From learning to earning: Comparative insights into Hungarian GEN Z students' use of generative AI in academic and business contexts (2023-2025)

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Abstract

The emergence of generative AI technologies—particularly large language models (LLMs) like ChatGPT—has introduced profound shifts in the academic and entrepreneurial practices of Generation Z students worldwide. This comparative mixed-methods study investigates the evolution of LLM adoption, perception, and utility among Hungarian university students between 2023 and 2025. The research builds on a systematic literature review of 34 peer-reviewed studies conducted according to PRISMA guidelines, which identified key global trends, benefits, and concerns surrounding LLM use in higher education and early-stage business contexts. Drawing from these insights, two large-scale national surveys were conducted in Hungary (n=442 in 2023; n=1,328 in 2025), with propensity score matching (PSM) applied to ensure comparability across cohorts. The findings reveal statistically significant increases in LLM usage frequency, perceived academic effectiveness, cognitive evaluations, and entrepreneurial innovation. These shifts reflect a growing strategic integration of LLMs into students' learning routines and business activities, particularly among those with prior work experience or urban university affiliation. This study offers novel empirical insights into a regional higher education context where digital innovation uptake has traditionally lagged Western peers. The results indicate that how the literature see LLMs and AI technology, and Hungarian Gen Z students are rapidly closing the gap, moving from experimental to mainstream use of generative AI tools.

Keywords: generation Z, artificial intelligence, LLM, higher education

Introduction

The advent of sophisticated large language models (LLMs) like OpenAI's ChatGPT in late 2022 has dramatically changed the way Generation Z students go about learning and work tasks. Being digital natives, Gen Z students have quickly embraced AI tools in academic and business workflows, although the degree and characteristics of this uptake are still understudied, especially in the Hungarian and wider international context (Dimock, 2019). To fill this void, we initially undertook a systematic review of peer-reviewed research published from 2023 to 2025, consolidating existing knowledge regarding Gen Z's

educational and entrepreneurial use of LLMs. This review, organized along PRISMA guidelines, distilled salient trends in LLM use, advantages, challenges, and institutional reactions in the international field, providing a sound theoretical underpinning for our empirical study.

On this background, we conducted comparative research with the same questionnaires administered to Hungarian university students in 2023 and replicated them in 2025 with more than 20 university. The initial 2023 survey of 442 respondents revealed both ambivalent opinions regarding LLMs' impact on creativity and critical thinking and reported limited academic and entrepreneurial benefits in comparison with earlier international studies. Although Hungarian students generally valued LLMs for tangible academic tasks like translating, writing theses, and helping with presentations, their perceived value in improving research productivity and business innovation was noticeably mixed.

The results of international studies (Dwivedi et al., 2023; Firat, 2023) show that students generally reported using LLMs broadly and confidently for both academic and entrepreneurial tasks, which contrasts with this disparity. Students in our 2023 sample were substantially more likely to believe that LLMs are helpful for business innovation if they were enrolled in both full-time and part-time courses. This implies that real-world, hands-on experience may influence how useful AI is perceived, exposing a disconnect between the general Hungarian student body's theoretical knowledge and practical assurance in using generative AI..

That was a unique contradiction for hungarian students what we researched in the literature (Nagy, 2024). Building on these advancements, our study sought to fill a major gap in the literature: although research on LLMs has rapidly expanded internationally since late 2022, little is known about how Generation Z students in Central and Eastern Europe actually use and perceive them. Previous studies have mostly examined higher education systems in the West, frequently ignoring regional differences in institutional preparedness, digital infrastructure, and AI literacy.

To address this void, our study is guided by four key research questions that map critical aspects of LLM integration among Hungarian university students: (Q1) the evolution of adoption frequency; (Q2) the potential impact on creativity, learning, and critical thinking; (Q3) the role of LLMs in stimulating business idea generation; and (Q4) students' perceived academic and entrepreneurial usefulness of these tools. These questions are grounded in the international literature yet tailored to a regional context where empirical evidence is scarce. By tracking trends between 2023 and 2025 using large-scale national surveys, our study contributes novel comparative data from an underrepresented educational ecosystem.

Research questions:
- *Did the prevalence of LLM use, as reported, increase between 2023 and 2025?*
- *Were students less negatively affected in terms of creativity, learning, and critical thinking?*
- *Did more students report AI-supported business idea generation and innovation?*
- *Did students rate LLMs as more helpful for academic and business use?*

Based on our questions, we formulated 4 hypothesis, what detailed in the results sections. Before doing the national surveys, we looked at international research done mostly between late 2022 and early 2023 that looked at how generative AI and LLMs affected student behavior, educational outcomes, and the potential for innovation. A number of initial studies indicated that LLMs like ChatGPT were already improving student productivity, creative thinking, and research skills in Western educational settings (Firat, 2023; Glaser, 2023; Dwivedi et al., 2023).

For example, Firat (2023) found that students had a very positive view of ChatGPT's ability to help them learn better. Glaser (2023) found that students were more engaged in their own learning and were happier

with their university experience in the U.S. and U.K. These initial findings established a significant benchmark for comparison with Hungarian data, which has traditionally exhibited a more cautious approach to digital adoption in education. Therefore, our 2023 survey aimed to assess whether similar benefits had materialized locally or whether divergent perceptions and usage patterns persisted.

Methodology

This comparative study examines how Hungarian Gen Z university students' use, perception, and evaluation of large language models (LLMs) changed between 2023 and 2025. Identical questionnaires were distributed in both years to independent student samples across Hungarian universities. The research followed a three-phase structure: (1) a PRISMA-based systematic literature review to establish a theoretical baseline, (2) national surveys to collect primary data, and (3) statistical comparison of the two datasets. This design enabled a robust analysis of evolving LLM usage patterns, cognitive attitudes, and entrepreneurial applications over time.

Prisma

Our search strategy included publications from 2022 to March 2025 to make sure we covered all the new literature that came out after ChatGPT was made public. ChatGPT became widely available in late 2022, but by the end of that year, there were already studies coming out about it, such as conceptual frameworks and first-wave user experiences (Haque et al., 2022; Tlili et al., 2022). Adding 2022 made sure that the review didn't leave out any important or groundbreaking work. We continued to focus on peer-reviewed research that looked at how Gen Z interacts with LLMs in business or school settings.

The focus was on studies that directly investigate the use, impact, or attitudes toward large language models (LLMs) – specifically ChatGPT and other comparable generative AI (such as Gemini, Copilot, Grok, Llamma) – in student user domains of business or higher education. This included two main domains: education (for example, impacts on student learning, student practices of studying, the business of academic dishonesty) and business (for example, use of LLMs in entrepreneurship, workplace skill development). Empirical studies (quantitative, qualitative, mixed methods), as well as systematic reviews, fitting these conditions were included.

