





The Role of Study Field and Gender in University Students' Attitudes towards Computer-Assisted Language Learning

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Abstract: *Just as it has permeated all other aspects of modern life, technology has inevitably transformed the way English is taught and learned, making Computer-assisted Language Learning (CALL) an indispensable component of contemporary language education. This study explores Serbian university students' attitudes toward CALL and examines whether these attitudes vary by field of study and gender, through an exploratory, mixed-method design, using a sample of 183 students from diverse academic disciplines. The findings reveal that university students generally hold positive attitudes towards CALL, with moderate to high mean scores for both internal and external factors related to ICT integration. This suggests a perceived benefit of ICT, particularly in enhancing classroom atmosphere and instructional practices. Contrary to expectations, no significant differences were found in attitudes towards CALL based on the field of study. Both technological/engineering and social sciences/humanities students displayed similar acceptance levels of ICT in English learning, indicating a uniform appreciation of ICT's role across disciplines. Similarly, no significant differences were found in attitudes toward CALL based on gender, with the only notable difference being that female students showed a slightly higher appreciation for the external motivating role of ICT.*

Keywords: CALL; ELT; study field; gender; ICT tools.

1. INTRODUCTION

Recent decades have witnessed a remarkable transformation in language education, largely driven by the integration of technology. From traditional face-to-face methods to incorporating various tools, and most recently, the integration of AI, language teaching has continually adapted to new technological advancements to enhance the learning experience. This constant evolution mirrors broader societal trends where technology permeates every aspect of life, making it inconceivable to discuss English Language Teaching (ELT) without addressing Computer-assisted Language Learning (CALL).

Today's students, often referred to as 'digital natives' [1], have grown up with technology at their fingertips. This familiarity with digital tools has naturally extended into their learning environments. When it comes to language learning, CALL leverages this affinity, offering dynamic and interactive methods for language acquisition. Unlike conventional methods, CALL provides learners with the flexibility to engage with educational materials at any time and place [2]. Through the internet, students can collaborate,

communicate, and access resources globally, thus removing the constraints of time and space that once defined traditional ELT education.

Moreover, CALL empowers learners to take charge of their own education. They can tailor their learning experiences to suit their individual needs, gaps, and preferences, leading to a more personalized and effective learning journey. This autonomy not only fosters greater engagement but also encourages self-directed learning, which is crucial in developing proficiency and confidence in a new language [3, 4].

However, despite the apparent advantages of CALL, student attitudes towards this mode of learning can vary widely. While some students embrace the autonomy and flexibility that CALL offers, others may prefer the structure and personal interaction of traditional face-to-face methods. This study aims to explore these varied attitudes among university students and determine how different factors might shape their perceptions of CALL.

2. THEORETICAL FRAMEWORK

Computer-assisted Language Learning (CALL), a subfield of Second Language Learning (SLL), has been constantly evolving for over half a century, as a response to the demands of language teachers and students in a world increasingly immersed in technology [5]. Over the years, various terms have been proposed to describe this subfield, such as Technology-Enhanced Language Learning (TELL) and Computer-Aided Language Instruction (CALI). However, CALL has become the most widely accepted term [5], with numerous scholars offering different definitions.

Levy [6] describes CALL as “the search for and study of applications of the computer in language teaching and learning” [6]. A broader definition offered by Beatty [7] accommodates the evolving nature of CALL and its practical outcomes: “any process in which a learner uses a computer and, as a result, improves his or her language.” The acronym itself, widely adopted from the early 1980s, poses a challenge due to its constraint of incorporating the term ‘computer’ in an era dominated by smartphones, tablets, the internet, and artificial intelligence (AI) [8]. Hubbard [9] acknowledges this by suggesting that the term ‘computer’ in CALL extends beyond traditional desktop and laptop devices to include networks, peripheral devices, and various technological innovations such as PDAs, mp3 players, mobile phones, electronic whiteboards, and DVD players [9].

Taking into consideration all of these definitions Singh [10] concludes that “CALL is a multidisciplinary field; it is complex, dynamic, and quickly changing; it involves various contexts and methods; and it encompasses various activities associated with learning a language using computers” [10].

