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LINGUISTIC AND INTERACTIVE DRIVERS OF CHATBOT ACCEPTANCE IN EMI HIGHER EDUCATION: A CASE STUDY OF THE TESLA CHATBOT IN SERBIA

Abstract: This study investigated international students' perceptions of the Tesla chatbot in English-medium instruction (EMI) courses, with a focus on its usability, motivational impact, perceived learning support, and contribution to English language skill development. The primary objective was to determine whether these factors predicted classroom engagement, perceived learning enhancement, support for integration into teaching, and differences by gender. A quantitative, cross-sectional design was used. Data were collected via a 16-item online questionnaire from 54 international students enrolled in the *Business Economics* program at Singidunum University, Belgrade. The survey was administered immediately after classroom interaction with the chatbot. Analyses were conducted using IBM SPSS Statistics v29.0.2, applying multiple regression, Pearson correlation, and independent-samples t-test. Results indicated that linguistic clarity significantly predicted perceived learning enhancement, whereas technical usability did not, and engagement was not significantly predicted. Motivation to explore artificial intelligence was positively associated with support for regular classroom use and integration with textbooks. No significant gender differences were observed in perceived learning support. Perceived linguistic benefits, especially classroom interactivity and chatbot understanding of questions, significantly predicted support for integration into EMI courses. These findings suggest that linguistic and interactive quality are central to chatbot acceptance in higher education and support their targeted use in language-focused EMI contexts. Future research should explore longitudinal impacts, discipline-specific adaptations, and the integration of adaptive features, while practitioners can prioritize linguistic accessibility and interactive design to maximize educational benefits.

Keywords. chatbot integration, educational technology, English-medium instruction, linguistic benefits, student motivation

Introduction

The expansion of English as a Medium of Instruction (EMI) in higher education has reshaped academic practices in many non-Anglophone countries, reflecting broader trends of internationalization, mobility, and competitiveness (Dearden, 2014; Hultgren et al., 2015). EMI settings require students to engage with both disciplinary content and a non-native language, which can introduce linguistic and cognitive challenges affecting participation, comprehension, and academic performance (Lasagabaster, 2022). Addressing these challenges often involves not only language support measures but also pedagogical innovations that foster accessibility and engagement.

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Generative artificial intelligence (AI) has recently emerged as a promising source of such innovations, offering interactive, adaptive, and accessible learning tools across disciplines (Bannister et al., 2023). Among these, educational chatbots—AI-driven conversational agents capable of delivering information, answering questions, and sustaining dialogue—are attracting particular interest for their potential to provide real-time, personalized interaction in educational contexts (Kuhail et al., 2023). In EMI environments, where language barriers may limit comprehension and confidence, chatbots can offer a safe, low-pressure space for students to clarify meaning, practise communication, and explore course-related topics.

The present study investigates student acceptance of a multilingual, persona-based educational chatbot modeled after Nikola Tesla, implemented as a general pedagogical support tool in English-medium instruction (EMI) higher education settings with international students in Serbia. The research focuses on whether perceptions of the chatbot's technical usability, linguistic clarity, interactivity, and motivational appeal influence students' engagement and perceived educational value, contributing empirical evidence to the growing literature on AI adoption in higher education—particularly in EMI contexts where language accessibility and pedagogical innovation intersect.

Literature review

EMI in the International Context

English-medium instruction (EMI) refers to the delivery of academic subjects in English in settings where English is not the majority first language (Macaro et al., 2018). Over the past decade, EMI has expanded rapidly in higher education, driven by internationalization agendas and the demand for graduates capable of operating in multilingual and multicultural environments (Galloway & Ruegg, 2022; Rose et al., 2020). Today, EMI is implemented across diverse higher education systems, adapting to local linguistic, cultural, and policy contexts while maintaining its role as a key instrument of global academic mobility.

