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IDIMT-2024
Changes to ICT, Management, and Business Processes through AI

32nd Interdisciplinary Information Management Talks

With pride we present the proceedings of the 32nd annual IDIMT Conference.

Artificial Intelligence continues to make impressive advances and almost every month a new system is presented. But does this translate into a proportionate use in business – and as a second step, business advantages? In this conference we investigate various aspects of new developments to ICT itself as well as its use for management and business processes and their transformation. Ethical and security aspects as well as specific application areas (teaching, autonomous vehicles, supply chain management, social media) are touched too, to obtain an encompassing view of the topic.

We have chosen the following 11 topics for 2024:

- AI Support for Crisis Management (Neubauer, Rainer)
- Cyber Security (Sonntag)
- AI in Virtual Collaboration, Teaching & Learning (Jantos)
- Autonomous Vehicles and Smart Environments (Schoitsch)
- ICT Systems and Business (Doucek, Maryska)
- Digital transformation and digital business models (Pucihar)
- Social Media and the Role of AI (Pavlíček)
- Data and AI in Supply Chain Management (Delina, Tkáč)
- Academic Business Co-operation (Pitner)
- Ethical Integrity of Research in AI (Lisnik)
- Special session: Early Career & Student Showcase (Sonntag)

Based on a double-blind two-step review process we have selected 54 of the submitted papers with a totality of more than 126 co-authors. The program ran in two parallel streams.

The authors come from 11 different countries: Armenia, Austria, Czech Republic, Estonia, Germany, Greece, Netherlands, Poland, Slovakia, Slovenia and Spain.

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DIFFERENCES IN AI UTILIZATION BETWEEN STUDENTS AND TEACHERS IN HIGHER EDUCATION INSTITUTION: AN EMPIRICAL STUDY

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AI Utilization; Higher Education; Students; Teachers; References

Abstract

This study investigates the utilization of Artificial Intelligence (AI) within the context of higher education, focusing on the divergent patterns of AI adoption among students and teachers at Matej Bel University. Employing a questionnaire as the primary research method, the objectives were twofold: to ascertain the extent of AI usage among the university's students and teachers and to examine the scope of AI references within academic materials. The findings reveal significant differences in AI utilization between students and teachers. This empirical study contributes to the burgeoning discourse on AI ethics in higher education, emphasizing the need for a comprehensive understanding of AI's role in shaping teaching methodologies and learning experiences. Empirical research was carried out on a sample of teachers at Matej Bel University and on a sample of students at the Faculty of Economics. The representativeness of the sample was verified by the chi-square test. The research confirmed greater use of AI by students, but on the contrary, a more ethical approach by teachers.

1. Introduction

Studies in the Literature review underscore the multifaceted nature of AI ethics, spanning from theoretical frameworks to practical applications, and highlight the critical need for ongoing dialogue, research, and policy development to navigate the ethical complexities of AI technologies. The literature review focuses on the burgeoning field of artificial intelligence (AI) ethics, highlighting various dimensions of the discourse from bibliometric analyses to specific challenges in education, healthcare, and broader societal impacts. This review synthesizes the findings from recent research, offering a comprehensive overview of the current state of AI ethics. In the rapidly evolving domain of artificial intelligence (AI), ethical considerations have become increasingly significant. This literature review synthesizes research findings that span various facets of AI ethics, including ethical frameworks, the dual use of generative AI, the ethical management of human-AI interactions, and the privacy and ethical implications in specific sectors like healthcare and digital transformation.

2. Literature review

Graf & Bernardi (2023) embark on a discussion about the balance between ethics, transparency, and advancement within the context of ChatGPT's use in research. This study underlines the intricate balance required to foster innovation while adhering to ethical standards. Slota et al. (2023) explore the dynamics of AI ethics work, emphasizing the role of personal values and professional commitments. Through interviews with stakeholders in AI research, law, and policy, they advocate for incentivizing ethical considerations in AI development and application. Franzke (2022) delves into AI ethics guidelines through a qualitative lens, analyzing 70 documents to understand the promoted values and the translation of ethical concepts into practice. This exploration reveals a tendency towards utilitarian values and a call for greater reflexivity in ethical guidelines. Grinbaum & Adomaitis (2024) discuss the dual-use concerns of generative AI and large language models, suggesting the application of the Dual Use Research of Concern framework to improve governance and societal awareness of generative AI's impact. Lyons et al. (2023) propose a shift from attributing ethics to AI itself towards ensuring the ethical use of AI, highlighting key research areas such as education, transparency, human-centered design, and ethical monitoring. Zhang et al. (2021) offer a bibliometric analysis to map the ethical and privacy concerns in AI, identifying leading contributors and evolving themes, thereby bridging AI techniques with ethical considerations. Majerník et al. (2023) and Lysá et al. (2019) bring selected aspects of quality methods applicable in ethical attitudes in higher education institutions.