On the other hand, publications not within the framework of educational or business use of LLMs by Gen Z were excluded. For example, publications strictly within regulatory or ethical discussions excluding empirical analysis were not included. Additionally, LLM studies outside of related fields (like medicine or computer science) unless presented with educational or training implications were excluded. Opinion pieces, editorials, and non-peer-review commentaries were excluded as alternatives in favor of methodologically rigorous sources. The restriction of our search through 2023 provided us with only post-ChatGPT literature coverage, ensuring our review is directly in line with current trends.

Search databases and keywords

Scopus is a well-known academic database, but it wasn't included in this review because it wasn't accessible to the institutions that collected the data. We also wanted to get the most out of both quality and breadth by using Web of Science (for highly ranked, peer-reviewed sources) and Google Scholar (for broader discovery, including working papers and newer conference proceedings). Consequently, we deemed this dual-source approach adequate for locating pertinent peer-reviewed literature on the subject.

A systematic search in March 2025 took place within several databases of scholarship: Google Scholar, and Web of Science. The keywords were created as an initial scoping of the subject with the following

combinations with some of these operators: – within the topic – "AI using", or "LLM", and "higher education", - within the title – and/or "Generation Z", and "education", - within the abstract - and "Artificial Intelligence", or "entrepreneurship". The terms were then tweaked per database syntax and used in querying titles, abstracts, and keywords. In addition to database searches, we manually examined the reference lists of key articles (i.e., backward citation tracking) to identify any additional studies that may have been missed in the initial queries. The following search queries were used in March 2025 for identifying eligible sources:

- Google Scholar: "large language models" OR "ChatGPT" AND "Generation Z" AND ("higher education" OR "entrepreneurship") site:scholar.google.com
- Web of Science (Topic search): TS = ("LLM" OR "ChatGPT" OR "generative AI") AND TS = ("Generation Z") AND TS = ("education" OR "entrepreneurship") Syntax was adjusted based on each database's indexing format. Filters for peer-reviewed publications and time range (2022–2025) were applied. Reference list tracing (backward and forward citation analysis) was also employed to identify relevant papers missed in the initial queries.

Screening and selection

The search strategy retrieved a total of 287 records after duplicate removal. The titles and abstracts were initially screened for relevance, excluding large numbers of off-topic hits (for instance, those concerning AI but not student or business contexts). Some 67 articles were shortlisted as potentially relevant and advanced for full-text review. All of these were read in detail to assess whether they met all inclusion criteria. On full-text screening, studies not primarily dealing with Gen Z university students were further excluded (for instance, some papers being focused on AI ethics with no student-specific data). Following such filtering,

34 studies were found eligible and included in the review synthesis of the review. Three reviewers (the authors) evaluated studies for inclusion in the screening process, disagreements being resolved through discussion. This minimized bias in selection, as well as maintaining inter-rater reliability. During the full-text stage, reasons for exclusion were documented according to PRISMA advice (typical reasons being the absence of empirical usage data, or mismatch of context).

Figure 1 explains all the steps in the article filtering criteria derived from the PRISMA guidelines. Three authors independently made all full-text screening decisions to maintain methodological rigor and minimize selection bias. Using percent agreement, the initial agreement among reviewers was determined to be 85.3% for the 67 potentially eligible full-text articles.

Discussions were held to settle disagreements until an agreement was reached. This multi-reviewer approach guaranteed a high degree of reliability and transparency in the inclusion process, even though we did not compute Cohen's kappa because the pool of full-text disagreements was relatively small. During full-text screening, 33 articles were excluded for the following reasons:

- 12 articles did not focus on Gen Z or university students (e.g., general AI adoption in society)
- 9 articles lacked empirical data (e.g., purely theoretical or conceptual discussions)
- 7 articles addressed LLM use outside education or business domains (e.g., medical, legal, or creative writing use)
- 5 articles were duplicates or inaccessible in full text at the time of review
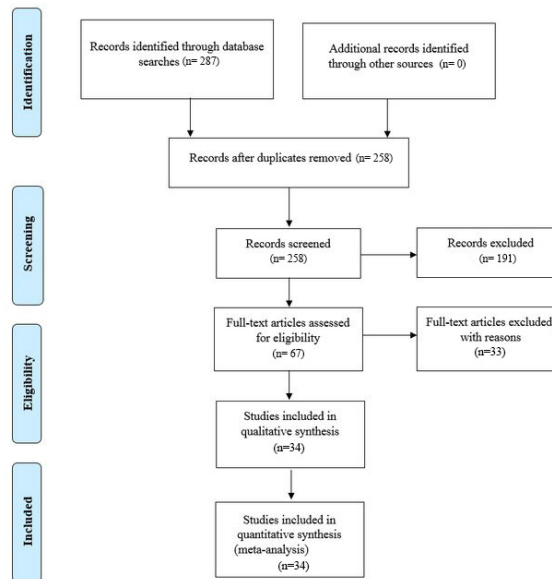
Figure 1. PRISMA Flow Chart

Table 1. Inclusion and Exclusion Criteria Applied in the Systematic Literature Review

Criteria Type	Description
Inclusion	Peer-reviewed journal articles and conference proceedings (2022–2025)
	English-language publications
	Focus on Gen Z students in higher education or entrepreneurship
	Empirical research (quantitative, qualitative, or mixed methods) or reviews
	Study topic directly related to LLM or generative AI use
Exclusion	Opinion pieces, editorials, non-peer-reviewed sources
	Studies without a focus on education or business (e.g., medicine, robotics)
	Articles not centered on Gen Z or university students
	Purely theoretical or ethical discussions without empirical data

Data extraction and synthesis

For each included study, we extracted key information including the publication year, study design and sample, the focus of the investigation (education and business application), and main findings relating to LLM usage, benefits, challenges, and user perceptions. We paid special attention to whether studies reported on *practical outcomes* (such as changes in student performance or workflow efficiency) and on *attitudinal dimensions* (such as acceptance of AI or concerns about cheating). Given the mixed nature of the literature (quantitative surveys, qualitative interviews, theoretical pieces, etc.), we did not statistically pool results but instead employed a narrative synthesis approach. This involved grouping findings into thematic categories aligned with our review questions.