Research on technology-enhanced learning has demonstrated that well-designed educational chatbots can support reasoning, knowledge retention, and comprehension. Meta-analyses report medium-to-large positive effects on academic achievement and interest (Labadze et al., 2023). However, in EMI higher education, chatbots are typically used for language support, assessment, or administrative functions, with relatively few studies exploring their direct integration into discipline-specific teaching (Bannister et al., 2023; Kikuchi, 2024).

Empirical EMI studies consistently point to both opportunities and persistent barriers. On the positive side, EMI can offer authentic exposure to English while facilitating access to disciplinary knowledge (Hu & Wu, 2020; Sahan & Sahan, 2021; Xie & Curle, 2020). Yet comprehension issues remain common, linked to students' limited English proficiency (Curle et al., 2020) and lecturers' restricted communicative competence in English, which may result in rigid, non-interactive delivery styles (Hu & Lei, 2014; Hua, 2019).

Zhou et al. (2022) documented such challenges in Chinese EMI programs, particularly in productive skills such as academic writing. Their multi-site study identified three institutional models of language support—concurrent instruction alongside EMI courses, preparatory programs before EMI enrollment, and self-access learning or writing centers—and showed how, in the absence of formal provision, lecturers often drew on students' multilingual resources to aid comprehension. Findings stress the importance of integrating targeted ESP/EAP support into EMI curricula to address students' academic and linguistic needs.

Comparable issues are reported in other under-researched contexts. In Sudan, Alhassan et al. (2021) found that linguistic and pedagogical challenges in an EMI MBA program hindered performance, exacerbated by scarce EAP provision. In Turkey, Bayram et al. (2022) showed that while undergraduates valued EAP for improving academic skills, course designs often neglected speaking, vocabulary, and writing, leading students to call for longer, skills-focused instruction by experienced English lecturers. In Kazakhstan, Tajik et al. (2023) revealed misalignments between EMI policy aims and institutional capacity, with many students lacking prior EMI exposure, reporting low confidence, and experiencing high stress during transition. Across these settings, the evidence converges on the need for context-specific support mechanisms, whether through improved EAP/ESP provision, professional development for lecturers, or closer alignment between policy and practice.

Yu and Kaur (2024) provide insight into mitigating comprehension barriers through explicitness strategies. Studying tutorials and supervision meetings in an EMI program at a Chinese university's overseas campus, they found that effective lecturers frequently employed self-repetition, self-repair, paraphrasing, expansion, and exemplification to clarify technical terms, offer concrete illustrations, and pre-empt misunderstanding. The predominance of self-initiated strategies highlights the importance of lecturer proactivity in maintaining clarity, particularly in dialogic settings. Incorporating such strategies into EMI lecturer training could enhance communicative effectiveness; further, modeling them in educational chatbots could extend language clarification and support beyond the classroom.

Finally, a systematic review by Rouaghe and Assassi (2024) identifies structural disparities shaping EMI research and practice. The Global North—led by countries such as Spain, Sweden, China, and Japan—accounts for over 70% of EMI-related publications, supported by robust funding and well-developed research infrastructures. In contrast, contributions from the Global South, including regions such as Albania, Serbia, and Malaysia, remain limited due to underfunded institutions, lower international visibility, and insufficient EAP provision. The review stresses that equitable EMI outcomes require not only broader research representation but also sustained investment in EAP/ESP integration, pedagogical training, and stronger collaboration between content and language specialists. These global patterns form a critical backdrop for understanding Serbia's own EMI trajectory, where the expansion of English-medium provision has followed a markedly different pace and set of structural conditions.

EMI in the Serbian Higher Education Context

Serbia reflects several of the challenges and disparities identified in international EMI research, including uneven development, limited institutional capacity, and gaps in language support. Within Serbia, EMI remains a relatively recent and unevenly developed practice. While the Higher Education Law (2018) and participation in Erasmus+ have encouraged the expansion of English-taught programs, growth has been concentrated in disciplines such as medicine, engineering, and ICT, and is more prevalent in private institutions. Đorđević and Blagojević (2019) identify two persistent challenges: insufficient English proficiency among many lecturers and a continued reliance on traditional, teacher-centered methods. Janković et al. (2025) add that EMI implementation often lacks conceptual clarity, with overlapping use of terms such as EMI, CLIL, and ESP/EAP leading to inconsistent pedagogical approaches.

