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Artificial Intelligence in Economic Education: Adoption, Uses and Student Perceptions in Higher Education

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Abstract:

Purpose: *The aim of this article is to identify ways in which economics students use artificial intelligence tools and to assess their perception of AI as a tool supporting the learning process and academic teaching.*
Design/Methodology/Approach: *A quantitative CAWI survey was conducted in June 2024 among economics students at the John Paul II University in Biala Podlaska. A population of N=100 was invited to participate; n=50 responses were obtained (RR=50%), which justifies the pilot nature of the study. The questionnaire included a personal data section, a module on the use of AI, and a module on the perception of AI (Likert scales). The analysis was performed in Statistica 13, using descriptive statistics, Pearson's correlation and t-tests (including Welch's variant) at α=0.05.*
Findings: *All respondents (100%) declared that they used AI tools; 44% used them daily, and 94% at least several times a month. The most popular tool was ChatGPT (94%), followed by Grammarly (66%) and DeepL (56%). AI was mainly used for writing term papers (88%), explaining issues from the curriculum (84%) and preparing presentations (78%). Most students did not report any difficulties in using AI (90%). A strong positive correlation was confirmed between the frequency of AI use and its effectiveness in learning ($r=0.90$; $p<0.001$). Students who had completed AI courses/training used AI significantly more often than others ($t=4.00$; $p<0.001$; $d\approx0.88$). No significant differences were found in the assessment of AI potential between first and second cycle studies ($t\approx-1.90$; $p=0.064$).*
Practical Implications: *The results indicate a very high acceptance of AI among economics students and justify the implementation of teaching solutions including (1) course modules on AI competencies (including prompt quality and critical evaluation of results), (2) training to improve staff competence in the educational use of AI, (3) formal guidelines on the ethical and transparent use of AI in coursework, and (4) institutional support in accessing tools (e.g. licences/educational versions) to reduce the risk of technological inequality.*
Originality/Value: *The article provides empirical, pilot evidence on the intensity of AI use and perceptions of its usefulness in economics education, combining a description of usage patterns with verification of hypotheses about determinants (AI training) and relationships between usage and effectiveness ratings. The added value lies in embedding the results in the*

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realities of the field of economics and indicating implications for the design of study programmes and the organisation of teaching in higher education.

Keywords: *Artificial intelligence, higher education, economic education, student perceptions, AI adoption, digital competencies.*

JEL Classification: *A22, I23, O33.*

Paper type: *Research article.*

1. Introduction

Intellectual capital, which at the beginning of the 21st century became a fundamental factor in growth and a source of wealth for nations and individuals (Thieme, 2009), is now supported by modern technologies. Contemporary education increasingly uses artificial intelligence (AI), whose potential enables the transformation of the teaching process towards more effective, personalised and innovative teaching (Kowalski and Tomaszewska, 2024).

Higher education institutions, as key institutions shaping the competences of future specialists, face the challenge of adapting to the new technological reality (Berezka, 2011). In the context of the dynamic development of artificial intelligence tools in recent years (Nguyen *et al.,* 2024), it is particularly important to understand how the younger generation, including economics students, perceive and use AI tools in the educational process.

In the context of economics, AI can significantly influence the way students acquire knowledge and develop their skills. Understanding how students use AI in their educational process is crucial for the appropriate design of curricula and for preparing them for the challenges of the modern labour market (Ramirez *et al*., 2024).

The aim of this study is to determine how students of the Faculty of Economic Sciences at the John Paul II University in Biała Podlaska use AI tools and how they perceive these technologies. Economics students, both at the bachelor's and master's levels, participate in classes that may be directly related to AI applications (e.g., IT support for business, statistics, econometric modelling, logistics, e-business, e-commerce, information systems, etc.).

Three research hypotheses were adopted as part of the study to achieve the objective of the work. These hypotheses are as follows:

H1: There is a positive correlation between the frequency of use of AI tools and students' assessment of their effectiveness in learning.
H2: Students who have participated in AI courses or training use AI tools more often than students who have not participated in such courses.
H3: There are no significant differences in the perception of the potential of AI in improving the teaching process between first- and second-cycle students.

