level ESP contexts.

This study explores Serbian university students' perceptions of the role of technology in enhancing distinct aspects of English language proficiency - reading, writing, speaking, listening, grammar, vocabulary, and pronunciation - and examines the frequency of their use of various digital tools for language learning. Using a quantitative research design, data were collected from 183 students across different academic fields and analyzed using descriptive statistics, independent-samples t-tests, and one-way ANOVA to identify potential differences related to field of study, gender, English proficiency level, and computer literacy.

The results reveal generally moderate to positive attitudes toward CALL across all language skills, with listening and vocabulary perceived as benefiting most from technology, while patterns of digital tool use revealed a preference for everyday, easily accessible resources over more structured learning platforms. While perceptions were largely consistent across gender and academic disciplines, more pronounced differences emerged in both skill development and tool use in relation to English proficiency and computer literacy, suggesting that learners' linguistic and digital competence plays a more decisive role than demographic factors. These findings support a more differentiated, learner-sensitive approach to integrating technology into ESP curricula in higher education.

Key words: Academic Disciplines, Computer-Assisted Language Learning (CALL), Digital Tools, English for Specific Purposes (ESP), Student Attitudes

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1. Introduction

The integration of technology into language education is no longer a matter of innovation but of pedagogical inevitability (Slavuj, 2022; Krsmanović, 2021). In higher education English language teaching contexts, digital mediation has shifted from an auxiliary support mechanism to a constitutive element of instructional design (Tafazoli et al., 2018). Computer-Assisted Language Learning (CALL) is now routinely used as an almost-ready solution to a wide range of pedagogical challenges, often with minimal interrogation of the conditions under which such promises are realized. This tension between technological abundance and pedagogical necessity is particularly relevant in English for Specific Purposes (ESP), where instructional effectiveness is measured not by general proficiency gains but by the acquisition of context-bound, discipline-sensitive communicative competence.

Unlike general English instruction, ESP is explicitly goal-oriented, discipline-sensitive, and pragmatically anchored in academic and professional communicative needs (Lasekan, 2024, p. 151; Slavuj, 2022, p. 151). As such, the effectiveness of CALL in ESP cannot be assumed to be uniform across contexts, skills, or learner populations. While digital tools promise efficiency, personalization, and skills integration (Bahari et al., 2025; Serfaty & Serrano, 2024; Krsmanović, 2022; Krsmanović, 2021), their pedagogical value depends largely on how learners engage with them and how they perceive their usefulness. These factors remain underexplored, particularly in relation to specific language skills and diverse learner profiles at the tertiary level.

Moreover, the assumption that contemporary university students, frequently labeled “digital natives”, are uniformly adept at and receptive to technology-mediated learning has been increasingly problematized (Tica et al., 2024; Suárez-Guerrero et al., 2023; Vukićević-Đorđević, 2015). While students may display high levels of everyday digital engagement, this does not necessarily translate into pedagogically effective or strategic use of technology for language learning (Krsmanović, 2021). Learner variables such as language proficiency, prior exposure to digital tools, and levels of computer literacy can significantly shape how CALL is experienced, valued, and exploited (Tafazoli et al., 2018; Tica et al., 2024; Lasekan, 2024; Božić Lenard & Šokčević, 2024). In ESP contexts, however, disciplinary affiliation may further mediate these perceptions, as students’ communicative needs and learning priorities differ across fields such as engineering, social sciences, or humanities.

The present study investigates Serbian university students' perceptions of the role of technology in enhancing specific aspects of English language proficiency, including reading, writing, speaking, listening, grammar, vocabulary, and pronunciation. It also examines the frequency of students' engagement with various digital tools for language learning. The analysis focuses on potential differences related to field of study, gender, English proficiency level, and computer literacy of the said students. By foregrounding learner perceptions within ESP contexts, this research seeks to contribute to a more refined, learner-sensitive understanding of CALL implementation and to offer empirically grounded insights for the principled integration of technology into ESP curricula in higher education.

2. Theoretical Background

Computer-Assisted Language Learning (CALL) has evolved over more than half a century from a sporadic innovative tool to an indispensable component of contemporary language education (Tica et al., 2024; Krsmanović, 2022). Although the use of technology in language learning predates the label itself, the term *Computer-Assisted Language Learning* became established in the early 1980s, marking the formal consolidation of CALL as a subfield of applied linguistics. Since then, the field has undergone successive phases of expansion, including methodological, technological, and epistemological developments. CALL now operates as a two-way street in which pedagogical practice both informs and is reshaped by technological innovation, to the extent that, as Chapelle observes, "almost anyone who is working on materials for classroom language learning is working in CALL" (Chapelle, 2010, p. 67).

Initially defined as "any process in which a learner uses a computer and, as a result, improves his or her language" (Beatty, 2010, p. 7), with the advances of technology we encounter on a daily basis, both the field and the term have widened their scope. While the acronym originally focused on the "computer," modern theoretical frameworks have expanded this definition to include a vast array of digital technologies, such as smartphones, tablets, and global network connections. More recently, artificial intelligence (AI) has entered the field, holding a particular promise for reconfiguring language instruction and language education, as it enables adaptive, data-driven, and increasingly personalized learning experiences (Krsmanović & Tica, 2025; Bahari et al., 2025).