2.1. Previous research

As Singh points out in [10] CALL, constantly developing since the 1960s, has historically been predominantly practice-oriented and it continues to be. The practice serves as the driving force behind research in CALL, which has seen substantial growth and diversification over the past few decades. Scholars have extensively explored the role of CALL in enhancing and influencing all aspects of language acquisition, including reading comprehension and vocabulary knowledge [11], [12], writing [13], oral skills [14], etc.

Furthermore, the COVID-19 pandemic acted as a significant catalyst for the expansion of CALL research, highlighting the necessity and benefits of remote and technology-enhanced learning environments [15]. Concurrently, the advent of artificial intelligence (AI) in education has opened new avenues for research [16]. Faster than scholars and practitioners could decide whether AI

was a “friend or a foe”, it has further advanced CALL, offering personalized and efficient learning experiences for language learners [17]. This development has marked the onset of a new, revolutionary phase in CALL history, known as Intelligent CALL (ICALL) [18], suggesting that the evolution of CALL is far from reaching its zenith and will continue to expand as technology progresses.

A recent focus within CALL research has also been on underrepresented and underdeveloped contexts. Works such as the “Handbook of CALL Teacher Education and Professional Development: Voices from Under-Represented Contexts,” edited by Dara Tafazoli and Michelle Picard [19], emphasize the importance of inclusivity and the diverse needs of learners from various backgrounds. This shift highlights a growing recognition of the global nature of language learning and the need to address the unique challenges faced by learners and educators in less developed regions.

Serbia, as part of this global landscape, finds itself in a transitional phase regarding the integration of CALL in its educational systems. While there have been efforts to incorporate technology in language teaching, comprehensive studies specifically focusing on Serbia are still relatively few (see, for example: [20, 21, 22]). This presents an opportunity for further research to explore how CALL can be optimized for Serbian students, taking into account their unique cultural and educational context.

When it comes to students’ attitudes to CALL, it refers to their emotions connected to the use of technology in language learning. In general, attitudes can be defined as evaluative orientations or predispositions towards objects, individuals, or concepts that influence behavior, decision-making, and responses to stimuli [23]. In educational settings, attitudes play a significant role in shaping students’ engagement, motivation, and learning outcomes, as they can impact learning experiences and academic performance. Consequently, measuring computer attitudes can be seen as an evaluation whereby individuals respond favorably or unfavorably to computer use in the context of teaching and learning language. Existing research on CALL attitudes has extensively covered aspects such as individual differences (ID), motivation, age, and gender [24, 25, 26].

Although computers are used by both genders, it is stereotypically still perceived that computers belong to the traditionally male domain of mathematics, science, electronics, and machinery. Studies have consistently shown that boys tend to hold more positive attitudes towards computers compared to girls [27] and that girls were less likely to use computers and exhibited lower confidence in utilizing information and communications technology (ICT) than boys [28].

The disparity in gender attitudes towards computers can be observed in the choice of academic discipline as well. For example, research conducted in [29] revealed that girls exhibited decreased interest in computer science in terms of self-efficacy and overall identification with the discipline. While some studies suggest the gender gap has lessened over time, others indicate persistent differences, with boys viewing computer knowledge as more valuable for future employment [30].

Academic discipline can also be seen as a factor influencing CALL, given the possible varying degrees of familiarity and comfort with technology that students in different fields of study possess. Engineering and Technology students are generally more exposed to and required to use advanced technological tools and applications, which likely fosters a more favorable attitude towards CALL. In contrast, students from Humanities and Social Sciences may not interact with technology as intensively, potentially leading to less enthusiasm and confidence in using computers for language learning. However, there is a noticeable gap when it comes to examining differences in attitudes towards CALL based on academic disciplines or majors. One of the few studies addressing this issue, among other factors, was conducted by Al-Emran et al. [31], who found no significant differences in attitudes towards CALL across various majors.

3. METHODOLOGY

3.1. Research aims

This study aims to fill the aforementioned gap by exploring the attitudes of university students in Serbia towards CALL, with a specific focus on differences across scientific fields and gender. By doing so, it seeks to contribute to a more nuanced understanding of how various factors shape students' perceptions and acceptance of CALL, thereby informing more effective, inclusive, and tailored language teaching practices.