The rest of the article presents the theoretical context for the application of artificial intelligence in academic teaching, with particular emphasis on economic education, and outlines the key benefits and risks associated with its widespread use. Next, the methodology of the pilot study and the results of empirical analyses verifying the formulated hypotheses are presented.

The article concludes with a discussion of the results in the light of the literature on the subject, implications for teaching practice in higher education, and an indication of limitations and directions for further research.

2. The Role of Artificial Intelligence in the Transformation of Education

The role of artificial intelligence in the transformation of education is indisputable. The personalised teaching that it enables, along with automated assessment and access to advanced tools that support the teaching process, is a key component in the modern educational landscape. Contemporary technologies and readily accessible dedicated solutions have been shown to facilitate both the acquisition of knowledge among students and the adaptation of teaching methods to the individual needs of students by teachers (Okan, 2024).

AI has also been demonstrated to support the development of independence among students (Baltezarević and Baltezarević, 2024). It is evident that contemporary tools such as ChatGPT, Grammarly and DeepL Translator have the capacity to facilitate the rapid correction of language errors, translation of teaching materials and generation of academic texts. An intriguing study was conducted at the Białystok University of Technology, exploring the utilisation of artificial intelligence in the educational process by students.

Amongst the 170 respondents, a mere 2.9% had never used artificial intelligence for academic purposes, with the vast majority using it at least once a week. In the course of the discussion, reference was made to a number of tools, including ChatGPT, Beautiful (a software application that facilitates the creation of slides using artificial intelligence) and intelligent translators.

However, over 55% of respondents indicated that teachers do not encourage them to use AI-based tools in the learning process. The primary objective of incorporating AI-based tools within educational settings is to enhance accessibility to educational resources, whilst concomitantly augmenting the efficacy of learning processes and

facilitating a more profound comprehension of complex concepts and issues. Furthermore, a significant proportion of respondents, amounting to 58.2%, reported that the utilisation of AI-based applications led to a reduction in their stress levels (Nieścior *et al*., 2024).

Research conducted by Chalmers University of Technology in Sweden indicates that students there perceive chatbots as a source of knowledge and inspiration, often describing them as tutors, teachers, mentors or even equal partners in learning (Malmström *et al*., 2023).

The considerations presented by Fazlagić (2022) and summarised in the PARP report (2023) confirm that artificial intelligence can act as a tutor, supporting students in learning basic concepts. However, these tools are not yet capable of supporting the development of higher-order skills such as creativity. An important aspect is its potential to create a safe space for students, where they can learn through trial and error, avoiding negative emotions such as fear of social judgement.

Traditional teaching methods are often limited to averaging students' needs, which is not conducive to individual development. AI enables the personalisation of content, the intensification of tasks in areas requiring improvement, and the development of the talents of above-average students. Thanks to such solutions, the education process becomes more effective.

Artificial intelligence can analyse data on student progress and provide reliable feedback. Thanks to algorithms based on the analysis of large data sets, these tools allow for objective assessment of achievements, eliminating the subjective errors typical of human evaluation. AI has the potential to relieve teachers of administrative tasks such as assessing students, checking attendance and managing parent relations. Automating these processes allows teachers to focus on teaching, which can improve their motivation and reduce the risk of burnout (PARP, 2023).

AI algorithms can support the management of the education system at various levels, from evaluating teachers' work to analysing large data sets on students and schools. This makes it possible to optimise resources, predict trends and make decisions based on reliable data.

As indicated in the report, AI can facilitate the teaching process at the individual, group and systemic levels, eliminating the barriers of the traditional teaching approach. In particular, a systemic solution to the issue of artificial intelligence, e.g., in the form of training in the use of and critical approach to AI, seems to be urgent, as universities are a significant source of knowledge about new technologies for students (Romaniuk and Łukasiewicz-Wieleba, 2024).

Another example of AI support in education are data analysis systems that enable students, e.g., of economics, to perform advanced market analyses. These tools,

based on machine learning, allow for the processing of large data sets and the generation of economic forecasts, which supports the development of practical analytical skills (Franczyk and Rajchel, 2024). AI can also streamline the process of preparing coursework and projects by offering quick translations, text formatting and language correction, which is particularly useful in an international environment (Wędzińska, 2023).