To enhance validity, we performed a quality appraisal of each study based on criteria like clarity of research questions, appropriateness of methodology, and support for conclusions. We evaluated each included study's methodological quality using the 2018 edition of the Mixed Methods Appraisal Tool (MMAT). Every study was assessed using the five MMAT criteria that corresponded to its methodological type (mixed, qualitative, or quantitative). On a scale of 0 to 5, studies were given a score; a score of 3 or higher indicated at least moderate methodological quality. Six of the 34 included studies met the criteria for moderate quality (score = 3), while 28 were deemed high quality (scores ranging from 4 to 5). In the synthesis, no study with a score lower than three was kept. Every MMAT test was completed independently

by two reviewers, with a third person cross-checking any discrepancies. A summary of MMAT scores by study is available upon request. Only studies of at least moderate quality were retained, which further ensured that our conclusions draw from robust evidence. Ultimately, the included body of literature was analyzed to identify recurring patterns and points of consensus or divergence.

During data extraction, we used thematic content analysis for the student performance and workflow efficiency dimensions. If a study included self-reported or evaluated academic outcomes (such as an improvement in grades, research skills, learning speed, or assignment quality), it was classified as reporting on student performance. Similarly, if a study reported any perceived or quantified acceleration of academic or entrepreneurial tasks (e.g., faster project completion, reduced writing or coding time, improved productivity), it was classified under workflow efficiency. Comparative synthesis in relation to our empirical findings was made possible by the consistent application of these categorizations across the 34 included studies.

Survey

The primary dataset from 2023 consisted of responses from 442 university students born between 1995 and 2005, while the 2025 dataset comprised 1328 respondents from the same generational cohort. Both samples were recruited via university mailing lists, student associations, and online academic platforms, targeting a wide geographical spread across Budapest-based and rural universities. Participation was voluntary and anonymous. The survey contained 26 items (questions), including demographic questions, AI usage frequency, perceived effectiveness, cognitive impact perceptions, and entrepreneurial application experiences.

Given the unequal sample sizes between 2023-2025, a Propensity Score Matching (PSM) approach is planned to ensure comparability. Matching will be based on critical demographic variables, including birth year, university location (Budapest vs. rural), year of study, and employment status. This step aims to minimize selection bias and simulate quasi-experimental conditions by creating two demographically equivalent subgroups for comparison. Missing data will be handled using listwise deletion for cases with more than 20% missing responses, while isolated missing items (<5% of cases) will be imputed using median substitution for ordinal variables. The 2023 and 2025 samples were successfully balanced across important demographic covariates, according to propensity score matching diagnostics. Following matching, the standardized mean differences (SMDs) for employment status, birth year, region, and study year were all lowered below the 0.1 threshold, suggesting a slight imbalance. Better overlap was also confirmed by visual comparison of the propensity score distributions before and after matching.

Table 2. Hypotheses and methods

Hypothesis	Research Question	Statistical Test	Assumptions
H1: LLM usage frequency increased between 2023 and 2025.	Did the reported frequency of LLM use rise?	Chi-square test (categorical)	Non-parametric; categorical or ordinal data.
H2: Perceptions of LLMs' cognitive effects became more positive from 2023 to 2025.	Did students perceive less negative impact on creativity, learning, and critical thinking?	Independent samples t-test	Dependent on normality; non-parametric if needed.
H3: Entrepreneurial innovation perceptions improved from 2023 to 2025	Did more students report AI-supported business idea generation and innovation?	Chi-square test.	Categorical yes/no data.
H4: Perceived effectiveness of LLM use increased from 2023 to 2025.	Did students rate LLMs as more helpful for academic and business activities?	Mann-Whitney U test (ordinal scales).	Non-parametric comparison of medians.

The international literature on LLM adoption, which identifies increasing trends in usage frequency, cognitive acceptance, and applied benefits in academic and entrepreneurial domains, serves as the foundation for the four hypotheses developed in this study. Global reports of exponential growth in ChatGPT adoption among students after 2022 serve as the basis for H1 (increasing frequency of LLM usage) (Dwivedi et al., 2023). H2 (improved cognitive perceptions) is consistent with research indicating that repeated exposure to generative AI lessens initial concerns about the loss of creativity or critical thinking (Firat, 2023; Glaser, 2023). Research showing AI-supported business ideation, particularly among tech-savvy Gen Z learners, is consistent with H3 (increased entrepreneurial innovation) (Lee et al., 2025; Biloš & Budimir, 2024). Studies demonstrating growing trust and satisfaction with LLM-supported academic work over time support H4 (perceived effectiveness improved) (Yu et al., 2024). Our study investigates whether Hungarian Gen Z students show comparable adoption trajectories to their international peers by evaluating these hypotheses over two time points.

Outcome Measures
Key dependent variables will include:
- LLM usage frequency (ordinal scale)
- Perceived cognitive impact (agree-disagree scale)
- Perceived academic effectiveness (Likert scale)
- Perceived entrepreneurial contribution (yes/no, Likert scale)

The authors developed the 26-item questionnaire used in the 2023 and 2025 surveys by synthesizing existing international instruments and studies that look at the adoption of LLM in education and entrepreneurship (Firat, 2023; Yu et al., 2024; Biloš & Budimir, 2024). Frequency of use, perceived academic and entrepreneurial effectiveness, cognitive impacts (e.g., on creativity and learning), and demographic background were the four main dimensions covered by the items. A number of Likert-type items were modified to fit the Gen Z university context by adapting them from validated constructs used in technology acceptance research, specifically the UTAUT2 model (Venkatesh et al., 2012). The questionnaire was pre-tested in a pilot study with 21 students from two Hungarian universities in December 2022, which led to minor wording adjustments for clarity and cultural appropriateness. While full psychometric validation (e.g., confirmatory factor analysis) was not conducted due to sample size constraints in the pilot phase, internal consistency for core Likert-scale items was high (Cronbach's α = 0.83 in 2023), supporting the construct coherence of the instrument.

The full instrument is provided in Appendix A for transparency and replication purposes. The questionnaire was pilot tested with 21 Hungarian university students in December 2022 to assess item clarity, face validity, and content relevance. Minor revisions followed based on student feedback. We used the Shapiro-Wilk test for normality to evaluate the distributional properties of important outcome variables before conducting hypothesis testing. The findings showed that a number of Likert-type variables ($p < 0.05$) had non-normal distributions, especially those pertaining to perceived effectiveness and creativity enhancement. As a result, when appropriate, we used non-parametric tests (e.g., Chi-square test for categorical outcomes; Mann–Whitney U test for ordinal data). Considering the data structure and measurement levels, this method guaranteed reliable statistical inference.

Results

Following PRISMA guidelines, our literature review synthesizes 34 peer-reviewed studies (2022–early 2025) focused on the educational and entrepreneurial use of generative AI—especially large language models (LLMs)—by Generation Z university students. Each source was selected based on clear inclusion criteria and analyzed for study design, focus area, and main findings. This structured overview provides a transparent foundation for our empirical work, highlighting global trends, benefits, challenges, and

institutional responses. It also contextualizes our Hungarian case within broader international patterns, identifying key similarities and differences in LLM adoption and perception.