Today, CALL encompasses a broad ecosystem of digital tools and environments, and new technologies and applications emerging at an accelerating pace. Originating within the broader domain of computer-assisted instruction, CALL has also developed several subfields and has thus become an umbrella term for Mobile-Assisted Language Learning (MALL), which foregrounds the use of handheld devices for language learning (Stockwell, 2022), and Intelligent Computer-Assisted Language Learning (ICALL), an advanced strand concerned with the application of artificial intelligence in language instruction (Tafazoli et al., 2019). Additional terminological variants of the latter have also emerged in recent literature, such as Artificial Intelligence-Assisted Language Learning (AIALL) (Bahari et al., 2025). In the post-pandemic era, the significance of CALL has been further amplified by the normalization of blended learning in higher education, as well as by the unplanned but widespread shift to fully online instructional contexts during Emergency Remote ELT (Bozkurt & Sharma, 2020), a development that positioned CALL as the primary, and often the only means of delivering language instruction (Krsmanović, 2022). Within this expanded CALL ecology, Massive Open Online Courses (MOOCs) offer a way for learners to study at their own pace combined with highly structured instructional design, mediated through large-scale electronic platforms (Dimulescu & Nechifor, 2021).

Within its broad spectrum of language apps, multimedia resources, and online language learning platforms, CALL has been extensively examined from both learner-centered and teacher-oriented perspectives. Empirical research consistently indicates that CALL not only facilitates heightened interaction and greater responsiveness to learners' needs (Dimulescu & Nechifor, 2021; Rachmawati et al., 2020; Vasbieva & Saienko, 2018), but also yields a range of pedagogical benefits. These include increased enjoyment and motivation in learning English (Liu et al., 2023; Đorđević, 2020; Rachmawati et al., 2020; Asrifan et al., 2020), measurable gains in vocabulary acquisition (Sadaghatkar, 2018) and grammatical development (Ghorbani & Ebadi, 2020), improvements in writing skills (Ali Ghufroon & Nurdianingsih, 2021), and enhancements in overall language proficiency (Bahari et al., 2023; Delibegović & Hasanspahić, 2020). Additionally, CALL has been shown to support the development of listening and reading skills while simultaneously increasing learners' exposure to diverse linguistic and cultural contexts (Tafazoli et al., 2018). Within this broader landscape, ICALL offers further advantages, notably by mitigating learners' fear of making mistakes through the provision of immediate, individualized feedback via intelligent systems such as chatbots (Dimulescu & Nechifor, 2021).

2.1. Previous Research on CALL in Higher Education and ESP

The field of ESP has likewise been shaped by these ongoing developments in technology-enhanced language learning. Recent research suggests that ESP instructors actively incorporate digital tools into their teaching practices, reporting generally favorable results in terms of pedagogical impact and learner response (Constantinou & Papadima-Sophocleous, 2020; Rachmawati & Irawan, 2024; Tica & Krsmanović, 2024).

However, despite the extensive body of research documenting generally positive student attitudes toward CALL in higher education (e.g., Liu & Chen, 2023; Vasbieva & Saenko, 2018; Rachmawati & Irawan, 2024, Tica et al., 2024), existing studies have tended to conceptualize technology use in broad, undifferentiated terms. Prior work has predominantly focused on overall acceptance of CALL or on macro-level factors such as motivation, access, and institutional support (Martín-González & Chaves-Yuste, 2024), while paying comparatively limited attention to students' perceptions of technology's contribution to specific language skills or to actual usage patterns of particular digital tools. Moreover, empirical evidence from underrepresented educational contexts, such as Serbian higher education, remains limited, especially with respect to potential differences related to academic discipline, language proficiency, and computer literacy.

The present study builds on earlier research that explored Serbian university students' attitudes toward CALL in relation to internal and external factors of ICT integration (Tica et al., 2024). The internal factors examined in that study comprised affective ICT strategies, metacognitive strategies, the personal significance of ICT, and the perceived importance of mobile tools, while the external factors included curriculum-based limitations, task-centered strategies, the use of ICT tools in learning, and the motivating role of ICT. The findings revealed generally positive attitudes toward CALL, with moderate to high evaluations of both internal and external factors, suggesting that students perceive ICT as beneficial for ESP-related language learning. No statistically significant differences were found across academic disciplines, while only minor gender-related variations emerged in certain motivational aspects.

While these findings provide valuable insight into students' general perceptions of ICT integration, they do not address which specific digital tools students engage with most frequently, nor how students perceive the role of technology in supporting the development of distinct language skills. This limitation points to the need to move

beyond general attitudinal measures and examine more closely how technology is used in practice and how it is linked to particular aspects of language learning.

In ESP contexts, such an approach is particularly important. Disciplinary affiliation shapes communicative needs, language proficiency may constrain learners' access to more demanding or autonomous digital tools, and digital self-efficacy affects learners' ability to benefit from technologically rich learning environments. Separating general attitudes toward CALL from skill-oriented perceptions and actual usage patterns therefore represents a necessary step toward a more pedagogically informed understanding of technology integration in ESP. The present study addresses this gap by adopting a skill-oriented and tool-based perspective of CALL in ESP contexts, as outlined in the methodological section that follows.

3. Methodology

3.1. Research aims and questions

The primary aim of this study is to examine Serbian university students' perceptions of technology-supported development of specific English language skills in ESP contexts, as well as their patterns of digital tool use. Special attention is given to how these perceptions and patterns vary according to learners' characteristics. Drawing on the concept of the learner profile as a way of describing a range of characteristics relevant to learners and their educational experiences (Inguva et al., 2019), learner profile is operationalized in the present study through four characteristics: academic discipline, gender, English proficiency level, and computer literacy. In order to achieve these aims, the following research questions were formulated:

RQ1. How do Serbian university students perceive the role of digital technologies in supporting the development of specific aspects of English language proficiency, namely reading, writing, speaking, listening, grammar, vocabulary, and pronunciation, in ESP learning contexts?