Mišić-Ilić and Đorđević (2022) examine the intersection of English for Specific Purposes (ESP) and the internationalization of higher education and research in Serbia, noting the increasing need for specialized ESP and English for Academic Purposes (EAP) courses for faculty and researchers. They argue that the growth of EMI requires not only enhanced linguistic competence but also improved pedagogical and intercultural communication skills among university staff. Their analysis of the Erasmus+ TeComp project illustrates a targeted approach to EMI capacity building, combining ESP, EAP, and discipline-specific pedagogical training for university teachers and early-career researchers

across four Serbian universities. This model underscores the importance of integrated training that addresses both language proficiency and instructional skills, particularly in non-Anglophone academic settings such as Serbia.

Previous initiatives, such as the Tempus-funded FUSE project (2013–2016), demonstrated the potential benefits of targeted EMI training for faculty, but such programs have not been systematically institutionalized (FUSE, 2016, as cited in Đorđević & Blagojević, 2019). Research also shows that many instructors, particularly outside the humanities, do not see themselves as responsible for students' language development in EMI, focusing instead on subject content (Anđelkov, 2022). This perspective can limit opportunities for integrating communicative competence development into EMI curricula.

In the Serbian higher education context, no peer-reviewed empirical studies have documented the use of chatbots—multilingual or otherwise—within EMI courses. This study addresses this gap by examining the application of a multilingual, persona-based chatbot modeled after Nikola Tesla in EMI settings at a Serbian university. While not designed specifically for EMI delivery, its multilingual capabilities and interactive design provide a relevant testing ground for assessing potential contributions to linguistic clarity, interactivity, and student motivation in internationalized classrooms.

Methodology

Research Objectives and Questions

This study evaluated university students' perceptions of the Tesla chatbot in EMI settings, focusing on usability, motivation, learning support, and linguistic benefits. The research addressed four questions:

1. Does chatbot usability (technical and linguistic) predict perceived learning enhancement and classroom engagement?
2. Is motivation to explore artificial intelligence associated with support for its classroom use and integration with textbooks?
3. Do perceptions of learning support differ by gender?
4. Do perceived linguistic benefits influence support for chatbot integration into EMI language courses?

Hypotheses

H1. Students who rate the chatbot as more usable (technically and linguistically) report higher levels of perceived learning enhancement and classroom engagement.

H2. Students who agree that the chatbot motivated them to explore more about AI will also support its regular classroom use and integration with textbooks.

H3. Students' perceptions of learning support will differ significantly by gender.

H4. Students who perceive that the chatbot helped them improve their English language skills—particularly in expression and vocabulary building—are more likely to support its regular classroom use and its integration into EMI language courses.

Research Design and Participants

A quantitative, cross-sectional survey was conducted among 54 international students enrolled in the *Business Economics* study programme at Singidunum University, Belgrade. The programme is delivered in English by native Serbian-speaking lecturers. All participants were non-native speakers of both English and Serbian.

Research Instrument

A structured online questionnaire with 16 items, rated on a five-point Likert scale (1 = Strongly disagree to 5 = Strongly agree), was administered immediately after students interacted with the Tesla chatbot. The items addressed key aspects of the chatbot experience, including engagement, perceived learning enhancement, usability, motivation, support for integration, linguistic benefits, and overall learning support. Example items include “Chatting with Tesla’s chatbot was engaging” (engagement) and “The chatbot’s responses were clear and understandable” (usability).

Data Analysis

Analyses were conducted using IBM SPSS Statistics v29.0.2. Multiple regression tested H1 and H4, Pearson correlation tested H2, and independent-samples t-test assessed H3. Statistical significance was set at $p < 0.05$.

H1: Two separate multiple regression analyses examined the relationship between chatbot usability and two dependent variables: classroom engagement (item 1) and perceived learning enhancement (item 7). Usability was operationalized through three predictors: technical simplicity and interactive accessibility (item 2), absence of technical difficulties (item 4), and linguistic clarity of responses (item 5). Model 1 tested predictors of classroom engagement; Model 2 tested predictors of perceived learning enhancement.