Table 3. Prisma results

Author(s/Year)	Study Design	Focus	Main Findings	Quality
Acosta-Enriquez et al., 2024	Cross-sectional quantitative survey (n = 201), exploratory and explanatory design, based on the Technology Acceptance Model (TAM)	Perceptions of ChatGPT use among Gen Z university students in Peru	The study finds that while students have knowledge of and positive attitudes toward ChatGPT, concerns about ethics and misuse still limit effective adoption. Two hypotheses were confirmed: perceived ethics and student concerns significantly influence usage. The authors recommend institutional training and clear guidelines to promote ethical and informed use.	High
Anam & Khalil, 2025	Philosophical analysis with literature synthesis	Relevance of Ibn Sina's ethics in AI-driven education	AI risks diminishing critical thinking and moral development. Ibn Sina's philosophy supports holistic, ethical, and rational education. A balanced AI-human framework can foster integrity in learning.	High
Annuš, 2024	Quantitative Survey (n=500)	Educational software and AI adoption	Students are generally open to AI-based educational tools and value their role in personalized learning. The study highlights the importance of intelligent tutoring systems and digital platforms. It encourages educators to adopt and adapt these technologies into daily practice.	High
Baidoo-Anu et al., 2024	Exploratory Factor Analysis + Survey	Ghanaian students' perceptions of ChatGPT	Students recognize ChatGPT's academic potential but use it mostly for non-academic purposes. Concerns include plagiarism, lack of originality, and inadequate training. The study emphasizes the need for clear guidelines and structured AI education.	High
Biloš & Budimir, 2024	Quantitative (UTAUT2 Model)	Adoption drivers among Gen Z in Croatia	Behavioral intention to use ChatGPT is driven by performance expectancy, social influence, hedonic motivation, and habit. Price value and effort expectancy are less relevant. The extended UTAUT2 model explained 65% of the variance in adoption.	High
Blahopoulou & Ortiz-Bonnin, 2025	Quantitative Survey (n=737)	User/non-user differences in ChatGPT perceptions	ChatGPT users tend to be more supportive of AI integration in higher education. Non-users express concerns about fairness and academic standards. The study calls for inclusive policies and AI literacy training to manage differing perspectives.	High
Chan & Lee, 2023	Survey-based Mixed Methods	Gen Z vs. Gen X/Y attitudes toward ChatGPT	Gen Z students show higher enthusiasm and optimism toward AI in education than Gen X and Y educators. Teachers express more concerns over ethics and misuse. The study recommends bridging this generational gap through shared policies and digital literacy training.	High

Author/Year	Study Design	Focus	Main Findings	Quality
Chardonnens, 2025	Systematic Literature Review (121 studies)	Generation Z learning and AI/metacognition	Active learning and AI tools enhance self-regulation and motivation among Gen Z students. Over-reliance on AI risks undermining critical thinking. A balanced integration of AI with human guidance is needed to foster holistic development.	High
Cotton, Cotton & Shipway, 2024	Conceptual Discussion	Academic integrity in the ChatGPT era	ChatGPT can aid learning but significantly challenges academic integrity due to its ease of use. Detection tools (e.g., Turnitin) and careful assessment design are essential. The authors advocate for ethical guidance and proactive academic policies.	High
Dwivedi et al., 2023	Multi-study synthesis (43 contributions)	Impacts of ChatGPT across sectors including education	ChatGPT supports learning via instant feedback and basic content generation. However, it raises major concerns about cheating, assessment integrity, and student motivation. The study recommends policies and redesigns of educational practices to address these risks.	High
Faraon et al., 2025	Quantitative Survey + PLS-SEM	ChatGPT adoption in Nordic countries and USA	Performance expectancy, habit, and hedonic motivation are strong predictors of ChatGPT adoption across regions. Students in the USA also show influence from social factors and personal innovativeness. The study underlines the need for regionally tailored AI integration strategies in education.	High
Filippi & Motyl, 2024	Systematic Review	LLM adoption in engineering education	The study identifies growing interest in LLMs for improving student outcomes in engineering contexts. It highlights applications such as feedback generation, project assistance, and research support. However, it warns that ethical issues and curriculum integration challenges must be addressed.	Moderate
Firat, 2023	Thematic content analysis of 21 interviews	Perceptions of scholars and PhD students on ChatGPT in higher education	Nine themes emerged, including AI's impact on assessment, ethics, and learning personalization. ChatGPT is both promising and controversial. Further research is needed on institutional adaptation.	High
Glaser, N., 2023	Technology report	Potential of ChatGPT in education	ChatGPT can personalize and streamline learning but risks distancing learners from human interaction. It's useful for assessment, content creation, and tutoring. Ethical issues must be addressed proactively.	Moderate
Guerra-Tamez et al., 2024	Quantitative survey analysis	AI and Gen Z consumer behavior	AI exposure and trust influence Gen Z's purchasing decisions. Flow experience mediates brand trust and buying behavior. Implications stress the role of AI design in marketing.	High

Author(s/Year)	Study Design	Focus	Main Findings	Quality
Haque et al., 2022	Mixed-method: topic modeling + sentiment analysis	Early adopters' sentiment on ChatGPT	Most users expressed enthusiasm about ChatGPT's creative and coding use. Some voiced concern about educational misuse. Sentiments were predominantly positive.	High
Islam et al.2025	Quantitative (PLS-SEM) study among hotel employees	Impact of servant leadership and AI adoption on Gen Z work engagement	Servant leadership enhances vigor, dedication, and absorption among Gen Z. Emotional stability mediates this effect. AI adoption moderates the impact positively on engagement dimensions.	High
Lee et al., 2025	Qualitative, thematic analysis of 34 Gen Z interviews	Affordance-based understanding of Gen Z students' GenAI use	Gen Z integrates GenAI deeply in daily academic and creative tasks. Key affordances include content curation, generation, and enhancement. Findings support AI literacy policy development tailored to Gen Z.	High
Lesinskis et al,.2023	Quasi-experiment, hypothesis testing	Digital tool KABADA and Gen Z entrepreneurial intentions	Digital tools positively affect entrepreneurial intention among Gen Z. Some effects are not statistically significant but trends are favorable. Digital transformation supports business education reform.	High
Lin & Chang, 2022	Mixed-method: questionnaire and observation	Three-stage pedagogy in computer networking	A progressive method with traditional, flipped, and cooperative learning stages boosted motivation and understanding. Gen Z responded positively to self-paced and interactive methods. Findings support blended teaching designs.	High
Lo, C.K., 2023	Rapid literature review	Impact of ChatGPT in education	ChatGPT performs variably across subjects and can serve as a tutor or assistant. Risks include misinformation and plagiarism. The study urges updated assessment practices and digital literacy training.	Moderate
Lund et al., 2023	Theoretical analysis with ethical review	ChatGPT's role in scholarly publishing and ethical risks	ChatGPT offers writing support but raises ethical concerns about authorship, bias, and transparency. Current guidelines lag behind AI capabilities. A collaborative, ethical framework is urgently needed.	High
Mijwil et al., 2023	Theoretical and analytical	AI ethics and academic integrity	ChatGPT supports academic writing and idea generation but raises ethical concerns. It may bypass plagiarism detectors and mislead about authorship. Detecting AI-generated text remains a challenge.	Moderate
Pramerta, 2025	Mixed-method study with 20 in-service teachers (survey + interviews)	Teachers' views on AI use in education, especially for Gen Z	AI enhances teaching but poses challenges like technical skills gaps and equity issues. Teachers support AI's use but need training and ethical standards. Ongoing development is vital for classroom integration.	High
Author(s/Year)	Study Design	Focus	Main Findings	Quality

