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Determinants of Students' Perceived Usefulness of Large Language Models: The Role of Relevance, Enjoyment, and Ease of Use

Abstract

Perceived usefulness (PU) is one of the most important determinants for the acceptance of technologies as it strongly influences both the intention to use and the actual use of the technology. As large language models (LLMs), such as ChatGPT, are increasingly used in higher education, it is important to understand what factors influence students' perceptions of the usefulness of LLMs for academic learning. Based on the Technology Acceptance Model (TAM), this study investigated the role of relevance to academic learning, perceived enjoyment, and perceived ease of use (PEOU) on students' perceptions of the usefulness of LLMs. The study involved 102 students from a Croatian university. The data were analyzed using Spearman correlation and multivariate regression analysis. The correlation analysis showed that all three factors had a statistically significant positive correlation with the perceived usefulness of LLMs. However, the regression analysis showed that only relevance to academic learning and perceived enjoyment of using LLMs for learning were significant positive predictors, while perceived ease of use played a minor role. Together, these two variables explained 71.8% of the variance in students' perceptions of the usefulness of LLMs. The results emphasize the importance of identifying the factors that shape students' perceptions of the usefulness of LLMs as they are an important predictor of intention to use the technology. The findings suggest that there is a need to develop LLM-based tools that are pedagogically relevant and engaging for students and that can serve as guidelines for their successful integration into higher education.

K e y w o r d s: Large Language Models (LLMs); Technology Acceptance Model (TAM); perceived usefulness; relevance for academic learning; perceived enjoyment; higher education

Generative Artificial Intelligence (GenAI) includes systems that use deep learning to autonomously generate new content, including Large Language Models (LLMs) such as ChatGPT, Gemini, Claude and Copilot, which can generate human-like text and are increasingly used in higher education to support learning and teaching (Belkina et al., 2025; Giannakos et al., 2025; Mienye & Swart, 2025). Understanding the factors that shape attitudes towards LLMs is crucial for their successful integration into higher education as the acceptance of new educational technologies depends on students' perceptions of their usefulness, ease of use and motivational aspects (Davis, 1989; Venkatesh & Davis, 2000; Venkatesh & Bala, 2008). Previous research has shown that the successful integration of LLMs into higher education requires a simultaneous management of technical, pedagogical and ethical challenges. García-López et al. (2025) emphasised the need for sustainable and scalable infrastructure, a balance between personalisation and equity in learning, protection of data quality and security, and the introduction of ethical guidelines and human oversight, while Belkina et al. (2025) argued that GenAI transforms teaching and student support, but must be aligned with pedagogical frameworks in order to be implemented responsibly. Similarly, Tillmanns et al. (2025) emphasised the importance of aligning GenAI technologies with health professionals. In the context of this research, these findings emphasise the importance of aligning LLMs with students' pedagogical goals and needs, which has a direct impact on their perceived usefulness – a key factor in the acceptance and use of new technologies. Furthermore, Giannakos et al. (2025) caution the need for careful implementation and evidence of pedagogical effectiveness. Mienye & Swart (2025) also highlight the potential of LLMs for personalised learning and task automation, but warn of ethical challenges in terms of privacy, opacity and bias. They advocate the use of explainable artificial intelligence (XAI) and human oversight to ensure trust and accountability in the use of GenAI tools.

Research Problem. Large language Models (LLMs) are increasingly used in higher education, but the factors that influence students' perceptions of their usefulness for learning have not yet been adequately explored. Previous studies have rarely examined a combined influence of relevance to academic learning, perceived enjoyment and perceived ease of use on students' perceptions of usefulness. This lack of evidence limits our understanding of how students evaluate the pedagogical value of LLMs, and hinders their effective integration into teaching and learning practices. In addition, previous studies have analysed students' perceptions and usage behaviours of GenAI tools, including LLMs. Chan & Hu (2023) have shown

that students have a generally positive attitude towards GenAI tools, highlighting their usefulness and relevance for personalised learning, writing, brainstorming and research, but also have concerns about accuracy, privacy and ethical issues. Similarly, Almassaad et al. (2024) found that most students use GenAI tools, especially ChatGPT, primarily for defining and clarifying terms, translating, generating ideas, and summarising literature. Students highlight both the benefits, such as easy access, time savings, and immediate feedback, and the risks, such as unreliability of information, plagiarism, reduced interpersonal interaction, and the impact on learner autonomy. Both studies emphasise the need for ethical guidelines, academic integrity policies, and support systems to maximise the benefits and minimize the risks associated with their use.