To achieve this, the following research questions were formulated: (1) What are Serbian university students' attitudes towards CALL? (2) Are there differences in attitudes based on the field of study? (3) Are there differences in attitudes based on gender?

3.2. Sample

The sample consisted of 183 university students from Serbia: 92 females (50.3%), 87 males (47.5%), and 4 individuals (2.2%) who chose not to reveal their gender. Regarding their field of study, 59% were from technological/engineering fields (including engineering, computer science, and other related disciplines), and 41% were from humanities and social sciences (such as law, economics, philology, psychology, etc.) (Fig. 1).

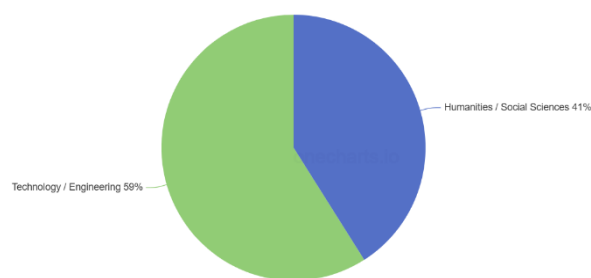


Figure 1. Distribution of students' based on field of study

3.3. Variables

In this study, the independent variables are the field of study and gender, while the dependent variable is the attitudes towards Computer-assisted Language Learning (CALL). Attitudes towards CALL in university settings are influenced by various factors, which can be divided into internal and external. Internal factors refer to individual beliefs, emotions, and perceptions that influence one's stance towards utilizing technology in language learning. These internal factors may include personal experiences with technology, perceived effectiveness of CALL compared to traditional methods, individual preferences, and comfort levels with digital tools. External factors, on the other hand, encompass environmental or contextual elements that impact attitudes towards CALL. These factors involve institutional support for technology integration, availability of resources, curriculum requirements, and societal norms regarding technology use in education. Additionally, teacher-related factors such as pedagogical approaches, affective attitudes, and beliefs can also influence students' perceptions of CALL.

3.4. Instrument and procedure

This study employed an exploratory, mixed-methods design, combining both qualitative and quantitative research techniques to comprehensively explore university students' attitudes towards CALL. The data collection was conducted through an online questionnaire administered via Google Forms.

The questionnaire consisted of three parts: 1) Demographic Information: The first section gathered basic demographic information, including age, gender, field of study, and competence in computers; 2) CALL Attitudes: The second part included 28 questions specifically designed to assess students' attitudes towards CALL. These questions were based on an instrument developed in [32], which has been further adapted and validated in [33], to ensure reliability and accuracy. This instrument is an eight-factor questionnaire which consists of both internal and external components. The internal factors included Internal Affective ICT Strategies (8 questions), Internal

Metacognitive Strategies (5 questions), Internal Personal Significance of ICT (3 questions), and Internal Importance of Mobile Tools (2 questions). The external factors comprised External Curriculum-based Limitations (2 questions), External Task-Centered Strategies (3 questions), External Use of ICT Tools in Learning (3 questions), and External Motivating Role of ICT (2 questions). A four-point Likert scale (1=strongly disagree, 4=strongly agree) provided the scoring framework, with means categorized as follows: 1-1.59 (very low), 1.6-2.16 (low), 2.2-2.79 (moderate), 2.8-3.39 (high), 3.4-4 (very high). To accommodate the participants, the questions were translated into Serbian using a blind back-translation method to maintain the integrity and accuracy of the content;

3) Open-Ended Questions: The third section comprised open-ended questions created by the authors to gain deeper insights and support the statistical analysis. These questions aimed to capture the views and personal experiences of the students regarding CALL.

For the quantitative analysis, the Statistical Package for the Social Sciences (SPSS 2020) was used. The data were analyzed using descriptive statistics and t-tests to identify any significant differences in attitudes based on gender and field of study. Thematic analysis was employed to analyze the qualitative data from the open-ended questions, allowing for the identification of common themes and patterns in the students' responses.