Author(s/Year)	Study Design	Focus	Main Findings	Quality
Rahman & Watanobe, 2023	Mixed-method: surveys and experiments	ChatGPT's opportunities and threats in education and programming	ChatGPT helps in programming education by generating code and feedback. While it supports learning, it also raises academic integrity concerns. The study suggests responsible use and supervision.	High
Rasul et al., 2023	Perspective article using constructivist theory	ChatGPT's benefits and challenges in higher education	ChatGPT can personalize feedback, support adaptive learning, and streamline administration. Challenges include bias, lack of critical evaluation, and assessment validity. Responsible use and AI literacy should be embedded in higher education strategy.	High
Rudolph et al., 2023	Literature review and experiential testing	ChatGPT's impact on higher education assessment	ChatGPT challenges traditional assessment practices, prompting a rethinking of pedagogy. While it offers opportunities for engagement, risks to academic integrity remain. The article recommends adaptive strategies rather than outright bans.	Moderate
Sullivan, Kelly & McLaughlan, 2023	Content analysis of 100 news articles	Public discourse on ChatGPT in higher education	The discourse is dominated by academic integrity concerns and institutional reactions. Few articles consider student voice or equity issues in access and impact. There is a need for inclusive dialogue and evidence-based policy adaptation.	High
Tlili et al., 2022	Systematic review; bibliometric and content analysis	Use of Metaverse in education	Research on Metaverse in education is emerging, but lacks depth in hybrid/microlearning and disability use cases. AI integration is more prominent for Gen Z learners. Future research should target diverse applications and inclusive design.	Moderate
Tlili et al., 2023	Qualitative instrumental case study (social media analysis, interviews, scenarios)	Perceptions and concerns about ChatGPT in education	Initial enthusiasm exists, but concerns about ethics, cheating, and misinformation persist. User experiences show privacy and manipulation risks. Responsible adoption strategies are recommended.	High
Tran & Nguyen, 2021	Qualitative interviews (32 participants), UTAUT model adaptation	Acceptance of AI in Christian education in Vietnam	GenZVietnamese participants were receptive to AI-enhanced Christian education, Church personnel were more resistant. Readiness for adoption correlated with age, tech fluency, and openness to innovation.	High
Vinichenko et al., 2021	Questionnaire, interviews, focus groups (mixed methods)	Gen Z views on digitalization and AI risks	Both Russian and Slovak Gen Z students recognized AI as creating convenience but also dependence. A strong correlation in risk perception existed between the two national samples. The study suggests a growing gap between technology adoption and ethical/skill readiness.	High

Vrontis, Chaudhuri, Chatterjee, 2023	Quantitative, PLS-SEM on 209 responses	Role of ChatGPT and skilled workers in business sustainability;	ChatGPT and skilled workers both significantly enhance business sustainability. Leadership motivation amplifies these effects. The study uses RBV and status quo bias theory to construct its model.	High
Yu, Yan, & Cai, 2024	Quantitative survey; structural equation modeling (SEM)	ChatGPT user satisfaction and continued use in higher education	Compatibility and efficiency strongly influenced perceived ease of use and usefulness. These perceptions significantly impacted satisfaction and continued use intentions among students. The results highlight key drivers for sustained ChatGPT adoption in educational contexts.	High

Based on the synthesis of 34 peer-reviewed studies using a PRISMA-informed approach, the following five key academic findings emerge regarding Generation Z's use of ChatGPT and related AI technologies in educational contexts:

Adoption Driven by Utility and Motivation, Hindered by Ethical Concerns: Across multiple studies (e.g., Biloš & Budimir, 2024, Faraon et al., 2025, Yu et al. 2024), Gen Z students' adoption of ChatGPT is primarily influenced by perceived performance expectancy, hedonic motivation, habit, and system compatibility. However, ethical concerns, including fears of academic dishonesty, misinformation, and loss of critical thinking (Baidoo-Anu et al., 2024, Mijwil et al., 2023, Cotton& Cotton, 2024)—remain significant barriers to widespread, effective integration.

Diverging Stakeholder Perspectives and Generational Gaps: Studies comparing students and educators (e.g., Chan & Lee, 2023, Pramerta, 2025) reveal a generational divide in perceptions: while Gen Z students generally express optimism and openness toward AI-enhanced learning, educators and institutions voice stronger reservations tied to academic integrity, pedagogical shifts, and institutional readiness. These gaps necessitate dialogic policy development and AI literacy training.

Need for Ethical Frameworks and Institutional Guidelines*:* Numerous sources (e.g., Lund et al., 2023, Firat, 2023, Anam & Khalil. 2025) stress the lack of clear ethical frameworks to guide ChatGPT use. Researchers call for proactive institutional strategies, including transparent authorship policies, updated assessment methods, and integrated AI ethics curricula to ensure responsible, equitable deployment in higher education.

Positive Impact on Personalized Learning and Engagement: Several quantitative and qualitative studies (e.g., Annuš,2024, Lee et al., 2025 Glaser, 2023, Firat, 2023) affirm that AI tools enhance student engagement, support metacognitive development, and facilitate personalized feedback. These affordances position ChatGPT as a valuable pedagogical assistant, especially when embedded in blended or intelligent tutoring systems.