Hauer (2020) challenges the division of AI ethics into the creation of ethical standards and the autonomous ethical behavior of AI, critiquing philosophical approaches that hinder the development of morally capable machines. Saurabh et al. (2022) present a framework for AI-led ethical digital transformation, emphasizing the integration of ethics into digital transformation processes and the identification of ethical pillars for guiding this integration. Heyder et al. (2023) review the ethical management of human-AI interaction from a socio-technical perspective, proposing a framework that reconciles duty and virtue ethics in the management of AI systems. Klenk (2024) addresses the manipulation risks of generative AI, advocating for a design-oriented research agenda that encompasses conceptual, empirical, and design considerations to mitigate these risks. Miao (2019) investigates human rights ethics within AI research, proposing management and supervision at every stage of AI's lifecycle to ensure its beneficial impact on humanity. Vakkuri et al. (2021) introduce ECCOLA, a method for implementing ethically aligned AI systems, developed through cyclical action research and collaboration with both researchers and practitioners. Tamburrini (2022) explores the ethical implications of AI's carbon footprint and the distribution of responsibilities among involved actors, suggesting nudging interventions to promote climate-aware AI research. Morley et al. (2020) review publicly available AI ethics tools, methods, and research, aiming to bridge the gap between ethical principles and practical applications in AI development. Mirbabaie et al. (2022) critique the unstructured discourse on AI ethics within information systems research, applying a citation-based technique to identify and analyze fundamental manuscripts in AI ethics. Maouche (2019) discusses the opportunities, risks, and ethical challenges associated with Google AI, highlighting the controversies and ethical debates surrounding emerging technologies and their governance.

Gao et al. (2024) provide a bibliometric analysis tracing the evolution of AI ethics research over two decades, identifying a tripartite progression from initial concepts to the development of human-centric AI systems. They highlight key issues in AI ethics, such as transparency, privacy, and the challenge of superintelligence, while also pointing out research gaps in the large ethics model and AI identification. Complementing this, Chuang, Chang, Chen, Selvamani, and Shia (2022) conduct a worldwide bibliometric analysis, underscoring the global interest in AI ethics and pinpointing the

regions and researchers most active in this field. Their work illustrates certain countries' significant contributions and the discourse's evolution over seventy years. The role of explainable AI (XAI) in fostering ethical AI practices is examined by Vainio-Pekka et al. (2023), who stress the lack of a common framework and conceptual clarity within AI ethics and XAI research. They argue for systematic mapping to identify research gaps and empirical studies to advance the field. Bouhouita-Guermech, Gogognon, and Belisle-Pipon (2023) delve into the specific challenges AI poses to research ethics, highlighting issues such as responsibility and transparency. Their scoping review reveals that research ethics boards (REBs) lack the necessary knowledge and tools to evaluate AI research ethically. Hagendorff (2020) critiques the proliferation of AI ethics guidelines, analyzing their overlaps and omissions. His evaluation seeks to bridge the gap between ethical principles and their implementation in AI research. Hallamaa and Kalliokoski (2022) propose enhancing AI ethics by adopting methodologies from fields like systems theory and safety research, arguing that current ethical codes have limited influence due to their abstract nature. The importance of integrating AI ethics into medical education is emphasized by Weidener and Fischer (2024), who propose a principle-based approach to prepare medical professionals for the ethical challenges posed by AI in healthcare. Choi, Yang, and Goo (2024) explore the effects of an AI ethics education program on middle school students, demonstrating significant improvements in ethical awareness and attitudes toward AI. This study underscores the value of early education in AI ethics. This literature review reveals a diverse and evolving field of AI ethics research characterized by a blend of bibliometric analyses, thematic studies, and educational initiatives. The works of Gao et al. (2024), Vainio-Pekka et al. (2023), Bouhouita-Guermech et al. (2023), and others collectively underscore the critical need for systematic frameworks, empirical research, and education in navigating the ethical challenges posed by AI. As AI technologies continue to permeate various aspects of human life, the discourse on AI ethics remains crucial for guiding ethical AI development and implementation. The research was carried out in January and February 2024.

3. Research methodology

This research aims to explore the extent and nature of Artificial Intelligence (AI) utilization among students and teachers at Matej Bel University in Banská Bystrica. Through the examination of research objectives and hypotheses, the study aims to shed light on the dynamics of AI utilization in higher education, particularly focusing on the differences between student and teacher engagements with AI technologies and the ethical dimensions of AI integration into academic practices. Research.

3.1. Research objectives and variables

The first objective seeks to understand the scope of AI usage among the student and teacher populations within the university, examining how these two groups incorporate AI into their academic and educational practices.

The second objective investigates the extent to which AI-generated content is referred to in academic materials by students and teachers, aiming to identify patterns and norms in the citation of AI-produced texts. To guide the inquiry, the study posits two hypotheses.