4. RESULTS AND DISCUSSION

Apart from general demographic questions, the first part of the questionnaire also included a self-assessment scale regarding competence in computer knowledge, as mentioned in 3.2 section. The majority of students (60.7%) rated their proficiency in computers as intermediate, whereas 30.1% perceived their level of knowledge as advanced, and 9.2% as beginners. Overall, 90.8% of respondents feel confident in their computer skills. These findings appear significant as they confirm that students' attitudes towards CALL are not influenced by the level of ICT competence.

4.1. Attitudes towards CALL

The results of both internal and external factors, which altogether constitute the CALL attitude scale through eight constructs, are given in Table 1.

Internal Factors Total: The overall mean of 2.80 (SD=0.608) for internal factors indicates a moderate to high attitude towards the internal use of ICT strategies in English language learning. The lower standard deviation suggests that these attitudes are relatively consistent across the student population. Internal factors encompass the personal significance of using ICT and mobile tools (smartphones and tablets), and affective and metacognitive strategies. Affective strategies refer

to emotions and enjoyment derived from ICT use, such as feeling happy or finding it personally important. Metacognitive strategies involve cognitive processes like remembering and understanding facilitated by ICT. The means for all these factors indicate a moderate to high level of acceptance, as shown in Table 1.

External Factors Total: The overall mean of 2.77 (SD=0.589) for external factors reflects a similar moderate attitude towards external uses of ICT. External factors encompass several key areas: constraints on using ICT for both classroom activities and self-study, the integration of ICT content into the curriculum (External Task-Centered Strategies), the utilization of ICT tools in learning by teachers and their support (External Use of ICT Tools in Learning), and the motivational role of ICT in classroom management. Again, the means for the external factors indicate a moderate to high level of acceptance (Table 1).

Table 1. Overall students' attitudes towards CALL regarding different factors

Factors	Min	Max	Mean	St. dev
Internal Affective ICT Strategies	1	4	2.91	.706
Internal Metacognitive Strategies	1	4	2.89	.795
Internal Personal Significance of ICT	1	4	2.64	.738
Internal Importance of Mobile Tools	1	4	2.75	.697
Internal factors total	1	4	2.80	.608
External Curriculum-based Limitations	1	4	2.68	.812
External Task-Centered Strategies	1	4	2.66	.876
External Use of ICT Tools in Learning	1	4	2.73	.836
External Motivating Role of ICT	1	4	3.03	.805
External factors total	1	4	2.77	.589

Overall, the lowest score is given to the factor of the internal personal significance of ICT, which included statements such as 'I cannot learn without ICT' or 'ICT plays a very important role in my learning process.' This suggests that students do not perceive ICT as indispensable or deeply integrated into their learning strategies. The relatively low mean score of M=2.64 for this factor highlights a gap in the perceived intrinsic value of ICT in individual learning experiences. This could imply that while students recognize the utility of ICT, they may not yet see it as crucial to their academic success or as a central component of their learning identity (Table 1).

On the other hand, the highest mean score (M=3.03) was observed for the factor "External Motivating Role of ICT," which included statements

such as 'ICT tools create a better atmosphere in the classroom' and 'Teachers should incorporate the use of ICT tools into their teaching.' This indicates a strong acknowledgement among students of the positive impact ICT have on classroom dynamics, including increased engagement and a more stimulating learning atmosphere.

Although the overall results show that internal factors are rated high ($M=2.80$) and external factors are rated moderate ($M=2.77$), these values are on the borderline, and the difference between them is negligible, suggesting that students are almost equally receptive to both dimensions of ICT integration in English language learning.

Thematic analysis of open-ended questions provides further support for the statistical findings. Students were asked to share their positive and negative experiences with CALL. The responses were overwhelmingly positive. Many students cited specific applications and tools that enhanced their learning experience. Popular mentions included Duolingo for its engaging exercises, Google Translate for quick translations, various online grammar exercises for practice, and Grammarly and ChatGPT for real-time writing feedback. These tools were praised for their accessibility, user-friendly interfaces, and tangible improvements to language skills. The students also emphasized the importance of support from teachers and parental encouragement in facilitating a positive atmosphere and effective use of such tools.