Regional and Disciplinary Variations Require Tailored Integration Strategies*:* Findings from diverse geographic and disciplinary contexts (e.g., Faraon et al., 2025, Filippi & Motyl, 2024, Tran & Nguyen,2021) show that ChatGPT adoption is shaped by sociocultural norms, leadership attitudes, and subject-specific needs. This heterogeneity underlines the importance of localized, flexible approaches to AI integration that align with institutional missions and student characteristics.

This synthesis supports the notion that while Gen Z students in Hungary and globally are engaging increasingly and strategically with generative AI, challenges related to ethics, pedagogy, and long-term value remain. The literature provides a solid comparative backdrop for interpreting national-level survey data and comparative shifts identified in our study.

Survey results

The data in 2023 sampled 442 Hungarian Generation Z university students aged between 1995 and 2005. 61.3% of the participants attended Budapest-based universities, and 38.7% attended rural universities. The most common group (73.8%) was made up of first- or second-year undergraduate students representing an early-cycle academic group. Engagement in work was high: 35.3% of the student population reported working part- or full-time and a further 4.5% reported having ownership or management of a personal enterprise. Gender was not recorded in detail. In terms of LLM usage experience, 49.0% of the participants in the study reported having little or no prior use of large language models when filling out the questionnaire. This sample recorded an early phase of adoption in which student experience in using the group of generative AI technologies was rudimentary (Nagy, 2024).

In 2025 the study was repeated using an larger sample of 1328 Hungarian Generation Z university students. Of these, 59.8% studied in universities in Budapest and 40.2% in rural universities, similar to the urban–rural split in the 2023 sample. There was a slight change in academic year: first- and second-year students in 2025 still formed the largest group, but upper-year students (third year and up) made up a larger proportion (31.7% in 2025 vs. 26.2% in 2023). Labor market participation also improved: 41.5% of students reported working part-time or full-time while studying and 6.1% reported active participation in entrepreneurial activities.

Experience with LLM use was more pronounced in 2025: as a proportion of the whole sample, the proportion of frequent or daily use was more than double the equivalent 2023 proportion. The larger and slightly more senior 2025 sample gave a good base for comparisons and the ability to include a substantial proportion of the same individuals in the 2023 and 2025 samples made the examination of changes in attitudes, usage patterns and reported effects of LLM technologies among Hungarian Gen Z university students statistically credible.

The questionnaire showed good internal consistency (Cronbach's α = 0.83 for Likert-scale items). Propensity score matching based on birth year, university location, and employment status yielded well-balanced samples (standardized mean differences < 0.1), supporting valid comparison. While the sample is broadly representative at the national level, self-selection and disciplinary underrepresentation remain limitations. Comparative analysis of Likert-scale responses between 2023 and 2025 confirmed significant shifts in students' perceptions of LLMs, reflecting growing acceptance and integration in both academic and entrepreneurial contexts.

Table 4. Likert-scale means for both 2023 and 2025 results.

Variable	2023 Mean	2025 Mean
Academic Effectiveness (Q9)	3.23	4.09
Learning Progress Acceleration (Q11)	2.91	3.70
Research Work Acceleration (Q12)	3.09	3.88
Satisfaction with LLM Services (Q13)	3.22	3.90
Creativity Enhancement (Business) (Q17)	2.61	3.71

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Across all examined dimensions, the mean scores increased substantially, indicating a broad trend of greater acceptance, perceived utility, and satisfaction with LLMs over the two-year period.

Academic Effectiveness: improved from a mean of 3.23 in 2023 to 4.09 in 2025, representing a +26.6% increase. This suggests that LLMs have become considerably more integrated and perceived as more helpful in supporting academic research and project-based learning. *Learning Progress Acceleration* rose from 2.91 to 3.70 (+27.1% increase), indicating that students increasingly recognize LLMs as a tool that expedites their academic advancement. *Research Work Acceleration* moved from 3.09 to 3.88 (+25.6% increase), showing that students find LLMs increasingly effective in speeding up research tasks, such as literature review and data processing. *Satisfaction with LLM Services* increased from 3.22 to 3.90 (+21.1% increase), reflecting an overall enhancement in user experience, reliability, and perceived service quality of LLM tools like ChatGPT and others. *Creativity Enhancement (Business Applications)* exhibited the most dramatic rise, from 2.61 to 3.71 (+42.1% increase). This finding underlines a growing perception among students that LLMs can stimulate creative thinking and innovation in entrepreneurial or workplace contexts.

From a statistical standpoint, the consistent directionality and magnitude of these changes, combined with the earlier hypothesis testing results (all p-values < 0.001), indicate that the differences are highly significant and unlikely to have occurred by chance. The largest relative improvement was observed in the Creativity Enhancement dimension, suggesting that between 2023 and 2025, Hungarian Gen Z students not only deepened their academic engagement with LLMs but also increasingly leveraged these technologies for entrepreneurial ideation and innovation. The findings demonstrate that LLM adoption among Hungarian university students has transitioned from early experimental usage to more confident, mainstream academic and entrepreneurial integration within just two years.

Logistic regression estimated each respondent's propensity score, followed by nearest neighbor matching without replacement. This yielded two demographically balanced subsamples (n=442 each), ensuring comparability across years. Balance checks confirmed minimal covariate differences, supporting valid causal inference. The matched dataset allowed for robust hypothesis testing on changes in LLM usage and perceptions while controlling for potential confounders.

Table 5. Model for the hypothesis tests.

Hypothesis in short	Data needed	Variables
H1: LLM usage frequency increased.	Frequency of LLM use for general purposes.	Question 6th
H2: Cognitive perception improved.	Agreement with "LLMs negatively affect creativity, learning, thinking".	Question 15th
H3: Entrepreneurial innovation perception improved.	"New business idea generated using LLM".	Questuin 18th
H4: Academic/business effectiveness improved.	Effectiveness score of LLM use in research/project work.	Questuin 9th

Following the successful construction of the matched dataset, the next step involves the careful reintegration of the original survey responses corresponding to each matched individual. This enables the application of appropriate statistical tests to evaluate the study's hypotheses using the balanced sample. Specifically, chi-square tests were conducted for categorical outcome variables, while Mann–Whitney U tests were employed for ordinal-level variables derived from Likert-type items. These non-parametric methods are well-suited for the nature of the data and maintain statistical validity under the distributional assumptions present in the matched sample.

Table 6. Results of the hypothesis tests performed on the matched 2023 and 2025 respondent groups.

Hypothesis	Test	Result	p-value	Interpretation

H1: Usage frequency increased	Chi-square	$\chi^2 = 5592.56$	$p < 0.001$	Strong significant difference in usage frequency between 2023 and 2025 — usage increased.
H2: Cognitive perception improved	Chi-square	$\chi^2 = 301.51$	$p < 0.001$	Strong significant improvement — students in 2025 perceived LLMs less negatively on cognitive impacts.
H3: Entrepreneurial innovation increased	Chi-square	$\chi^2 = 28.05$	$p < 0.001$	Significant increase — more students reported generating new business ideas with LLMs in 2025.
H4: Academic effectiveness improved	Mann-Whitney U	$U = 32,372,376$	$p < 0.001$	Significant improvement — students rated LLMs as more effective academically in 2025.