Hypothesis 1 (H1) suggests that students significantly more utilize AI for writing and creating their academic works compared to their teachers, reflecting a generational or technological gap in the adoption of AI tools for academic purposes.

Hypothesis 2 (H2) proposes that teachers exhibit a more ethical attitude towards the utilization of AI, particularly in how they refer to or cite text generated by AI in their academic materials, indicating a

higher level of awareness or concern for ethical considerations in AI usage within educational settings. Research variables are:

1. %TU: percentage of teachers using AI to generate texts out of all teachers in the sample;
2. %TR: percentage of teachers who mention AI in the references out of all teachers;
3. %SU: percentage of students using AI to generate texts out of all students;
4. %SR: percentage of students who mention AI in the references out of all students;
5. %NET: percentage of teachers who do not cite AI of teachers who use AI;
6. %NES: percentage of students who do not cite AI of students who use AI.

3.2. Research sample representativeness

We calculated the representativeness of the sample using Pearson´s chi-squared test ($\chi 2$ – test. It tests a null hypothesis, stating that the frequency distribution of certain events observed in a sample (ni) is consistent with a particular theoretical distribution (npi) at the level of statistical significance (α) for appropriate degrees of freedom (k-1), where k is the number of fitted parameters. The frequencies observed, and the expected, (theoretical) frequencies due to teachers` position, are shown in Table 1. Representativeness of the sample due to study degree is shown in Table 2.

Table 1. $\chi 2$ - test due to teachers` position.

Teachers` position	np_i		n_i		$(n_i-np_i)^2$	$(n_i-np_i)^2/np_i$
	No.	%	No.	%		
Professor	58	11.37	9	10.47	0.82	0.072
Associate Professor	128	25.10	21	24.42	0.46	0.018
Assistant (PhD.)	294	57.65	51	59.30	2.74	0.048
Assistant	2	0.39	0	0.00	0.15	0.392
Lector	11	2.16	2	2.33	0.03	0.013
Researcher	17	3.33	3	3.49	0.02	0.007
Σ	**510**	100.00	**86**	100.00		**0.551**

Source: (author)

Matej Bel University in Banská has 510 teachers and the research sample consisted of 86 teachers. The questionnaire was anonymous. The $\chi 2$ value we achieved is lower than the critical $\chi 2$ value at the level of statistical significance $\alpha = 0.05$ for 5 degrees of freedom (6 - 1), which in particular presents the value of 1.14 (value in statistical tables). Since $0.551 < 1.14$, we accept the null hypothesis and we state that the sample file of teachers represents their theoretical distribution.

Table 2. $\chi 2$ - test due to study degree (Faculty of Economics)

The study degree	np_i		n_i		$(n_i-np_i)^2$	$(n_i-np_i)^2/np_i$
	No.	%	No.	%		
Bachelor's degree – full-time students	720	54.26	58	48.33	35.10	0.65
Bachelor's degree – part-time students	112	8.44	14	11.67	10.41	1.23
Master's degree – full-time students	406	30.60	36	30.00	0.35	0.01
Master's degree – part-time students	89	6.71	12	10.00	10.84	1.62
Σ	**1327**	100.00	**120**	100.00		**3.51**

Source: (author)

Faculty of Economics of Matej Bel University in Banská has 1327 students (Academic Year 2023/2024; except for mobility students) and the research sample consisted of 120 students. The questionnaire was anonymous. The χ^2 value we achieved is lower than the critical χ^2 value at the level of statistical significance $\alpha = 0.05$ for 3 degrees of freedom (4 - 1), which in particular presents the value of 7.815 (value in statistical tables). Since $3.51 < 7.815$, we accept the null hypothesis and we state that the sample file of students at the Faculty of Economics represents their theoretical distribution.

3.3. Research results

Hypothesis 1 (H1) suggested that students significantly more utilize AI for writing and creating their academic works compared to their teachers. As Figure 1. shows, 69.77% of the teachers in the sample reported using AI to generate texts, denoted as %TU. In contrast, a higher percentage of students, 93.33%, indicated utilizing AI for text generation, represented as %SU. These findings highlight a significant difference in the adoption rates of AI for text generation between the two groups, with students showing a notably higher propensity towards using AI technologies for this purpose. We accept hypothesis H1.