In 2023, Stanford University conducted research on the use of artificial intelligence in education. The study involved over 1,000 students from 20 schools in the United States. These students used an adaptive learning system called Adaptive Learning Environment (ALE), which tailored content and tasks to their individual needs based on their previous achievements.

The results of the study showed that students using ALE achieved better educational results compared to students who did not have access to this system. The average exam results in the group using ALE were 10% higher than in the control group. In addition, the study participants indicated that learning with ALE was more engaging and interesting compared to traditional teaching methods (Stanford University, 2023).

The implementation of artificial intelligence-based technologies in higher education, including economics programmes, presents both opportunities and challenges. These opportunities include the development of modern forms of teaching, assessment and management, which were succinctly characterised in the previous subsection.

However, the integration of AI in education faces numerous obstacles. One of the biggest challenges is the lack of technological competence among academic staff. Many teachers do not have sufficient skills to effectively integrate AI tools with traditional teaching methods. This problem is particularly relevant in economics, where the use of tools such as predictive models and simulation systems requires advanced technological knowledge (Kuruliszwili, 2021).

Another challenge is the ethical and social issues associated with the use of AI. The automation of the teaching process can lead to reduced contact between teachers and students and increase the risk of dependence on technology.

Excessive use of AI carries the risk of limiting critical thinking and creativity among students, which is a significant problem in the context of their comprehensive development (Zdancewicz and Tadejko, 2024). In the context of economics, where data analysis and interpretation of results are crucial, such limitations can have serious consequences.

From an organisational perspective, it is essential to provide adequate technological infrastructure and training for both teaching staff and students. Universities that invest in the development of digital competences and the integration of AI into their

curricula will have a competitive advantage in the education market (Romaniuk and Łukasiewicz-Wieleba, op.cit.).

Another significant challenge related to the implementation of AI in education is inequality in access to technology. Universities with limited financial resources are often unable to provide adequate infrastructure, which hinders the implementation of advanced technological tools. This can lead to an 'educational digital divide' between universities with different levels of funding. At the same time, students from less affluent backgrounds may not have their own devices or stable internet access, which limits their ability to use AI tools in their studies (Blazic, 2022).

Another aspect that requires attention is the adaptation of teaching content to the specific nature of AI tools. Traditional curricula often fail to take into account the potential of new technologies, such as adaptive systems or educational chatbots. As a result, teaching content may be unsuitable for working with AI, which limits the effectiveness of these tools (Crompton and Burke, 2023).

It is therefore necessary to reformulate curricula in such a way that they take into account both the potential of technology and the needs of today's students, especially in fields such as economics, where the ability to work with data and analytical technologies is crucial.

The integration of artificial intelligence into economics education requires simultaneously addressing numerous challenges and exploiting potential opportunities. With appropriate training of teaching staff, thoughtful curriculum design and consideration of ethical aspects, AI can become an invaluable support in the transformation of higher education.

3. Research Methodology

The aim of the research was to determine how economics students use artificial intelligence tools in the educational process and how they perceive these technologies. To this end, a survey was conducted to collect detailed data from a selected group of respondents.

The study covered economics students at the Faculty of Economic Sciences of the John Paul II University in Biala Podlaska. The decision to limit the sample to this group was due to the subject matter of the study, which focuses on economic education and the applications of artificial intelligence in this area. Economics students, as representatives of a field closely related to data analysis, digital technologies and innovation in the social sciences, are a suitable group for achieving the research objective.

This sample selection ensured data consistency while enabling precise analysis of the results. The exclusion of students from other fields of study was a conscious

decision, dictated by the need to limit the variability of results resulting from differences in curricula or teaching profiles.

The survey was conducted in June 2024. It was carried out in the CAWI (computer-assisted web interview) format, with the questionnaire made available online. A unique link was used to prevent multiple responses. The survey was anonymous and participation was voluntary.

The entire population (N=100) was invited to participate. The survey was completed by n=50 students (RR=50%). Due to the fact that only half of those invited responded, there is a significant risk of non-response bias. For this reason, this study should be treated as a pilot study and the results obtained as preliminary.