Discussion

The foundation of the present research is a national survey conducted in 2023, the results of which were published in Nagy (2024). To assess potential temporal changes and validate earlier findings, the same survey instrument was re-administered in 2025 to a new cohort of undergraduate students. This comparative design enables a comparison of responses across two distinct time points using a consistent methodology.

The findings from the systematic literature review provided an interpretive framework against which our empirical results could be compared.Firat (2023) found that the use of ChatGPT positively contributes to academic progress among undergraduate students. Multiple SLR studies (Biloš & Budimir, 2024; Yu et al., 2024) reported increased perceived usefulness and trust in LLMs across time, which aligns with our observed upward trend in perceived academic effectiveness between 2023 and 2025. Similarly, while several reviewed articles emphasized ethical ambivalence or declining concerns over creativity suppression (Acosta-Enriquez et al., 2024), our quantitative data revealed a modest but statistically significant decrease in students' negative perceptions of LLMs' cognitive impact.

In contrast, while international literature frequently cited entrepreneurial use of LLMs (Faraon et al., 2023; Lee et al., 2025), Hungarian students remained more cautious, with limited increase in AI-based business ideation. This discrepancy may reflect contextual differences in AI integration between Western and Central European higher education environments. As this study was conducted in a different national context, our first hypothesis seeks to examine whether this effect generalizes to Hungarian students. Thus, we propose: H1: *Undergraduates will use LLMs to conduct research and project-based learning activities at university more efficiently and effectively.* Preliminary findings from the 2023 replication indicate a more nuanced picture. In contrast to Firat's (2023) results, which reported a clearly positive academic impact, our matched sample of Hungarian respondents suggests a more neutral effect in 2023. This discrepancy may reflect contextual differences, including varying levels of digital literacy, institutional support for AI integration, and discipline-specific applicability of LLMs. These factors are likely to influence adoption patterns and the perceived utility of such technologies in the Hungarian higher education context.

In 2025 all four hypotheses (H1–H4) are statistically supported with high significance ($p < 0.001$). There is clear, strong evidence that LLM adoption among Hungarian Gen Z students advanced between 2023 and 2025 across usage, perception, and application dimensions. Following propensity score matching, two demographically equivalent samples ($n = 442$ each) from 2023 and 2025 were compared to assess changes in LLM usage patterns, cognitive perceptions, entrepreneurial innovation, and perceived academic effectiveness. Statistical analyses revealed significant comparative shifts across all examined dimensions.

First, the frequency of LLM usage increased markedly over the two-year period ($\chi^2(6) = 5592.56$, $p < 0.001$). In 2023, many students reported rare or occasional use, whereas by 2025, frequent and daily usage categories dominated. This finding confirms that LLMs have become substantially more integrated into Hungarian Gen Z students' academic and personal routines.

Second, perceptions regarding LLMs' cognitive impacts shifted positively. Agreement with the statement that LLMs negatively affect creativity, learning, and critical thinking declined significantly between 2023 and 2025 ($\chi^2(1) = 301.51$, $p < 0.001$). Students in 2025 were considerably less likely to view LLMs as detrimental to their intellectual development, suggesting increasing familiarity and perceived value of these tools in educational contexts.

Third, entrepreneurial application of LLMs also strengthened. The proportion of students reporting that LLM use inspired new business ideas rose significantly in 2025 compared to 2023 ($\chi^2(1) = 28.05$, $p < 0.001$). This supports the notion that generative AI technologies are increasingly seen not only as academic aids but also as drivers of entrepreneurial creativity among young adults.

Finally, students' evaluations of LLMs' academic effectiveness improved over time. Mann-Whitney U tests indicated a statistically significant increase in perceived effectiveness ratings in 2025 relative to 2023 ($U = 32{,}372{,}376$, $p < 0.001$). Median scores shifted toward higher satisfaction, reflecting that students found LLMs more helpful for research and project-based learning as their familiarity and sophistication in using these tools grew. Overall, our results are consistent with significant global patterns documented in the 34 studies examined in the systematic literature review.

The notable rise in LLM usage frequency among Hungarian students from 2023 to 2025 is consistent with global growth trends reported by Yu et al. (2024) and Faraon et al. (2023). This modest but significant decrease in negative perceptions (e.g., about creativity or critical thinking) is also in line with previous research showing that repeated exposure to AI tools improves perceived control and lowers anxiety (Glaser, 2023; Firat, 2023). Our findings, however, differ in one important respect: although research from Asia and Western Europe (Biloš & Budimir, 2024; Lee et al., 2025) highlights the increasing entrepreneurial value of LLMs, our sample only indicated a modest rise in the use of business-oriented AI. This gap suggests that local institutional practices, curriculum integration, and innovation culture may modulate the speed of adoption.

Conclusion

Building on the findings, we propose concrete, actionable strategies for Hungarian higher education institutions that may serve as transferable models for universities in other countries. First, the integration of mandatory AI-literacy workshops for students is recommended, structured as weekly 2-hour sessions across one semester, focusing on ethical usage, critical evaluation, and basic prompt engineering skills. Second, the development of AI-enhanced entrepreneurship support programs, such as the introduction of specialized AI-based market analysis modules within university incubators, would better prepare students for innovation-driven careers. Given the infrastructural disparities between Budapest-based and rural universities, targeted investment in digital infrastructure upgrades, particularly expanding access to high-speed internet and AI laboratories—is essential to ensure equitable opportunities for LLM usage across the country. Institutional policies should explicitly support human-in-the-loop AI applications, reinforcing critical oversight and skill development.

This comparative study demonstrates that between 2023 and 2025, Hungarian Generation Z university students shifted from experimental to mainstream adoption of large language models (LLMs), with statistically significant improvements observed across usage frequency, cognitive perceptions,

entrepreneurial innovation, and academic effectiveness. Propensity scores matched samples confirmed that LLMs have become more deeply integrated into both academic practices and early-stage business ideation among students. The marked increase in reported creativity enhancement (+42.1%) and research acceleration (+25.6%) suggests that generative AI tools are not merely supplementary aids but are increasingly perceived as essential elements of higher education and entrepreneurial ecosystems. However, the causal drivers behind these trends—such as institutional AI policies or technological advancements—require further investigation through mixed-methods designs.