This positive feedback aligns with the high mean score for the "External Motivating Role of ICT" factor, highlighting the effectiveness and motivational impact of these ICT tools in language learning. Conversely, the lower scores in areas such as "Internal Personal Significance of ICT" suggest that while students benefit from these tools, they do not yet view them as indispensable to their learning process.

4.2. Influence of study field on attitudes towards CALL

When examining differences between study fields, distinct educational approaches are evident. As mentioned above, the Technological/Engineering field emphasizes practical, technology-driven education, while the Social Sciences and Humanities field prioritizes theoretical, analytical studies related to human behavior and culture. However, the SPSS analysis showed that there were no significant differences between the fields, as the mean scores for both fields were similar regarding both internal and external factors. For internal factors, the Technological field obtained a mean score of $M=2.84$, while students in the Social Sciences and Humanities field had a mean score of $M=2.73$. For external CALL factors, the Technological field had a mean score of $M=2.81$,

compared to $M=2.72$ for the Social Sciences and Humanities field (Table 2).

Table 2. Influence of study field on the attitudes towards CALL

Factors	Study field	No.	Mean	St. dev
Internal factors	Technological / Engineering	108	2.84	.636
	Social Sciences & Humanities	75	2.73	.562
External factors	Technological / Engineering	108	2.81	.620
	Social Sciences & Humanities	75	2.72	.540

Although the results for the Social Sciences and Humanities fields were slightly lower, a T-test indicated no significant differences between the fields (Table 3). This suggests that despite the different educational emphases, students from both fields have comparable attitudes towards the use of CALL, whether considering internal motivations and strategies or external influences and support.

Table 3. T-test study field means differences on attitudes towards CALL

Study field	t	df	Sig.
Internal factors CALL total	1.210	181	.228
External factors CALL total	1.119	181	.265
Internal Metacognitive Strategies	1.185	181	.238
Internal Significance of Mobile Tools	.947	181	.345
Internal Personal Significance of ICT	-.066	181	.948
External Curriculum-based Limitations	-.365	181	.716
External Task-Centered Strategies	2.348	181	.020*
External Use of ICT Tools in Learning	.919	181	.360
External Motivational Role of ICT	.162	181	.872

* level of significance $p<0.05$

These findings are in line with the findings of Al-Emran et al. [31] who also found no significant differences among the students' attitudes towards the use of M-learning with regard to their major (IT, English, Business Management, and Project Management were the study fields included in this study).

When considering individual factors, the only significant difference was observed in the factor related to External Task-Oriented Strategies (Table 3). For this factor, the mean for the Technological field was $M=2.79$, while for the Humanities and Social Sciences field, it was $M=2.47$. The T-test results confirmed a significant difference at level of significance $p<0.05$.

This difference could be attributed to the nature of the fields themselves. In the

Technological/Engineering field, there may be a greater emphasis on practical, hands-on learning, which necessitates more direct guidance and support from teachers on using ICT tools for specific tasks. In contrast, the field encompassing Humanities and Social Sciences may focus more on independent, theoretical work, where students might not require as much direct instruction on using ICT tools for specific learning tasks. This could explain why students in the first field report higher levels of teacher guidance and support for using ICT tools at home and in the classroom compared to their peers in the other field.

4.3. Influence of gender on attitudes towards CALL

When examining gender differences, the sample comprised 92 female students and 87 male students. Overall, the results indicate generally positive attitudes towards CALL among both genders, with mean scores ranging from $M=2.83$ for females to $M=2.79$ for males regarding internal factors, and $M=2.86$ for females and $M=2.70$ for males for external factors (see Table 4).

Table 4. Influence of gender on attitudes towards CALL

Factors	Gender	No.	Mean	St. dev
Internal factors	Female	92	2.83	.577
	Male	87	2.79	.622
External factors	Female	92	2.86	.574
	Male	87	2.70	.576

Similar to the findings obtained for study fields, although minor differences suggest a slightly more positive inclination towards CALL among female students, statistical analysis using a T-test revealed no significant differences between genders (Table 5).