RQ2. How frequently do students engage with different types of digital tools for English language learning, and which tools are used most and least often?

RQ3. To what extent do students' perceptions of technology-supported language development and their patterns of digital tool use differ according to learner-related variables, specifically academic discipline, gender, English language proficiency, and computer literacy?

3.2. Sample

The sample in the study consisted of 183 university students from Serbia. Among them, 92 were female (50.3%), 87 male (47.5%), and 4 participants (2.2%) chose not to disclose their gender (Figure 1). In terms of academic discipline, 59% of students were enrolled in technological or engineering fields, while 41% were from the humanities and social sciences.

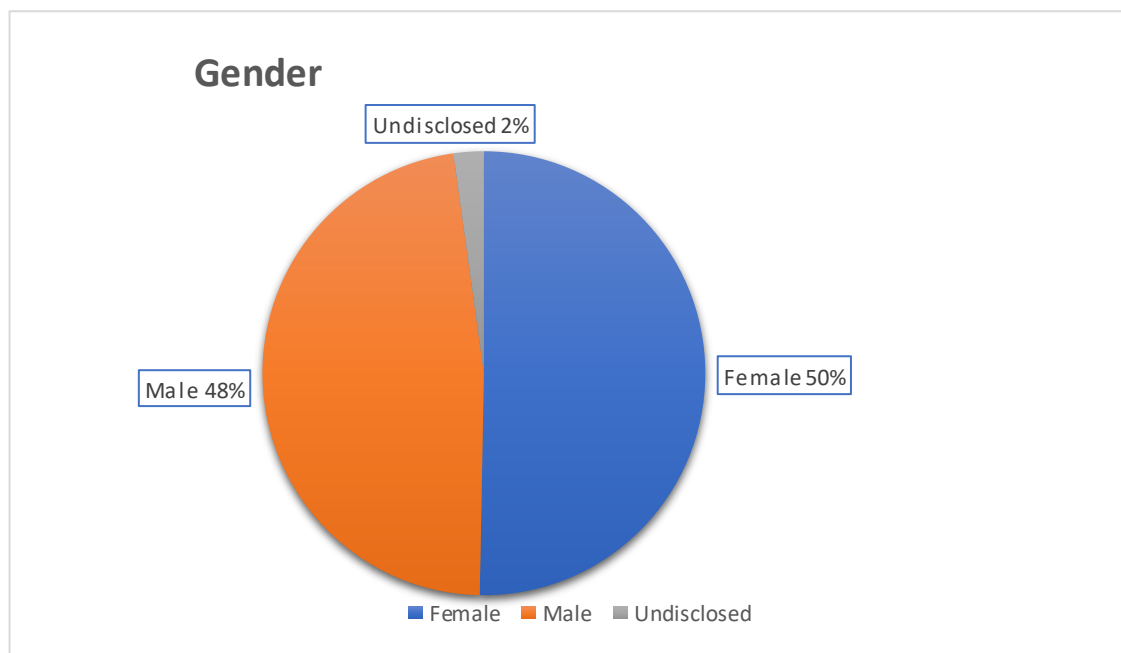


Figure 1. Distribution of Students by Gender

In addition to general demographic information, students were asked to provide self-assessments of both their computer proficiency and their perceived knowledge of English. The majority of participants (60.7%) reported an intermediate level of computer skills, while 30.1% perceived themselves as advanced users and only 9.2% identified as beginners (Figure 2). Overall, 90.8% of respondents indicated that they felt confident in their computer abilities, suggesting that differences in ICT competence were unlikely to significantly shape students' attitudes towards CALL, which was supported by the results in the previous study.