Research Focus. To address this gap, this study investigates how relevance to academic learning, perceived enjoyment, and perceived ease of use help shape students' perceptions of the usefulness of LLMs, which, according to the Technology Acceptance Model (TAM), is an important predictor of intention to use educational technologies. The aim of the study is to find out which of these factors are the strongest predictors of perceived usefulness in order to improve the understanding of students' perception and acceptance of LLMs in higher education. The results can serve as a basis for their strategic and pedagogically justified implementation in the education system as well as a basis for the development of a theoretical framework for future research in this context. The theoretical framework of this research is based on the TAM (Davis, 1989) and its extensions (TAM2: Venkatesh & Davis, 2000; TAM3: Venkatesh & Bala, 2008). According to the basic TAM, perceived ease of use (PEOU) and perceived usefulness (PU) are important predictors of intention to use, with PEOU not only directly influencing intention but also increasing PU. TAM2 introduces job relevance, which indicates the extent to which the user believes the technology is directly related to their goals and tasks; higher perceived relevance also increases PU (Venkatesh & Davis, 2000). TAM3 additionally includes hedonic motivation, operationalized as perceived enjoyment, which increases PEOU, and research (Yi & Hwang, 2003; Moon & Kim, 2001) shows that PU can also be directly influenced. Several studies have analyzed the motivation and intention to use GenAI tools using TAM and TTF concepts. Alshamy et al. (2025) have shown that students use GenAI more frequently when they perceive it as relevant and useful for certain academic tasks (brainstorming, writing, summarizing). Perceived usefulness and perceived ease of use were found to be important predictors of intention to use, and the TTF emphasizes the importance of matching the tool's capabilities to educational tasks. Similarly, Diao et al. (2024) found that the most important predictors of intention to use were precisely perceived usefulness and attitude towards GenAI, while expected effort and habit were weaker predictors. Singh & Paiva (2025) showed that perceived intelligence and technological novelty of GenAI tools increase both PU and PEOU, which then influence satisfaction, attitude and continued intention to use. Gong et al. (2025)

extended the TAM by including learning motivation, self-efficacy, perceived risk and previous usage experience and showed that PEOU positively influences PU and attitude towards using LLMs, while perceived time risk negatively influences PU.

Methodology of Research

General Background of Research. This study builds on the TAM (Davis, 1989), TAM2 (Venkatesh & Davis, 2000), TAM3 (Venkatesh & Bala, 2008), which identifies PU and PEOU as important predictors of technology use. TAM2 adds job relevance as a determinant of PU, while TAM3 includes hedonic motivation (perceived enjoyment) as an antecedent of PEOU and PU. As LLMs are increasingly integrated into higher education, understanding the factors that shape students' perceptions of usefulness is critical to their pedagogically meaningful implementation.

Sample of Research. A total of 102 students from various fields of study at the integrated Juraj Dobrila University of Pula took part in this study. Most of them came from the Faculty of Informatics (64.7%), followed by the Study of Design and Audiovisual Communication (10.8%), the University Undergraduate Study of Early and Preschool Education (6.9%), the Faculty of Engineering (7.8%; 4.9% Mechanical Engineering and 2.9% Computer Engineering), the Faculty of Economics and Tourism "Dr. Mijo Mirković" (3.9%), the Academy of Music (2.9%), the Faculty of Natural Sciences (2.0%), and the Integrated University Teacher Study (1.0%). This sample largely matches the one used in our earlier study (Babić, 2024, p. 36), with only two additional participants. The sample consisted of 53.9% female students, 43.2% male students and 2.9% who preferred not to state their gender. In terms of study status, 53.9% were full-time students and 46.1% were part-time students. Most of them (72.6%) rated their academic performance as average, 22.5% as excellent and 4.9% described themselves as students with learning difficulties. As for their experience with generative AI tools, 94.1% of the participants said they had used ChatGPT in their daily lives, while 5.9% had never used it. When asked about using ChatGPT as a tool for academic learning, 76.5% said they had used it for this purpose, while 23.5% had not. Half of the students (50.0%) said they had been using ChatGPT for less than a year, 27.5% for about a year and 22.5% for more than a year. Most of them used ChatGPT for academic learning several times a week at university (62.8%), while a smaller proportion (30.4%) used it several times a week at home. All students reported using ChatGPT to support their learning, while a much smaller proportion also mentioned other GenAI tools such as Copilot (9.8%), Gemini (7.8%) or Claude (2.0%). Students rated their knowledge of using ChatGPT for academic learning as good (M = 3.44; SD = 0.77) and their satisfaction with ChatGPT as very good

(M = 3.61; SD = 0.89). In terms of perceived usefulness, 42.2% said that ChatGPT helps them most of the time, 40.2% said it helps them to some extent, and 8.8% considered it essential for their learning. They mainly use ChatGPT to explain assignments and exercises (57.8%), to find additional study material (52.0%), to get help with coding and programming (47.1%), to prepare for exams through a question-and-answer simulation (40.2%) and to develop creative ideas (40.2%). They use it less frequently to solve mathematical and technical problems (29.4%), to analyze study materials (26.5%), to write seminar papers and other assignments (23.5%) and least frequently to learn and practice foreign languages (12.7%). The biggest benefits they cited were saving time (64.7%) and easier access to information (61.8%), while the smallest proportion of students said that ChatGPT helped them to develop critical thinking (13.7%).