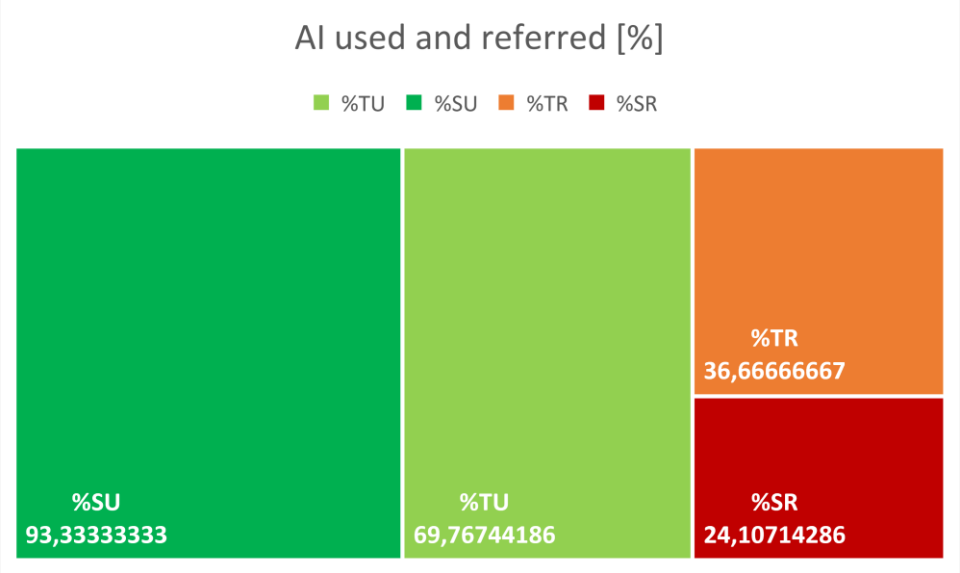

Figure 1. The scope of AI utilization and citation Source: (author)

Hypothesis 2 (H2) proposed that teachers exhibit a more ethical attitude towards the utilization of AI. The results indicate a discrepancy in the citation practices of AI-generated content between teachers and students at Matej Bel University. Specifically, 36.67% of teachers who utilize AI for generating texts acknowledge this by mentioning AI in their references. In contrast, a lower proportion, 24.11%, of students who use AI for text generation do the same. This difference of 12.56% suggests that teachers demonstrate a higher tendency towards ethical practices in AI utilization by more frequently acknowledging the use of AI in their academic outputs. This finding supports the hypothesis that teachers possess a more ethical attitude towards the use of AI, particularly in the correct citation of AI-generated texts. We also accept hypothesis H2.

4. Discussion

The research findings reveal a notable disparity in the citation practices concerning AI-generated content among teachers and students at Matej Bel University. This significant difference underscores a more conscientious approach among teachers regarding the ethical considerations of AI usage in academic publications. The data suggests that teachers exhibit a higher degree of ethical responsibility in their scholarly outputs compared to students, reinforcing the observation that teachers are more ethical in their publication practices than students. Based on the research findings regarding the utilization and citation practices of AI-generated content among teachers and students at Matej Bel University (MBU), several recommendations are proposed to enhance AI ethics in academic settings:

1. Implementing comprehensive training programs for both students and teachers that cover the ethical implications of using AI in academic work. These programs should focus on the importance of transparency and integrity, emphasizing the necessity of citing AI-generated content to maintain academic honesty.
2. MBU should develop and disseminate clear guidelines on how to ethically use and cite AI-generated content in academic works.
3. Guarantors of study programs should integrate AI ethics into existing syllabus to ensure all students and faculty understand the ethical considerations of using AI technologies.
4. Supporting interdisciplinary studies that explore the benefits and challenges of AI use in academic settings, promoting a culture of ethical AI utilization.

By adopting these recommendations, MBU can lead the way in fostering an ethical approach to AI utilization in academic settings, ensuring that all members of the academic community are equipped to use AI technologies responsibly and transparently.

5. Conclusion

The study conducted at Matej Bel University (MBU) in Banská Bystrica aimed to illuminate the dynamics of Artificial Intelligence (AI) utilization within higher education, specifically examining differences in AI use and citation practices between students and teachers. Through a detailed methodology incorporating anonymous questionnaires and statistical analysis, the research assessed the extent of AI-generated content usage and its acknowledgment in academic works. *The findings confirmed both proposed hypotheses: students are significantly more inclined to use AI for text generation, while teachers demonstrate a more ethical approach in citing AI-generated content*. The disparity in AI citation practices revealed through the research underscores a greater ethical consideration among teachers in their scholarly endeavors. A considerable percentage of students, however, neglect to acknowledge AI contributions in their academic outputs, highlighting a critical area for ethical education and policy development at MBU. Given these insights, the conclusion of the paper emphasizes the imperative for MBU to pioneer in fostering ethical AI usage within academic settings. Recommendations include the implementation of comprehensive training programs on AI ethics, the establishment of clear guidelines for ethically using and citing AI-generated content, the integration of AI ethics into curricula, and the encouragement of interdisciplinary research on AI's academic implications. By embracing these strategies, MBU can enhance the ethical standards of AI utilization among its community, ensuring transparency, integrity, and academic honesty in the burgeoning era of AI-driven education.

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