H2: A Pearson correlation analysis assessed the relationship between motivation for further exploration and support for educational integration. Motivation was measured by motivation to explore artificial intelligence (item 12) and motivation to further explore Tesla’s work (item 11). Support was measured by support for regular use (item 15) and preference for integration with textbooks (item 14). Correlations were calculated separately for each motivation–support pair.

H3: An independent-samples t-test compared *perceived learning support* between genders. This variable was calculated as the mean of items 7, 8, and 10.

H4: Multiple regression examined whether perceived linguistic benefits predicted support for regular educational use of the chatbot in EMI courses. Linguistic benefits were measured by items 8, 6, and 9. Support for integration was measured by the mean of items 15, 14, and 16.

Results

Multiple regression analysis (Table 1) indicated no significant association between classroom engagement and the selected predictors (Model 1). Although response clarity (item 5) showed a positive effect ($\beta = 0.097$, $p = 0.515$), the overall model was only marginally significant ($F = 1.963$, $p < 0.05$), with a low explained variance ($R^2 = 0.105$ or 10.5%). In contrast, Model 2 revealed a statistically significant contribution of response clarity (item 5), with $\beta = 0.398$ and $p = 0.005$. The overall model was significant ($F = 5.898$, $p < 0.01$), with a higher level of explained variance ($R^2 = 0.261$ or 26.1%), indicating that clarity of responses substantially contributes to the perceived educational value of chatbot interaction.

Based on the presented results, the hypothesis H1 is not fully confirmed — linguistic clarity contributes to learning enhancement, but technical usability does not, and engagement was not significantly predicted.

Table 1. Results of Multiple Regression Analysis Predicting Engagement and Perceived Learning from Chatbot Interaction

Model		Unstandard. Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
		B	S. Error	Beta			Tolerance	VIF
1	(Constant)	1.855	0.988		1.878	0.066		
	2. The chatbot was easy to use.	0.200	0.146	0.215	1.369	0.177	0.729	1.371
	4. I did not experience any technical difficulties while using the chatbot.	0.115	0.200	0.096	0.576	0.567	0.642	1.558
	5. The responses I received from the chatbot were clear and understandable.	0.142	0.217	0.097	0.655	0.515	0.813	1.230
R=0.325 R ² =0.105 F=1.963 p>0.05 n.s.								
2	(Constant)	1.372	0.726		1.891	0.064		
	2. The chatbot was easy to use.	0.138	0.107	0.184	1.294	0.202	0.729	1.371
	4. I did not experience any technical difficulties while using the chatbot.	0.049	0.147	0.051	0.337	0.738	0.642	1.558
	5. The responses I received from the chatbot were clear and understandable.	0.471	0.160	0.398	2.950	0.005	0.813	1.230
R=0.511 R ² =0.261 F=5.898 p<0.01 sig.								

R – Multiple Correlation Coefficient, **R²** – Coefficient of Determination, **F** – Statistic (ANOVA for Regression), **B** – Coefficient (effect of predictor on dependent variable), **Beta (β)** – Standardized Regression Coefficient, **Tolerance** – (1 – R², lower value = higher collinearity), **VIF** – Variance Inflation Factor (quantifies collinearity, VIF > 10 indicates problematic collinearity).

Pearson correlation results (Table 2) showed that motivation to explore artificial intelligence was significantly correlated with support for regular use of the chatbot ($r = 0.349$, $p = 0.010$) and with preference for combining the chatbot with textbooks ($r = 0.361$, $p = 0.007$). Additionally, motivation to further explore Tesla's work showed a significant association with preference for a combined learning approach ($r = 0.345$, $p = 0.011$). It can be concluded that H₂ is fully confirmed—motivation to explore artificial intelligence is significantly associated with both regular classroom use and integration of the chatbot with textbooks.