Table 5. T-test gender means differences on attitudes towards CALL

Study field	t	df	Sig.
Internal factors CALL total	.389	177	.698
External factors CALL total	1.874	177	.063
Internal Affective Strategies	-.862	177	.390
Internal Metacognitive Strategies	.039	177	.969
Internal Significance of Mobile Tools	.428	177	.669
Internal Personal Significance of ICT	1.742	177	.083
External Curriculum-based Limitations	.788	177	.432
External Task-Centered Strategies	1.220	177	.224
External Use of ICT Tools in Learning	2.045	177	.042*
External Motivational Role of ICT	1.151	177	.251

* level of significance $p < 0.05$

However, when examining specific variables within these factors, a significant difference emerged regarding the external use of ICT tools in learning, where female students exhibited a higher mean score compared to male students. The T-test for Equality of Means revealed a statistically significant result, at the level of significance $p < 0.05$, indicating that this difference is unlikely to have occurred by chance. This finding, while significant, does not necessarily reflect the overall moderate to high positive attitudes towards CALL observed across both genders in the study.

These findings align with the results obtained by Tafazoli et al. [26] and Al-Emran et al. [31], who also found no significant differences between male and female students. However, more recent research by Batool et al. [24] indicated that there are differences in attitudes and familiarity with CALL between genders, with female students showing a greater propensity to use technology in ELT classes than their male counterparts. It is important to note that this study only included students from the humanities, which might limit the generalizability of the findings. Similarly, the researchers in [25] found that female students were more positively oriented towards using ICT tools in learning English as a foreign language (EFL). These mixed results suggest that more research is needed to better understand the gender differences in attitudes towards CALL across different disciplines and contexts.

4.4. Pedagogical implications

The generally positive attitudes of students towards CALL, regardless of their field of study or gender, suggest that educators and curriculum designers should continue promoting the integration of ICT in English language teaching, emphasizing its external motivating role and the benefits it brings to classroom engagement. Professional development programs should focus on enhancing teachers' ICT skills and strategies to effectively support student learning across diverse disciplinary backgrounds and gender perspectives. Moreover, efforts to further investigate and address gender-specific attitudes towards ICT can ensure equitable access and utilization of technology in educational settings.

5. CONCLUSION

By examining the attitudes of students from diverse study fields and considering the impact of gender, this research seeks to provide a comprehensive understanding of the factors influencing students' acceptance of CALL. Based on the research questions regarding Serbian university students' attitudes towards CALL, several key findings and implications have emerged.

Firstly, the findings indicate that Serbian university students generally hold positive attitudes towards

CALL, as reflected in moderate to high mean scores for both internal and external factors related to ICT integration in English language learning. These scores suggest that students perceive ICT as beneficial, particularly in terms of its external motivating role in enhancing classroom atmosphere and instructional practices.

However, the study found no significant differences in attitudes towards CALL based on the field of study. Despite distinct educational emphases between the Technological/Engineering field, which prioritizes practical and technology-driven education, and the Social Sciences and Humanities field, which focuses on theoretical and qualitative studies, both groups of students displayed similar attitudes towards ICT use in learning English, with minor variations observed only in specific aspects such as external task-oriented strategies.

Similarly, when examining the differences in attitudes towards CALL based on gender, it was found that overall attitudes were generally positive among both male and female students. However, significant differences emerged in the external use of ICT tools for learning. Female students exhibited a slightly higher mean score, indicating a greater appreciation for the external motivating role of ICT in classroom dynamics. This finding underscores the importance of considering gender-specific preferences and needs when integrating ICT into educational practices.

Future research should expand to include other fields of study, such as medicine and arts, to gain a more comprehensive understanding of students' attitudes towards CALL across different disciplines. Additionally, further studies should delve deeper into the specific ICT tools students prefer and the aspects of English language learning most positively impacted by these tools, and any differences in students' perceptions based on demographic factors. Longitudinal studies examining the long-term effects of ICT integration in language learning can also provide valuable insights into its sustained benefits and potential areas for improvement. By addressing these areas, future research can contribute to a more nuanced understanding of the role of ICT in language learning and help educators optimize their teaching strategies.

ACKNOWLEDGEMENTS

This study was supported by the Ministry of Science, Technological Development and Innovation of the Republic of Serbia, and these results are parts of Grant No. 451-03-66/ 2024-03/200132 with the University of Kragujevac – Faculty of Technical Sciences Čačak.

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