Research Questions. The main objective of this study was to identify potential predictors of students' perceptions of the usefulness of LLMs (such as ChatGPT, Copilot, Gemini and others) as a learning aid. In this context, the following research questions were formulated:

1. Is there a relationship between relevance for academic learning, perceived enjoyment, perceived ease of use, and perceived usefulness of LLMs among university students?
2. Which of these factors are significant predictors of university students' perceived usefulness of LLMs?

Hypotheses. Based on the research questions, the following hypotheses were formulated:

H1: Relevance for academic learning is positively related to students' perceived usefulness of LLMs.

H2: Perceived enjoyment is positively related to students' perceived usefulness of LLMs.

H3: Perceived ease of use is positively related to students' perceived usefulness of LLMs.

Instrument and Procedures. The survey was conducted in September 2024, after the competent authorities of the respective higher education institutions had given their consent to conduct the survey at the integrated Juraj Dobrila University in Pula. It was based on a voluntary and anonymous basis. The online instrument was distributed to participants via a forum in the faculty's e-learning system (used for online and hybrid teaching) and via student groups of the course on Google Chat. The instrument and procedures were described in the previous paper (Babić, 2024, p. 38). In this paper, selected constructs were analyzed based on the TAM (Davis, 1989), TAM2 (Venkatesh & Davis, 2000), TAM3 (Venkatesh & Bala, 2008):

- *Perceived usefulness of LLMs* – indicates the extent to which students believe that using LLMs helps them learn and accomplish academic tasks (adapted from: Davis, 1989).

- *Perceived ease of use* – indicates the extent to which students perceive the use of LLMs as easy and effortless (adapted from: Davis, 1989).
- *Perceived enjoyment* – refers to the experience of satisfaction and enjoyment when using LLMs (adapted from: Venkatesh & Bala, 2008).
- *Relevance for academic learning* – indicates the extent to which students view the use of LLMs as related to their academic goals and tasks (adapted from: Venkatesh & Davis, 2000).

Reliability analysis showed that all scales used in this study had good to excellent internal consistency: relevance for academic learning ($\alpha = 0.942$), usefulness ($\alpha = 0.942$), enjoyment ($\alpha = 0.902$), and ease of use ($\alpha = 0.812$), indicating high reliability of the measurement instruments.

Data Analysis. The collected data was analyzed using JASP and Microsoft Excel. First, descriptive statistics were calculated for all variables. Spearman correlation analysis was used to examine the relationship between relevance to academic learning, perceived enjoyment, perceived ease of use and perceived usefulness. To determine the individual contribution of each factor to perceived usefulness, a multiple regression analysis was conducted using the Enter method, with perceived usefulness as the dependent variable. The statistical significance level was set at $p < 0.05$. To determine whether the experience with LLMs influences the perception of the statements of the selected scales in this study, the difference between users and non-users of LLMs for academic learning was analyzed using the Mann-Whitney U test.

Results of Research

Table 1 shows the distribution of students' responses to the items measuring the perceived usefulness of LLMs (such as ChatGPT, Copilot, Gemini) for academic learning. The mean scores of all items within the construct of perceived usefulness ranged from 3.28 to 3.48, indicating a moderately positive attitude towards the usefulness of LLMs for academic learning.

Table 1
Distribution of respondents' answers (N = 102) to the items measuring the perceived usefulness of LLMs

Scale items	Frequency (%)					M	SD
	1	2	3	4	5		
Improves academic performance	7 (6.9)	18 (17.6)	37 (36.3)	19 (18.6)	21 (20.6)	3.28	1.18
Increases productivity	10 (9.8)	17 (16.7)	26 (25.5)	30 (29.4)	19 (18.6)	3.30	1.23
Improves efficiency in learning	8 (7.8)	12 (11.8)	30 (29.4)	27 (26.5)	25 (24.5)	3.48	1.21
Improves the quality of studies	12 (11.8)	15 (14.7)	24 (23.5)	34 (33.3)	17 (16.7)	3.28	1.25

Note. Responses were given on a 5-point Likert scale (1 = strongly disagree, 5 = strongly agree). M = mean, SD = standard deviation.