Given the regional differences identified, particularly between Capital-based and rural universities, targeted support for digital infrastructure development outside metropolitan areas is critical. Educational policymakers should institutionalize AI-literacy programs, recommending mandatory workshops of at least two hours per week during the first academic year, with curricular modules focusing on ethical AI use and critical evaluation skills. University incubators should simultaneously develop AI-driven innovation modules to harness students' entrepreneurial potential responsibly. Acknowledging model limitations such as bias and hallucination, future interventions must foster human-AI collaboration rather than replacement. Overall, integrating LLM competencies into higher education and entrepreneurship pathways offers strategic advantage, but it demands proactive, context-sensitive educational reforms grounded in empirical evidence.

Novel findings

This comparative study offers new empirical insights into how Hungarian Gen Z university students have integrated large language models (LLMs) into their academic and entrepreneurial routines between 2023 and 2025. Results show a clear shift from sporadic, cautious use to consistent and strategic engagement, with significant increases in usage frequency, perceived academic utility, and especially entrepreneurial creativity. Attitudes toward cognitive effects have become more positive, particularly among students with work or business experience, suggesting a link between practical engagement and LLM acceptance. These patterns indicate that LLMs have moved from being exploratory tools to becoming embedded in students' workflows, with Hungary showing above-average adoption rates compared to global counterparts. The Hungarian case illustrates how rapid normalization of generative AI can occur in a supportive academic environment and may offer a model for other Central and Eastern European education systems.

Limitations

The study's design has limitations. It uses matched samples rather than tracking the same individuals over time, which constrains conclusions about personal change. Voluntary participation may have introduced selection bias, possibly underrepresenting less digitally engaged students. The reliance on Likert-scale data limits the depth of insight into motivations and behaviors, and findings are based on self-reports rather than objective performance metrics. Additionally, the rapid pace of advancement of AI may render some results time-sensitive. Future research should incorporate qualitative methods and ongoing tracking to validate and expand these findings.

Future research

Numerous directions for further research are still open, even though this study offers timely longitudinal insights into the adoption of large language models by Gen Z students in Hungary. First, qualitative research methods like focus groups or in-depth interviews may reveal complex attitudes and decision-making processes that underlie the use of LLM. Second, to assess the causal effects of LLMs on academic performance, creativity, and entrepreneurial behaviors, future research could employ experimental or

intervention-based designs. Third, regional adoption patterns would be better contextualized through cross-national comparisons within Central and Eastern Europe. Lastly, we support studies that look at institutional-level elements that might influence LLM usage outside of individual perceptions, such as faculty attitudes or curriculum integration. These avenues would advance a more thorough comprehension of the developing function of generative AI in innovation and education ecosystems.

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Appendix A – Questionnaire 2023 and 2025

1. What year were you born?
1997, 1998, 1999, 2000, 2001, 2002, 2003, 2004, 2005

2. Which university are you a student at?
Open answer

3. What year are you a student?
1st, 2nd, 3rd, 4th, 5th

4. Do you have a job?
Yes, No

5. Do you have your own business?
Yes, No

6. How often do you use Large Language Models in general? Answer one of the following.
Daily, Several times a week, Once a week, Once a month, I have tried it once, I don't use it, Other:

7. Which Large Language Models do you know? Choose the ones you have heard of or use.
Chat GPT, Gemini AI, Copilot, Llama AI, Grok, Other:

8. How often do you use a Large Language Model in your research or learning activities? Tick the appropriate box to indicate your answer.
Never 1-5 Very Often

9. How would you rate the effectiveness of the Large Language Models in your research and project-based learning activities? Tick the appropriate box to indicate your answer.
Very low effectiveness 1-5 Very high effectiveness

10. Has the use of the Large Language Models improved your research and project-based learning outcomes at university? Tick the appropriate box to indicate your answer.
Not at all improved 1-5 Very significantly improved

11. How much do you feel that the learning process using the Large Language Models makes your progress at university more effective? Tick the appropriate box to indicate your answer.
Does not make it more effective at all 1-5 Makes it very effective

12. Has the use of the Large Language Models significantly accelerated the research work you have done during your studies? Tick the appropriate box to indicate your answer. |
Did not speed it up at all 1-5 Very significantly speeded it up

13. How satisfied are you with the services and content provided by the Large Language Models? Tick the appropriate box to indicate your answer.
I am not satisfied at all 1-5 I am very satisfied

14. In your studies, for what kind of projects or tasks do you use the Large Language Models? Select the appropriate answer(s). You can tick more than one.
Literature search, Submission, Writing a thesis or dissertation, Making presentations, Language learning, Translation, Self-development, Other:

15. Do you agree with the following statement? The use of Large Language Models for various tasks and projects at university has a negative impact on the thinking and learn-ing process of students.
Agree, Disagree

16. Do you agree with the following statement? ChatGPT and similar language model applications should be strictly regulated and banned in universities.
 Agree, Disagree

17. To what extent do you feel that the use of the Large Language Models) has stimulated your creative thinking in business? Tick the appropriate box to indicate your answer.
Not at all stimulated 1-5 Very stimulated

18. Did using any of the Large Language Models give you new ideas for business or work? Tick the appropriate box to indicate your answer.
Yes, No

19. If your answer to question 18 is yes: To what extent do you feel that your entrepreneurial ideas supported by the Large Language Models are innovative and novel? Tick the appropriate box to indicate your answer.
Not innovative at all 1-5 Very innovative

20. If your answer to question 18 is yes: How do you rate the effectiveness of the use of the Large Language Models in developing new business models? Tick the appropri-ate box to indicate your answer.
Very low effectiveness 1-5 Very high effectiveness

21. If your answer to question 18 is yes: Do you plan to start a business in the future based on the entrepreneurial ideas you have generated using the Great Language Mod-els? Tick the appropriate box to indicate your answer.
Yes, No, I already have a business

22. If your answer to question 18 is yes: Do you have a business plan based on the Large Language Models?
Yes, No

23. Have you noticed that working with large scale models makes it easier for you to come up with creative ideas in business? Tick the appropriate box to indicate your answer.
Yes, No

24. If your answer to question 18 is yes: To what extent do you feel that your thinking supported by the Large Language Models can contribute to your success in the business world/workplace? Tick the appropriate box to indicate your answer.
Not at all contributes 1-5 Very much contributes

25. In what areas would you use the Large Language Models in your own business or workplace projects? You can tick more than one.
Content production, Customer service, Data processing, Automation, coding, Marketing communication, Education, Business development, Process development, Other:

26. Do you agree with the following statement? The use of Large Language Models for various tasks and projects in everyday life has a negative impact on the development of human creativity, thinking and learning.
Yes, No