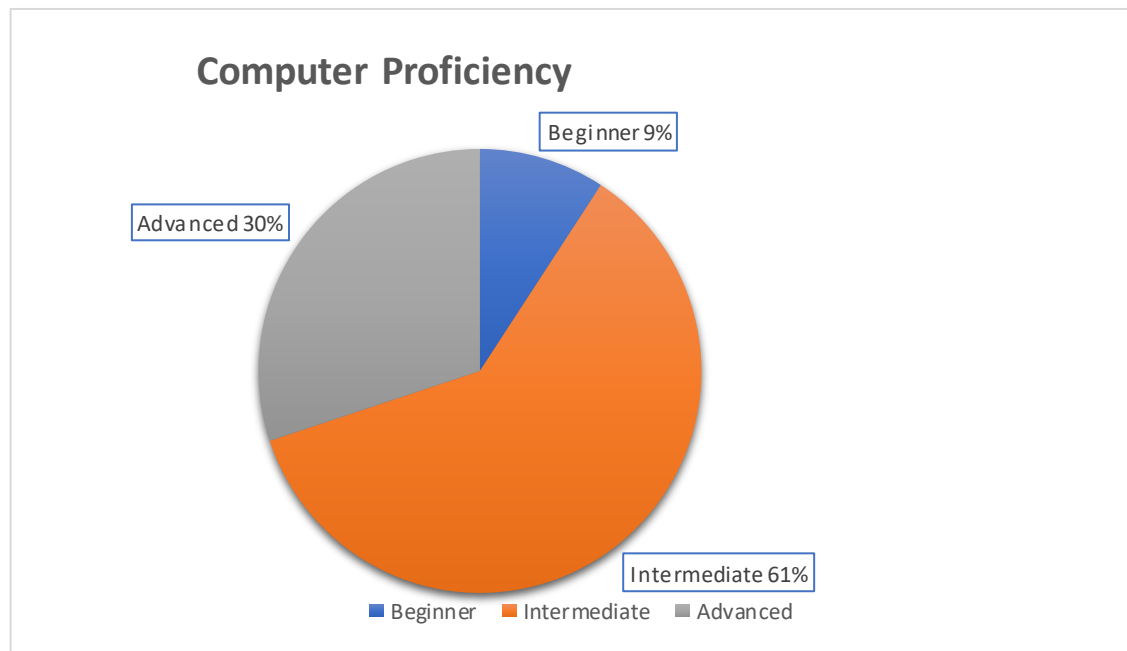


Figure 2. Distribution of Students by Computer Proficiency

Regarding English language knowledge, self-assessment results showed that 15.3% of students considered their proficiency to be at a beginner level, 44.7% reported an intermediate level, and 39.5% assessed their English as advanced (Figure 3). These findings indicate that the sample included students with diverse levels of English proficiency, allowing for the examination of whether prior language knowledge influences perceptions of technology use in ESP learning contexts.

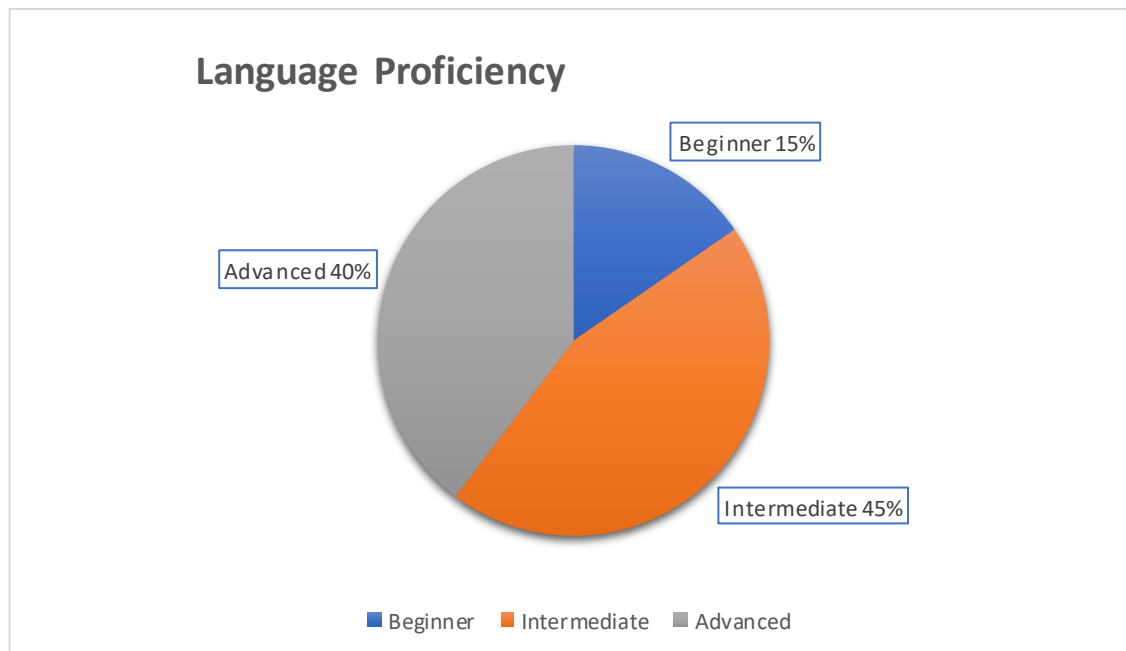


Figure 3. Distribution of Students by English Language Knowledge

3.3. Research design and variables

This study adopted a quantitative, exploratory research design. The independent variables included students' field of study, gender, and self-assessed levels of English proficiency and computer literacy, which together constitute each participant's learner profile. The dependent variables comprised students' perceptions of the effectiveness of technology in enhancing specific aspects of English language proficiency, namely reading, writing, speaking, grammar, vocabulary, and pronunciation, as well as the frequency of their use of various digital tools for language learning.

3.4. Data collection and data analysis

Data were collected using an online questionnaire administered via Google Forms to university students from various higher education institutions in Serbia. The instrument consisted of three sections. The first section gathered demographic information and included self-assessment items related to students' English language proficiency and computer literacy.

The second section focused on students' perceptions of the extent to which technology can support the development of specific language skills. Participants were asked to rate the perceived contribution of technology to improving reading, writing, speaking, grammar, vocabulary, and pronunciation using a five-point Likert scale.

The third section examined students' engagement with digital tools for language learning. Respondents reported how frequently they used a range of digital resources commonly employed in language learning. This section comprised 20 items reflecting different types of technologies and tools used to support English language acquisition, with responses recorded on a five-point Likert scale ranging from *never* to *always*.

The collected data were analyzed using SPSS (version 2020). Descriptive statistics were first applied to provide an overview of students' responses. Subsequently, independent-samples t-tests and one-way ANOVA were conducted to examine potential differences in students' perceptions and frequency of technology use based on gender, field of study, and level of English proficiency.