S o u r c e: Own work.

The results of the descriptive analysis (Table 1) show that the respondents' opinion that the use of LLMs (such as ChatGPT) "Improves efficiency in learning" had the highest mean (M = 3.48, SD = 1.21), with 51% of the students expressing their agreement with this statement. Similar results were obtained for the statements "increases productivity" (M = 3.30, SD = 1.23) and "improves academic performance" (M = 3.28, SD = 1.18), with 48% of respondents agreeing with this statement. Respondents' opinion that the use of LLMs in learning "improves the quality of studies" had the same mean score (M = 3.28, SD = 1.25), with 50% of students agreeing with the above statement, but with slightly greater variability in answers, indicating more pronounced individual differences in the assessment of the contribution of LLMs to improving the quality of study. The results of the Mann-Whitney test (Appendix Table 1) consistently showed statistically significant differences between LLM users and non-users in their perceptions of the usefulness of LLMs. As shown in Appendix, Table 1, LLM users indicated a significantly higher level of perceived usefulness of LLMs for all items examined. The mean ratings of users were consistently higher (56.28–57.85) compared to the mean ratings of non-users (30.88–35.98). All differences were statistically significant ($p < .01$), with moderate to strong effects ($r = -.398$ to $-.529$). These findings clearly indicate that direct experience of using LLMs leads to a significantly positive perceptions of their usefulness in an academic context.

In order to investigate the perceived relevance for academic learning, the respondents' answers to the three statements listed in Table 2 were analyzed.

Table 2
Distribution of respondents' answers (N=102) to the items measuring the perceived relevance of LLMs for academic learning

Scale items	Frequency (%)					M	SD
	1	2	3	4	5		
Important for academic success	23 (22.5)	28 (27.5)	23 (22.5)	20 (19.6)	8 (7.8)	2.63	1.25
Relevant for educational goals	12 (11.8)	19 (18.6)	35 (34.3)	26 (25.5)	10 (9.8)	3.03	1.15
Important for educational tasks	11 (10.8)	26 (25.5)	30 (29.4)	26 (25.5)	9 (8.8)	2.96	1.14

Note. Responses were given on a 5-point Likert scale (1 = strongly disagree, 5 = strongly agree). M = mean, SD = standard deviation.

Source: Own work.

The results of the descriptive analysis (Table 2) show that the mean values of the students' responses to all statements on the evaluation of the LLMs were predominantly neutral (M = 2.63–3.03) and only about one third of the respondents agreed with the statements (from 27.4% to 35.3%). The lowest level of agreement was with the statement that the use of LLMs is "important for academic success" (27.4%), indicating divided opinions on the value of LLMs for academic learning. The results of the Mann-Whitney test (Appendix, Table 1) consistently showed statistically significant differences between LLM users and non-users in their perceptions of the relevance of LLMs to academic learning. Statistically significant differences were found for all three statements analyzed regarding the evaluation of LLM relevance of LLMs for academic learning. The mean scores of users were significantly higher (54.92–55.46) than those of non-users (38.65–40.38). The differences were significant for the statements on relevance to academic success ($p = .013$), relevance to educational goals ($p = .024$), and relevance to educational tasks ($p = .030$), with medium effects ($r = -.285$ to $-.330$). These results indicate that users of LLMs recognize their educational relevance more clearly.

To investigate the emotional dimension of using LLMs in learning, students' perceptions of their enjoyment of working with them were analyzed (Table 3).

Table 3
Distribution of respondents' answers (N=102) to questions measuring perceived enjoyment of using LLM for academic learning

Scale items	Frequency (%) 1	2	3	4	5	M	SD
Using LLMs for learning is…							
Fun	7 (6.9)	7 (6.9)	40 (39.2)	23 (22.5)	25 (24.5)	3.51	1.14
Pleasant	2 (2.0)	11 (10.8)	31 (30.4)	36 (35.3)	22 (21.6)	3.64	1.00
Very interesting	5 (4.9)	13 (12.7)	29 (28.4)	33 (32.4)	21 (20.6)	3.51	1.11

Note. Responses were given on a 5-point Likert scale (1 = strongly disagree, 5 = strongly agree). M = mean, SD = standard deviation.

Source: Own work.

The results of the descriptive analysis (Table 3) show that the perception of the use of LLMs in learning is predominantly positive in terms of the fun factor. They agreed most with the statement that using LLMs is "fun" (M = 3.64; SD = 1.00), with more than half of the respondents (56.9%) agreeing with this statement.