Table 2. Correlations between motivation for further exploration and support for the educational integration of the chatbot

Pearson Correlation (r)	12	11	15	14
12. Using the chatbot inspired me to explore more about artificial intelligence.	r 1	0.324*	0.349**	0.361**
	Sig 0.017	0.010	0.007	
11. Chatting with the chatbot encouraged me to learn more about Nikola Tesla.	r 0.324*	1	0.019	0.345*
	Sig 0.017	0.894	0.011	
15. I think the chatbot should be used regularly in lessons.	r 0.349**	0.019	1	0.663**
	Sig 0.010	0.894	0	
14. I would prefer learning with the help of the chatbot alongside the textbook, rather than relying on the textbook alone.	r 0.361**	0.345*	0.663**	1
	Sig 0.007	0.011	0	

*. Correlation is significant at the 0.05 level (2-tailed). **. Correlation is significant at the 0.01 level (2-tailed).

An independent-samples t-test (Table 3) revealed no significant difference in perceived learning support between male ($M = 4.13$, $SD = 0.75$) and female students ($M = 3.94$, $SD = 0.66$), $t(52) = 0.993$, $p = 0.325$. Based on the presented results, H₃ is not confirmed.

Table 3. Results of the t-test for differences in perceived learning support by gender

Latent Variable	Sex	N	Mean	SD	t	df	p
Perceived learning support	Male	25	4.13	0.75	0.993	52	0.325
	Female	29	3.94	0.66			
Total		54	4.04	0.71			

Multiple regression results (Table 4) showed that classroom interactivity ($\beta = 0.486$, $p < 0.001$) and perceived chatbot understanding ($\beta = 0.309$, $p = 0.023$) were significant predictors of support for chatbot integration. Usefulness for understanding Tesla's life and work was not a significant predictor. The overall model was significant ($F = 7.342$, $p < 0.01$), explaining 30.6% of the variance ($R^2 = 0.306$). It can be concluded that H4 is fully confirmed.

Table 4. Regression Results of Student Support for Chatbot Use in EMI Courses

Model		Unstandar. Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
		B	S. Error	Beta			Tolerance	VIF
1	(Constant)	0.518	0.840		0.617	0.540		
	8. The information I received from the chatbot was useful for understanding Tesla's life, work, and inventions.	-0.140	0.172	-0.109	-0.811	0.421	0.772	1.295
	6. I felt that the chatbot understood my questions.	0.341	0.145	0.309	2.347	0.023	0.799	1.252
	9. Using the chatbot in class would make the lesson more interactive and engaging.	0.515	0.127	0.486	4.044	0.000	0.963	1.038

R – Multiple Correlation Coefficient, **R²** – Coefficient of Determination, **F** – Statistic (ANOVA for Regression), **B** – Coefficient (effect of predictor on dependent variable), **Beta (β)** – Standardized Regression Coefficient, **Tolerance** – ($1 - R^2$, lower value = higher collinearity), **VIF** – Variance Inflation Factor (quantifies collinearity).

Discussion

The first hypothesis (H1) was partially supported. Linguistic clarity of chatbot responses significantly predicted students' perceived educational value, whereas technical usability did not predict either learning enhancement or engagement. In EMI contexts with international students, this suggests that linguistic accessibility is more influential than the absence of technical difficulties. Students may tolerate minor usability issues if the language is clear and comprehensible, particularly when working with subject-specific or culturally rich content. The lack of a significant link with engagement indicates that engagement is shaped more by interactivity, novelty, and content relevance than by ease of use alone, echoing EMI research that emphasizes clarity and explicitness strategies, such as signposting and lexical clarification, as more critical to comprehension than surface delivery features (Yu & Kaur, 2024).

The second hypothesis (H2) was fully supported, showing a positive association between motivation to explore AI or Tesla's work and support for the chatbot's regular use and textbook integration. This finding reinforces the idea that motivational triggers can extend beyond the immediate task and foster openness to embedding digital tools in standard pedagogical practice. In EMI settings, where cultural and linguistic mediation are integral to learning, motivation may play an especially important role. These results are consistent with technology-acceptance studies in higher education that highlight perceived value, intrinsic interest, and contextual factors as predictors of behavioral intention to adopt educational technologies (Strzelecki, 2024; Tao et al., 2024).