4. Results and Discussion

4.1. Perceived Impact of Technology on Language Skills

The first part of the analysis examined students' perceptions of the extent to which technology can support the development of specific language skills. Descriptive statistics revealed generally positive attitudes across all skills, with mean scores ranging from 3.70 to 4.37 on a five-point scale ($N = 183$), indicating that students largely perceive technology as a beneficial component of English language learning (Table 1). This is consistent with our previous research (Tica et al., 2024) and with findings from other studies conducted in higher education and ESP-related contexts, including research involving students of economics and business (Kiss Kulenović et al., 2024), dentistry and business administration (Lasekan et al., 2024), international and Iranian student populations (Tafazoli et al., 2018), and administration studies (Slavuj, 2022), as well as research specifically focused on ESP learners (Krsmanović, 2021).

Table 1. Descriptive Statistics of Students' Perceptions on Technology-Supported Language Skills

Language Skill	Mean	Std. Deviation	Rank
Listening	4.37	0.885	1
Vocabulary	4.25	0.996	2
Reading	3.97	1.063	3
Speaking	3.88	1.093	4
Writing	3.83	1.168	5
Grammar	3.78	1.103	6
Pronunciation	3.70	1.195	7

The highest mean scores were recorded for listening ($M = 4.37$, $SD = 0.89$) and vocabulary development ($M = 4.25$, $SD = 1.00$), suggesting that students view

technology as particularly effective in supporting receptive skills and lexical acquisition. This is in line with other research studies where vocabulary and listening were also rated high, especially vocabulary for adopting ESP terminology (Tafazoli et al., 2018; Božić Lenard & Šokčević, 2024), or via apps such as Quizzlet (Serfaty & Serrano, 2024), and listening for gist (Krsmanović, 2021), or via movies and songs (Tafazoli et al., 2018). This finding is not unexpected, given the widespread availability of multimedia content and digital resources, such as videos, podcasts, and interactive applications, that naturally facilitate listening practice and repeated exposure to new vocabulary.

Moderately high mean values were observed for reading ($M = 3.97$, $SD = 1.06$), speaking ($M = 3.88$, $SD = 1.09$), and writing ($M = 3.83$, $SD = 1.17$). In contrast, grammar ($M = 3.78$, $SD = 1.10$) and pronunciation ($M = 3.70$, $SD = 1.19$) received the lowest ratings, although still above the scale midpoint. These results suggest that, while students acknowledge the usefulness of technology across all language skills, they tend to perceive it as less central for areas traditionally associated with explicit instruction, corrective feedback, and guided practice. This is somewhat consistent with what Chagas & Pedro (2021) found in their research, where CALL tools were mostly used for promoting reading skills (28.5%), although ranked higher than writing, listening, and speaking. Similarly, Slavuj (2022) found that receptive skills (reading and listening) in an ESP context accounted for 44% of students' CALL focus, showing a clear dominance over productive skills. Contrary to this, there is evidence that writing is the skill where students exhibit the most significant reliance on digital assistance (Božić Lenard & Šokčević, 2024).

In particular, the lower ratings for pronunciation and speaking may indicate that students still view oral production as a skill best developed through direct interpersonal interaction, or that they have limited experience with AI-based speech recognition and pronunciation tools. This interpretation is broadly consistent with previous research suggesting that speaking remains less represented in standard CALL interventions than receptive skills (Slavuj, 2022, p. 158). Moreover, Božić Lenard and Šokčević (2024) found that students did not consider pronunciation sufficiently important to prioritize through technology and rarely used AI-based pronunciation tools despite their potential advantages.

To further explore these perceptions, independent samples t-tests were conducted to examine the effects of two components of students' learner profiles: gender and field of study. The results indicate that gender does not play a statistically

significant role in students' perceptions of the benefits of technology for any of the examined language skills ($p > 0.05$), which aligns with Tafazoli et al. (2018), Lasekan, (2024), and Martín-González & Chaves-Yuste (2024). Similarly, no statistically significant differences were found between students enrolled in Technology and Engineering (TE) fields and those in Social Sciences and Humanities (SH) ($p > 0.05$). These findings point to a notable uniformity in attitudes toward CALL across different learner profiles. The absence of disciplinary differences is particularly noteworthy, as it suggests that "digital nativism" or general tech-savviness among contemporary university students transcends the traditional divide between the sciences and the humanities.

In contrast, one-way analysis of variance (ANOVA) revealed that English language proficiency and computer literacy influence students' perceptions to a limited but meaningful extent. Students with advanced English proficiency reported significantly more positive perceptions of technology's role in improving grammar ($p = 0.038$) and vocabulary ($p = 0.005$) compared to lower proficiency groups, which is compliant with Serfaty & Serrano, (2024), Kiss Kulenović et al., (2024), and Božić Lenard & Šokčević (2024). Post-hoc Fisher's Least Significant Difference (LSD) tests confirmed that advanced learners differed significantly from beginners in their evaluations of technology for grammar ($p = 0.011$) and vocabulary development ($p = 0.001$). This pattern suggests that more proficient students may be better positioned to recognize and exploit specialized digital resources that support the development of complex linguistic structures.

Computer literacy also emerged as a relevant factor, particularly in relation to listening skills ($F = 4.971, p = 0.008$). Students who self-identified as having advanced computer skills ($M = 4.67$) rated the contribution of technology to listening development significantly higher than both beginners ($M = 4.18, p = 0.040$) and intermediate users ($M = 4.24, p = 0.003$). These findings are in line with Slavuj (2022) and Tafazoli et al., (2018). This pattern implies that higher levels of digital self-efficacy enable students to more effectively navigate and utilize multimedia environments, thereby supporting the development of receptive language skills. Table 2 summarizes the statistically significant ANOVA results related to English proficiency and computer literacy.