Similar mean scores were obtained for the statement that using LLMs is "fun" (M = 3.51; SD = 1.14) and "very interesting" (M = 3.51; SD = 1.11), with approximately 48% to 53% of respondents agreeing with this statement (Table 3). These results suggest that students generally find using LLMs an enjoyable and interesting experience. The results of the Mann-Whitney test (Appendix Table 1) consistently showed statistically significant differences between LLM users and non-users in the perception of enjoyment. The data in Appendix, Table 1, show that LLM users reported significantly higher mean scores for enjoyment of working with LLMs compared to non-users. All three statements were statistically significant ($p < .01$). Users found working with LLMs more enjoyable (MR = 57.56 vs. 31.81), more pleasant (MR = 55.94 vs. 37.06) and very interesting (MR = 56.01 vs. 34.00). The largest effect was expected for the statement about fun ($r = -.505$), which further confirms that the use of direct LLMs has a positive effect on perceived fun.

The results of the descriptive analysis (Table 4) show that the majority of students perceive the use of LLMs in learning as easy. The highest mean score was for the item "easy to use" (M = 3.99; SD = 0.87), with 72% of respondents agreeing or strongly agreeing. This was followed by the item "The interaction is clear and understandable" (M = 3.69; SD = 0.99) with 65% positive responses. Lower mean values and a lower proportion of agreement were recorded for the items "easy to achieve the desired result" (M = 3.50; SD = 0.95; 51% agreement) and "requires no mental effort" (M = 3.38; SD = 1.10; 47% agreement). A large proportion of neutral responses (score 3) was also recorded for these items, particularly for "easy to achieve the desired result", suggesting that some students do not have a clear

opinion on this dimension. Although the majority of students expressed a positive attitude towards the ease of use of LLMs, the majority of neutral responses for individual items indicate different experiences and perceptions within the student population.

Table 4
Distribution of respondents' answers (N=102) to questions measuring the perceived ease of use of LLMs for academic learning

Items	Frequency (%)					M	SD
	1	2	3	4	5		
Interaction is clear and understandable	3 (2.9)	10 (9.8)	23 (22.5)	46 (45.1)	20 (19.6)	3.69	0.99
Requires no mental effort	6 (5.9)	14 (13.7)	34 (33.3)	31 (30.4)	17 (16.7)	3.38	1.10
Easy to use	1 (1.0)	3 (2.9)	24 (23.5)	42 (41.2)	32 (31.4)	3.99	0.87
Easy to achieve the desired result	2 (2.0)	12 (11.8)	36 (35.3)	37 (36.3)	15 (14.7)	3.50	0.95

Note. Responses were given on a 5-point Likert scale (1 = strongly disagree, 5 = strongly agree). M = mean, SD = standard deviation.

S o u r c e: Own work.

Regarding the perception of the ease of use of LLMs, the results of the Mann-Whitney U test (Appendix Table 1) showed that the only statistically significant difference was estimated for the statement "The interaction with the LLM is clear and understandable", where users had a higher average rank (55.04) than non-users (40.00), with statistical significance (p =.021) and measured (r = −.295). No statistically significant differences were found for the other statements (on mental effort, ease of use and goal achievement) (p>.05). It is assumed that the groups of respondents perceive the user-friendliness of LLMs similarly, although the users emphasize the clear interaction slightly more.

The results of the Spearman correlation analysis (see Table 5) showed that all three constructs analysed were statistically significantly positively associated with the perception of the usefulness of LLMs. The strongest correlation was found between relevance and perceived usefulness ($\rho = 0.774$; $p < .001$), suggesting that students perceive LLM users as particularly important and applicable to their academic goals. Perceived enjoyment (hedonism) showed a moderately positive relationship with usefulness ($\rho = 0.730$; $p < .001$), while perceived ease of use showed a weaker-moderate but significantly positive relationship ($\rho = 0.384$; $p < .001$) of the selected scales in the research.

Table 5
Results of Spearman's correlation of selected scales in the research (N=102)

Scale	Spearman's ρ	p-value	Interpretation of the strength of association
Relevance for academic learning	0.774	< .001	strong
Perceived enjoyment	0.730	< .001	strong
Perceived ease of use	0.384	< .001	weak to moderate

S o u r c e: Own work.

The results of the regression analysis showed that the group of predictors significantly explained the perceived usefulness of LLMs, $F(3,98) = 83.08$, $p < .001$, with the model explaining 71.8% of the variance. The strongest predictor was relevance ($\beta = .55$, $p < .001$), with perceived enjoyment also contributing significantly ($\beta = .41$, $p < .001$). Perceived ease of use ($\beta = –.02$, $p = .784$) was not significant when the other constructs were included in the model. These results suggest that students perceive LLMs as useful primarily when they perceive them as relevant to their academic needs and when they elicit a sense of enjoyment, whereas ease of use has no independent influence on the presence of other factors.