The third hypothesis (H₃) was not supported, with no significant gender differences in perceived learning support. This suggests that chatbot evaluation is shaped more by individual learning experiences than by gender-based factors. The result aligns with prior studies reporting minimal or context-dependent gender effects in AI adoption in higher education when other variables are accounted for (Qazi et al. 2022; Ravšelj, et al. 2025).

The fourth hypothesis (H₄) was fully supported: perceived linguistic benefits—particularly increased interactivity and the perception that the chatbot understood student questions—were strong predictors of support for integration into EMI courses. This reinforces the view that interactional quality and communicative competence are central in second-language instructional contexts. Systematic reviews similarly identify responsiveness, clarity, and personalized dialogue as central to educational chatbot adoption (Huang et al., 2025; Kuhail et al., 2023; Labadze, et al., 2023; McGrath et al., 2025).

The findings indicate that chatbot acceptance in EMI is best understood by a language-centred model in which linguistic clarity of output and interactive responsiveness shape perceived educational value, with motivation further supporting integration, while gender remains a non-differentiating factor. From a practical standpoint, EMI chatbot design should prioritize accessible, contextually relevant language and sustained, meaningful interaction.

In Serbia, where EMI implementation remains uneven and many lecturers lack targeted training in language-integrated pedagogy, these results show that well-designed chatbots could help bridge some of the communicative gaps in multilingual classrooms. While they cannot replace systemic capacity-building—such as the integrated ESP/EAP and pedagogy-focused training models piloted in Erasmus+ projects—they can provide an immediate, scalable layer of linguistic and interactional support for internationalized programs. This makes them especially valuable in contexts where institutional resources for EMI enhancement are limited.

The study contributes to EMI and educational technology research by offering empirical evidence from a non-English-speaking higher education context, highlighting the predictive role of linguistic clarity and interactional quality, linking motivation to integration support, and confirming the non-significance of gender in perceived learning support. These contributions are tempered by certain limitations: the research was conducted within a single institution and EMI program, involved a modest sample size, and relied on self-reported measures collected at one-time point. Such constraints limit generalizability and prevent conclusions about longitudinal trends.

Future research should test the robustness of these findings across a broader range of EMI programs and institutions in Serbia and in comparable regional contexts, ideally using larger and more diverse samples. Longitudinal designs could track changes in perceptions and usage over time, while experimental studies could manipulate chatbot language style, interactivity, and cultural references to identify optimal configurations. Comparative studies between Serbian EMI contexts and those in other Global South countries could further clarify the role of resource disparities in shaping adoption. Additionally, research should explore how chatbots integrate with other digital tools in blended EMI environments and whether adaptive personalization further enhances learning outcomes.

Conclusion

This study examined international students' perceptions of the Tesla chatbot in EMI higher education in Serbia, focusing on usability, motivation, perceived learning support, and linguistic benefits. The results highlight the central role of linguistic clarity and interactive quality in shaping perceived educational value and support for chatbot integration. Motivation to explore related topics significantly enhanced willingness to integrate the chatbot into teaching, while gender had

no influence on perceived learning support. Technical usability alone was insufficient to predict learning enhancement or engagement.

These findings stress the importance of designing EMI chatbots that prioritize clear, accessible language and meaningful interaction, aligning with communicative competence principles in second-language instruction. They also suggest that motivational elements can be strategically leveraged to promote adoption in regular teaching practice. In Serbia's still-developing EMI landscape—characterized by uneven provision and linguistic diversity—such tools may be particularly valuable for bridging communication gaps and sustaining student engagement in international classrooms.

While the scope of the study limits generalizability, its results contribute rare empirical evidence from a non-Anglophone higher education setting. Future research expanding to multiple institutions, tracking longitudinal effects, and testing varied interaction designs will help clarify the full potential of chatbots as a sustainable element of EMI pedagogy.

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