Table 2. Significant ANOVA Findings by English Proficiency and Computer Skills

Factor	Variable	F	Sig. (<i>p</i>)	Significant Pairwise Comparisons (LSD)
English Proficiency	Vocabulary	5.519	.005	Advanced/Intermediate > Beginner
	Grammar	3.324	.038	Advanced > Beginner
Computer Literacy	Listening	4.971	.008	Advanced > Intermediate & Beginner

Overall, these findings indicate that Serbian university students perceive technology as a valuable resource for enhancing English language skills, particularly listening and vocabulary, while differences in perceptions appear to be more closely related to learners' linguistic and digital proficiency than with gender or academic discipline, underscoring the importance of learner-related competencies in shaping meaningful engagement with technology in ESP contexts.

4.2. Frequency of Digital Tools Usage

The analysis of students' responses reveals a clear preference for resources already integrated into their daily digital routines (Table 3). Social media platforms (Facebook, X, TikTok, etc.) emerged as the most frequently used resource ($M = 4.17$, $SD = 1.11$), with more than half of the participants (53.6%) reporting the highest level of usage. These were closely followed by Internet search engines ($M = 4.08$, $SD = 1.077$), which serve as a primary gateway for information retrieval for 73.2% of students who reported using them frequently or very frequently.

In contrast, tools requiring higher levels of commitment or specific pedagogical structures are utilized far less often. Online courses (MOOCs) ($M = 2.23$, $SD = 1.365$) and Online learning with native speakers ($M = 2.24$, $SD = 1.235$) recorded the lowest usage rates, with 42.6% of respondents stating they almost never engage with MOOCs.

Table 3. Descriptive Statistics for the Frequency of Use of Digital Tools for English Language Learning

Item ID	Digital Tool / Platform	Mean (M)	Std. Deviation (SD)
7	Social networks (Facebook, X, TikTok, etc.)	4.17	1.110
15	Internet search engines	4.08	1.077
10	Movies with English subtitles	3.72	1.251
2	Automatic translators	3.69	1.088
9	Movies with Serbian subtitles	3.49	1.300
6	Podcasts	3.47	1.350
19	AI tools (ChatGPT, Dall-E, Twee, etc.)	3.39	1.370
20	Encyclopedias/Wikipedia in English	3.37	1.348
8	Online games	3.20	1.575
4	Instant messages	3.19	1.338
11	Movies without subtitles	3.16	1.491
5	Audio and video chat (Zoom, Skype, etc.)	3.14	1.329
3	Blogs/Vlogs	3.07	1.375
18	Mobile language learning apps (Duolingo, etc.)	2.96	1.427
13	Bilingual e-dictionaries (Eng-Srb / Srb-Eng)	2.78	1.350
14	Quizzes (Kahoot, Quizziz, etc.)	2.73	1.371
16	Video tutorials for pronunciation	2.66	1.389
12	Monolingual e-dictionaries (Eng-Eng)	2.65	1.417
1	Online learning with native speakers	2.24	1.235
17	Online courses (MOOCs)	2.23	1.365

The results clearly show that English language acquisition has shifted from formal environments to the daily informal use of digital media. For example, students reported moderate perceived usefulness of AI tools such as ChatGPT ($M = 3.39$, $SD = 1.37$), while traditional reference resources, such as bilingual dictionaries ($M = 2.78$) and standalone pronunciation tutorials ($M = 2.66$), received lower ratings. This pattern may indicate that students favor digital resources that are readily integrated into their everyday online activities. In other words, students are now “living” in English rather than “studying” it in the traditional sense. Such a shift toward blended informal/interactive digital engagement is consistent with findings from recent research on incidental and online informal language learning, which shows that

language learning can occur through routine digital activities beyond structured instructional settings (Lai & Wang, 2025; Webb et al., 2023).

Analysis of gender differences revealed several statistically significant variations in tool usage. Male students reported significantly more frequent use of online games ($M = 3.92$) than female students ($M = 2.51$), $p < .001$. In contrast, female students reported higher usage of blogs and vlogs ($M = 3.34$ vs. $M = 2.85$, $p = .017$), bilingual electronic dictionaries ($M = 3.07$ vs. $M = 2.49$, $p = .004$), and mobile language-learning applications such as Duolingo ($M = 3.26$ vs. $M = 2.70$, $p = .008$). These findings suggest that while widely used platforms such as social media function as largely gender-neutral spaces, more specialized tools tend to reflect gendered usage patterns. For male students, English appears to be more frequently mediated through competitive and interactive environments, such as online gaming, whereas female students show a greater tendency toward tools supporting vocabulary development, accuracy, and self-directed learning. This is in line with Vadivel et al. (2022) who also found that males show higher tendency for learning with CALL. The more frequent use of bilingual dictionaries among female respondents may also indicate a stronger focus on lexical precision. This is fully compliant with Božić Lenard and Šokčević (2024) who also found that females would consult digital dictionaries significantly more than males, a behavior attributed to hypercorrectness (Božić Lenard & Šokčević, 2024, p. 13).