Table 6
Results of the multiple regression analysis based on the answers of the respondents (N=102)

Scale	B	SE B	β	t	p
Relevance for academic learning	0.578	0.069	0.553	8.424	< .001
Perceived ease of use	-0.026	0.095	-0.018	-0.275	.784
Perceived enjoyment	0.458	0.086	0.408	5.343	< .001

Note. B = unstandardized regression coefficient; SE B = standard error of B; β = standardized regression coefficient; t = t-statistic; p = significance level.

S o u r c e: Own work.

Discussion

This study found that the largest proportion of respondents (94.1%) used LLMs in their daily lives, with most preferring ChatGPT. However, 24% of respondents do not use LLMs for the purpose of academic learning. These findings indicate that the students included in the study have already gained extensive experience with the use of LLMs, which is an important basis for a reliable assessment of their attitudes and perceptions in the educational context. The results of the Spearman

correlation analysis showed that all three variables analysed – relevance, enjoyment and simplicity – are statistically significantly positively associated with the perceived usefulness of LLMs, thus confirming all three hypotheses (H1, H2 and H3) at the association level. These results are consistent with the basic assumptions of the TAM (Davis, 1989) and its extensions (Venkatesh & Davis, 2000; Venkatesh & Bala, 2008), according to which both cognitive (relevance, simplicity) and affective (enjoyment) factors contribute to the formation of attitudes about the usefulness of educational technology. However, the results of the multiple regression analysis showed that only relevance and perceived enjoyment were significant predictors of students' perceived usefulness, while perceived ease of use did not make a statistically significant contribution to the prediction. In other words, although all three variables were related to usefulness, only relevance and enjoyment made a clear contribution to the prediction of usefulness when they were included in the model simultaneously. Hypothesis H3 was thus partially rejected. This result suggests that although students associate ease of use with usefulness, it does not play a crucial role in assessing the educational value of LLMs when other variables are taken into account, probably because it is perceived as an expected feature of modern digital tools. Alshamy et al. (2025) also come to similar conclusions and emphasize that relevance and usefulness are the most important factors for the intention to use LLMs, while ease of use becomes less important as the usage experience increases. Diao et al. (2024) also confirm that perceived usefulness, rather than expected effort, is the strongest predictor of intention to use GenAI tools, while Singh & Paiva (2025) emphasize that the hedonic component of use increases satisfaction and positive attitude, which is consistent with the findings of this study on the importance of perceived enjoyment. The results are partially consistent with the findings of Gong et al. (2025), who showed that perceived simplicity only indirectly influences usefulness via attitudes and previous experiences, while it was not confirmed as a direct predictor in this study. Additional analysis showed that users of LLMs for academic learning had statistically significantly higher scores on all items of the construct of perceived enjoyment than non-users, suggesting that personal experience of use increases the experience of satisfaction and engagement when working with these tools. This finding supports the assumption of the TAM3 model (Venkatesh & Bala, 2008) that the hedonic component of usage promotes the emergence of positive attitude towards technology and may indirectly contribute to its perceived usefulness. It is possible that students in this sample, as digitally literate users, understand the ease of use of LLMs and therefore place greater importance on the extent to which the tool relates to their educational goals and the level of satisfaction and engagement it provides them when using it. This emphasizes that the successful integration of LLMs into the educational process requires that they are aligned with pedagogical goals and that the activities are designed to engage students and are meaningfully connected to the course content (Belkina et al., 2025; Giannakos et al., 2025). Future research should include larger and more

diverse samples, additional constructs and a longitudinal approach to investigate how students' attitudes towards LLMs change over time.

Conclusions

The aim of this study was to investigate the extent to which relevance to academic learning, perceived enjoyment and perceived ease of use contribute to students' perceptions of the usefulness of LLMs in higher education. The results showed that all three variables were significantly positively associated with perceived usefulness, but that only relevance and enjoyment had significant predictive value when considered together in a regression model. This confirmed the importance of cognitive and affective factors in shaping attitudes towards educational technologies, with ease of use being associated with usefulness but not contributing to its prediction when other variables were controlled. The main contribution of this study is that it provides empirical evidence of the factors that shape students' perceptions of the usefulness of LLMs, focusing on the importance of their pedagogical evaluation and their ability to promote enjoyment and engagement in learning. These findings suggest that the integration of LLMs into higher education must be based on the design of activities that are consistent with educational objectives while being motivating for students. The findings can also serve as a basis for developing extended theoretical models of LLM acceptance and as a starting point for future research, which should include additional constructs, larger and more diverse samples, and a longitudinal approach to monitor changes in student' attitudes over time.

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Appendix A.

Results of the Mann-Whitney U-test to compare LLMs users and non-users for the statements of all scales

Table 1

Differences between users and non-users of LLMs in the items of all scales in this study (Mann-Whitney U-test)

Items	The use of LLMs for academic learning				U	p	r (rank-biserial)
	Users (N=78)		Non-Users (N=24)				
	Mean Rank	Mean SD	Mean Rank	Mean SD			
Perceived usefulness of LLMs							
Improves academic performance	56.89	3.51(1.09)	33.98	2.54(1.18)	1.357**	0.00	–.449
Increases productivity	57.85	3.59(1.10)	30.88	2.38(1.21)	1.431**	0.00	–.529
Improves efficiency in learning	57.67	3.74(1.10)	31.44	2.63(1.17)	1.418**	0.00	–.514
Improves the quality of studies	56.28	3.51(1.11)	35.98	2.54(1.38)	1.309*	0.02	–.398
Perceived Ease of use							
Interaction is clear and understandable	55.04	3.83(0.87)	40.00	3.21(1.22)	1.212*	.021	–.295
Requires no mental effort	51.79	3.40(1.06)	50.56	3.33(1.24)	958.5	.857	–.024
Easy to use	53.92	4.08(0.82)	43.63	3.71(1.00)	1.125	.114	–.202
Easy to achieve the desired result	52.35	3.53(0.94)	48.75	3.42(1.02)	1.002	.587	–.071
Relevance for academic learning							
Important for academic success	55.46	2.80(1.22)	38.65	2.08(1.21)	1.245*	.013	–.330
Relevant for educational goals	55.05	3.18(1.07)	39.96	2.08(1.21)	1.213*	.024	–.300
Important for educational tasks	54.92	3.09(1.11)	40.38	2.54(1.18)	1.203*	.030	–.285
Perceived enjoyment							
Using LLMs for learning is…							
Fun	57.56	3.77(0.99)	31.81	2.67(1.20)	1.409**	.000	–.505
Pleasant	55.94	3.80(0.96)	37.06	3.13(0.99)	1.283**	.004	–.370
Very interesting	56.01	3.71(1.06)	34.00	2.87(1.06)	1.288**	.001	–.436

*Note. U – Mann–Whitney U statistic; p – significance level (**p<0.01, *p<0.05); r – rank-biserial correlation (effect size)*

S o u r c e: Own work.

Snježana Babić

Badanie empiryczne nad rolą trafności, przyjemności i łatwości użytkowania w kształtowaniu postrzeganej użyteczności LLM-ów przez studentów szkół wyższych

S t r e s z c z e n i e

Postrzegana użyteczność (PU) jest jednym z najważniejszych czynników akceptacji technologii, ponieważ silnie wpływa zarówno na intencję korzystania, jak i faktyczne wykorzystanie technologii. Ponieważ duże modele językowe (LLM), takie jak ChatGPT, są coraz częściej wykorzystywane w szkolnictwie wyższym, istotne jest zrozumienie, jakie czynniki wpływają na postrzeganie przez studentów użyteczności LLM w uczeniu się akademickim. Na podstawie Modelu Akceptacji Technologii (TAM) niniejsze badanie analizowało rolę relewancji dla uczenia się akademickiego, postrzeganej przyjemności oraz postrzeganej łatwości użycia (PEOU) w kształtowaniu postrzegania przez studentów użyteczności LLM. W badaniu uczestniczyło 102 studentów z uniwersytetu w Chorwacji. Dane przeanalizowano z wykorzystaniem korelacji rang Spearmana oraz analizy regresji wielorakiej. Analiza korelacyjna wykazała, że wszystkie trzy czynniki były istotnie statystycznie dodatnio skorelowane z postrzeganą użytecznością LLM. Jednak analiza regresji wykazała, że tylko relewancja dla uczenia się akademickiego oraz postrzegana przyjemność korzystania z LLM w procesie uczenia się były istotnymi pozytywnymi predyktorami, podczas gdy postrzegana łatwość użycia odgrywała mniejszą rolę. Razem te dwie zmienne wyjaśniły 71,8% wariancji w postrzeganiu przez studentów użyteczności LLM. Wyniki podkreślają znaczenie identyfikacji czynników kształtujących postrzeganie użyteczności LLM, ponieważ są one ważnym predyktorem intencji korzystania z technologii. Uzyskane wyniki sugerują, że istnieje potrzeba opracowania narzędzi opartych na LLM, które będą pedagogicznie relewantne i angażujące dla studentów oraz które mogą stanowić wytyczne dla ich skutecznej integracji w szkolnictwie wyższym.