Differences were also observed with respect to field of study. Students from Social Sciences and Humanities reported significantly higher usage of movies without subtitles ($M = 3.49$) compared to students from Technology and Engineering fields ($M = 2.93$), $p = .011$, as well as greater reliance on monolingual (English–English) dictionaries ($M = 3.19$ vs. $M = 2.28$), $p < .001$. In contrast, TE students reported more frequent use of movies with Serbian subtitles ($M = 3.69$ vs. $M = 3.19$), $p = .009$. The most pronounced disciplinary differences were observed in dictionary use, with SH students making significantly greater use of both monolingual and bilingual electronic dictionaries ($p < .001$). These findings suggest that students in the humanities adopt a more linguistically oriented and immersive approach to digital tools, favoring resources associated with higher levels of language autonomy. TE students, while generally digitally proficient, appear to engage with English more instrumentally, using it primarily as a functional means to support their academic and professional needs rather than as an object of in-depth linguistic exploration. These results are consistent with the previous research which found that when comparing internal and external CALL factors by study field, the only significant difference was for external task-

oriented strategies, with students from TE fields reporting higher acceptance (Tica et al., 2024). Together, these findings reinforce the conclusion that TE students are more task- and function-oriented in their use of digital language learning tools, while SH students adopt a more immersive and autonomy-driven approach.

Table 4 summarizes the most significant differences in the frequency of digital tool usage across gender and academic field, based on independent samples *t*-test results ($p < .05$).

Table 4: Significant Differences in Tool Usage by Gender and Field of Study

Item	Group A (Mean)	Group B (Mean)	<i>t</i> -value	Sig. (<i>p</i>)
Gender	Female	Male		
Online Games	2.51	3.92	-6.68	.000
Blogs/Vlogs	3.34	2.85	2.40	.017
Field of Study	Social Sciences & Humanities (SH)	Technology and Engineering (TE)		
Monolingual Dictionaries	3.19	2.28	-4.48	.000
Movies without Subtitles	3.49	2.93	-2.57	.011

Furthermore, a one-way analysis of variance (ANOVA) confirmed that students' self-assessed English proficiency significantly influences their choice of digital tools. The results indicate a clear progression from reliance on supportive tools toward more immersive resources as proficiency increases. One of the most pronounced differences was observed in the use of movies without subtitles, which increased substantially with proficiency level, from beginners ($M = 1.86$) to intermediate learners ($M = 3.06$) and advanced learners ($M = 3.75$), $F = 20.19$, $p < .001$. A similar pattern emerged for the use of monolingual (English–English) dictionaries, with advanced students ($M = 3.27$) using them significantly more frequently than beginners ($M = 1.82$), $F = 15.71$, $p < .001$. Advanced learners also reported higher engagement with English-language encyclopedic resources such as Wikipedia ($M = 3.69$) compared to beginners ($M = 2.50$), $F = 8.66$, $p < .001$.

In contrast, automatic translators (e.g., Google Translate) were used most frequently by beginners ($M = 4.18$) and gradually declined with increasing proficiency, although they remained moderately present even among advanced learners ($M = 3.56$). This finding suggests that while reliance on translation tools decreases as

linguistic competence develops, such tools continue to serve a functional role across proficiency levels. Similarly, Božić Lenard and Šokčević (2024) found Google Translate to be the most frequent choice.

Table 5 presents the results of a one-way ANOVA examining differences in digital tool usage across English proficiency levels, highlighting a clear shift toward immersion-oriented tools among more advanced learners.

Table 5. ANOVA Summary: Tool Usage by English Proficiency Level

Tool	Beginner (<i>M</i>)	Intermediate (<i>M</i>)	Advanced (<i>M</i>)	<i>F</i> -value	Sig. (<i>p</i>)
Movies w/o Subtitles	1.86	3.06	3.75	20.19	.000
Monolingual E-Dictionaries	1.82	2.36	3.27	15.71	.000
AI Tools	3.29	3.46	3.35	0.22	.796
Wikipedia in English	2.50	3.36	3.69	8.66	.000

Overall, the ANOVA results highlight a systematic shift in digital behavior associated with language development. As learners progress from beginner to advanced levels, they increasingly abandon highly supportive tools and adopt resources that require greater linguistic autonomy and tolerance of ambiguity. Similar applications of technology-mediated scaffolding have been reported in research on online writing support (Butarbutar, 2024), AI-supported self-directed learning (Magwa, 2026), and technology-enhanced pedagogical scaffolding (Hussein et al., 2025). It is also broadly consistent with the findings of Božić Lenard and Šokčević (2024), who highlight the potential of AI-supported tools in relation to language learning.

Finally, computer literacy also emerged as an important factor influencing students' engagement with advanced digital tools. Students who self-identified as having advanced computer skills reported significantly more frequent use of AI-based tools such as ChatGPT ($M = 3.73$) compared to students with basic computer skills ($M = 2.59$), $p = .003$. Similarly, advanced users relied more heavily on internet search engines ($M = 4.44$) than beginners ($M = 3.24$), $p < .001$ (Table 6).

Table 6. Differences in Digital Tool Usage Based on Computer Literacy Level

Digital Tool / Platform	Basic Computer Literacy (<i>M</i>)	Advanced Computer Literacy (<i>M</i>)	Significance (<i>p</i>)
Internet Search Engines	3.24	4.44	< .001
AI Tools (ChatGPT, etc.)	2.59	3.73	.003

These findings suggest that technological self-efficacy plays a crucial role in determining access to and effective use of contemporary digital resources for language learning. The adoption of AI tools was not uniform across the sample but was strongly associated with higher levels of computer literacy. Students with limited technological confidence may therefore be at a disadvantage, as they are less likely to engage with AI-driven tools that offer substantial potential for language practice, interaction, and information retrieval. This points to a form of digital divide in which language learning opportunities are constrained not by linguistic ability alone, but by technological competence. If a student is not comfortable with modern technology, they are essentially locked out of the most powerful current resources for language practice, such as AI-driven conversation or complex information retrieval.

5. Conclusion

This study examined Serbian university students' perceptions of Computer-Assisted Language Learning (CALL) in ESP from a skill-specific and tool-oriented perspective, with particular attention to learner profiles, understood as a combination of academic discipline, gender, English proficiency, and computer literacy. Overall, students perceived technology as supportive of all language skills, particularly listening and vocabulary, consistent with previous research on multimedia-rich digital environments (e.g., Tafazoli et al., 2018; Božić Lenard & Šokčević, 2024). Minimal differences were observed across gender and academic discipline, while variations in perceived skill development were mainly related to learners' English proficiency and computer literacy.

Digital tool use revealed more pronounced differences. Disciplinary orientation influenced tool choice: Social Sciences and Humanities students favored immersive, language-focused resources such as monolingual dictionaries and movies without subtitles, whereas Technology and Engineering students preferred practical, task-oriented materials. Gender-related patterns were also noted, with male students more

engaged in game-based environments and female students using tools supporting vocabulary and accuracy, such as blogs and digital dictionaries. Most notably, as was the case for perceptions of skill development and patterns of digital tool use, the most decisive factors were learners' English proficiency and computer literacy, with more proficient and technologically confident students favoring immersive, autonomy-driven resources, while beginners relied on supportive tools such as translation applications.

From a pedagogical standpoint, these findings highlight the need to treat CALL as an integral part of ESP instruction, having learners' profiles in mind. Since gender and academic discipline did not significantly shape attitudes, instructional focus should move away from demographic assumptions and instead address differences in linguistic and digital competence. This involves aligning tool selection with learners' proficiency and literacy, guiding students from supportive to more immersive resources, and providing structured guidance for skills perceived as less effectively developed through technology, such as speaking and pronunciation.

Finally, the increasing visibility of AI-based tools points to their growing relevance in ESP learning, warranting more systematic pedagogical attention. Although this study relied on self-reported data and a cross-sectional design, it offers context-sensitive insights into how CALL is perceived and used in Serbian higher education. Future research could build on these findings through longitudinal or mixed-method approaches that further explore the pedagogical integration of specific digital tools in ESP contexts.

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Sažetak

RAČUNARSKI PODRŽANO UČENJE JEZIKA U NASTAVI ENGLSKOG JEZIKA STRUKE: ULOGA OBLASTI STUDIJA I PROFILA UČENIKA U OBLIKOVANJU STAVOVA STUDENATA

Računarski podržano učenje jezika (Computer-Assisted Language Learning – CALL) predstavlja sve značajniji segment nastave engleskog jezika struke (ESP) u visokom obrazovanju, naročito u kontekstu ubrzanog tehnološkog razvoja i sve šire primene digitalnih alata i veštačke inteligencije. Iako je CALL tema brojnih istraživanja, postojeći radovi često tehnologiju posmatraju na opštem nivou, bez detaljnijeg uvida u to kako studenti procenjuju njen doprinos razvoju pojedinačnih jezičkih veština, kao i bez uvida u to da li se te percepcije razlikuju u zavisnosti od profila učenika, posebno u okviru ESP nastave na tercijarnom nivou. Cilj ovog istraživanja bio je da se ispituju stavovi studenata univerziteta u Srbiji o ulozi tehnologije u unapređenju različitih aspekata znanja engleskog jezika, uključujući čitanje, pisanje, govor, slušanje, gramatiku, vokabular i izgovor, kao i učestalost upotrebe digitalnih alata u procesu učenja jezika. Istraživanje je sprovedeno primenom kvantitativnog pristupa, na uzorku od 183 studenta sa različitih studijskih programa. Prikupljeni podaci analizirani su primenom deskriptivne statistike, t-testa za nezavisne uzorke i jednofaktorske analize varijanse (ANOVA), kako bi se utvrdile eventualne razlike u odnosu na oblast studija, pol, nivo znanja engleskog jezika i stepen digitalne pismenosti.

Rezultati pokazuju da studenti u celini imaju umereno pozitivne stavove prema primeni CALL-a u ESP nastavi, pri čemu se slušanje i usvajanje vokabulara izdvajaju kao jezičke oblasti za koje studenti smatraju da tehnologija pruža najveću podršku. Iako nisu uočene značajne razlike u stavovima u odnosu na pol i oblast studija, analiza je ukazala na postojanje razlika u zavisnosti od nivoa znanja engleskog jezika i digitalne pismenosti. U pogledu upotrebe digitalnih alata, studenti najčešće biraju resurse koji su deo njihove svakodnevne digitalne prakse, dok se strukturirani obrazovni alati koriste ređe. Uočene su određene razlike u odnosu na pol i oblast studija, koje se ogledaju u izboru alata i načinu njihove upotrebe, ali se kao ključni faktori i ovde izdvajaju nivo znanja engleskog jezika i digitalna kompetentnost studenata, koji u najvećoj meri oblikuju njihove obrasce korišćenja tehnologije. Ovi nalazi ukazuju na potrebu za diferenciranim i učeniku prilagođenim pristupom integraciji tehnologije u ESP kurikulumu u visokom obrazovanju.

Ključne reči: oblast studija, računarski podržano učenje jezika (CALL), digitalni alati, engleski jezik struke (ESP), stavovi studenata

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