S ł o w a k l u c z o w e: duże modele językowe (LLM); Model Akceptacji Technologii (TAM); postrzegana użyteczność; trafność dla uczenia się akademickiego; postrzegana przyjemność; szkolnictwo wyższe

Snježana Babić

Estudio empírico sobre el papel de la relevancia, el disfrute y la facilidad de uso en la configuración de la utilidad percibida de los LLM entre estudiantes de educación superior

R e s u m e n

La utilidad percibida (PU) es uno de los factores más importantes en la aceptación de las tecnologías, ya que influye fuertemente tanto en la intención de uso como en el uso real de la tecnología. Dado que los grandes modelos de lenguaje (LLM), como ChatGPT, se utilizan cada vez más en la educación superior, es fundamental comprender qué factores influyen en la percepción que tienen los estudiantes sobre la utilidad de los LLM en el aprendizaje académico. Basándose en el Modelo de Aceptación de la Tecnología (TAM), el presente estudio analizó el papel de la relevancia para el aprendizaje académico, del disfrute percibido y de la facilidad de uso percibida (PEOU) en la confi-

guración de la utilidad percibida de los LLM por parte de los estudiantes. En el estudio participaron 102 estudiantes de una universidad en Croacia. Los datos se analizaron utilizando la correlación de rangos de Spearman y el análisis de regresión múltiple. El análisis de correlación mostró que los tres factores estaban significativamente correlacionados de forma positiva con la utilidad percibida de los LLM. Sin embargo, el análisis de regresión indicó que solo la relevancia para el aprendizaje académico y el disfrute percibido del uso de los LLM en el proceso de aprendizaje eran predictores positivos significativos, mientras que la facilidad de uso percibida desempeñaba un papel menor. En conjunto, estas dos variables explicaron el 71,8 % de la varianza en la utilidad percibida de los LLM por parte de los estudiantes. Los resultados subrayan la importancia de identificar los factores que configuran la percepción de la utilidad de los LLM, dado que constituyen un importante predictor de la intención de uso de la tecnología. Los hallazgos sugieren la necesidad de desarrollar herramientas basadas en LLM que sean pedagógicamente relevantes y motivadoras para los estudiantes y que puedan servir como directrices para su integración eficaz en la educación superior.

P a l a b r a s c l a v e: grandes modelos de lenguaje (LLM); Modelo de Aceptación de la Tecnología (TAM); utilidad percibida; relevancia para el aprendizaje académico; disfrute percibido; educación superior

Снежана Бабич

Эмпирическое исследование роли релевантности, удовольствия и простоты использования в формировании воспринимаемой полезности LLM у студентов высших учебных заведений

А н н о т а ц и я

Воспринимаемая полезность (PU) является одним из важнейших факторов принятия технологий, поскольку она существенно влияет как на намерение пользоваться технологией, так и на её фактическое использование. Поскольку крупные языковые модели (LLM), такие как ChatGPT, всё чаще используются в высшем образовании, важно понять, какие факторы влияют на восприятие студентами полезности LLM в академическом обучении. Опираясь на модель принятия технологии (Technology Acceptance Model, TAM), в данном исследовании анализировалась роль релевантности академическому обучению, воспринимаемого удовольствия и воспринимаемой простоты использования (PEOU) в формировании воспринимаемой полезности LLM у студентов. В исследовании приняли участие 102 студента одного университета в Хорватии. Данные были проанализированы с использованием ранговой корреляции Спирмена и множественного регрессионного анализа. Корреляционный анализ показал, что все три фактора имеют статистически значимую положительную связь с воспринимаемой полезностью LLM. Однако регрессионный анализ продемонстрировал, что лишь релевантность академическому обучению и воспринимаемое удовольствие от использования LLM в процессе обучения являются значимыми положительными предикторами, тогда как воспринимаемая простота использования играет менее значимую роль. В совокупности эти две переменные объяснили 71,8 % дисперсии в воспринимаемой полезности LLM у студентов. Полученные результаты подчёркивают важность выявления факторов, формирующих восприятие полезности LLM, поскольку они являются важным предиктором намерения использовать технологию. Результаты исследования указывают на необходимость разработки основанных на LLM инструментов, которые были бы педагогически релевантными и вовлекающими для

студентов и могли бы служить руководством для их эффективной интеграции в систему высшего образования.

К л ю ч е в ы е с л о в а: крупные языковые модели (LLM); модель принятия технологии (TAM); воспринимаемая полезность; релевантность академическому обучению; воспринимаемое удовольствие; высшее образование