The survey questionnaire was designed to obtain detailed information on both the use of artificial intelligence tools and their perception as a tool supporting the educational process. The survey consisted of three sections:

- Respondent characteristics included questions to collect basic demographic data such as gender, level of study, year of study, and previous participation in courses on artificial intelligence. This data was intended to identify the characteristics of the study group and enable a comparative analysis between different categories of respondents.
- Use of artificial intelligence by students, which included questions about the identification of AI tools used, the frequency and purposes of their use, as well as difficulties encountered in using AI.
- Perception of artificial intelligence as an educational tool, where respondents presented their feelings about the usefulness of AI tools in the teaching process, assessed the potential of AI in improving the teaching process, and expressed their opinion on the legitimacy of formally incorporating AI tools as an integral part of compulsory teaching activities.

The questionnaire contained closed and scaled questions (Likert scale), which enabled quantitative analysis of the results. The collected data were entered into a spreadsheet and subjected to detailed statistical analysis using Statistica 13 software. The analysis used descriptive statistical methods, such as calculating means, standard deviations and frequency distributions, which allowed for an accurate characterisation of the sample and basic variables.

Inferential statistical methods were used to verify the research hypotheses. Pearson's correlation analysis was performed to determine the strength and direction of the relationship between the frequency of AI tool use and the assessment of their effectiveness in learning. In addition, Student's t-test for independent samples was used to compare the mean values between two independent groups:

- The average frequency of AI use was compared between students participating and not participating in AI courses.
- The assessments of the potential of AI to improve the teaching process were compared between first- and second-cycle students.

In all statistical tests, a significance level of $\alpha = 0.05$ was adopted. The results of the analyses allowed for the verification of research hypotheses and the formulation of conclusions regarding the use and perception of artificial intelligence tools by economics students.

4. Students' Use and Perception of Artificial Intelligence

The research group consisted of 50 economics students from the Faculty of Economic Sciences at the Academy of Bialsk. Among them, 30 people, or 60% of all respondents, were women, while 20 people, or 40%, were men. This distribution indicates a predominance of women in the sample, which reflects the overall demographic structure of students in this field.

In the group of students surveyed, 18 people, or 36% of respondents, had previously participated in courses or training related to artificial intelligence. On the other hand, 32 people, or 64% of those surveyed, had no previous educational experience in this field. This distribution indicates that the majority of students have not yet had the opportunity to acquire knowledge or skills related to AI through organised forms of education.

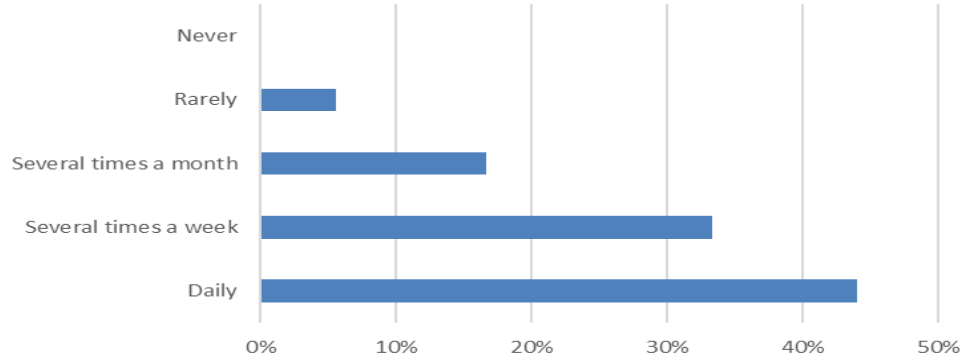
It is important to note that 100% of respondents declared that they use AI tools, which confirms that this is a common phenomenon among economics students at the John Paul II University in 2024. This indicates a strong interest in and integration of AI into the educational process.

It should be emphasised that due to the pilot nature of the study and the limited sample size (n=50), the results presented are preliminary. They only provide an insight into the phenomenon under study and therefore require careful interpretation and should not be overly generalised beyond the context of the population studied.

Students were asked to specify the frequency of their use of AI tools during their studies. The respondents' answers are presented in Figure 1.

As many as 94% of students use AI tools at least several times a month, and 44% of students declare that they use AI on a daily basis. None of the respondents did not use AI tools, which indicates the important role these tools play in the educational process. Such widespread use of AI may result from the relatively easy availability of tools and their usefulness in learning. Students had the opportunity to indicate the AI tools they use. Table 1 presents the most popular tools.

Figure 1. *Frequency of AI usage*



Source: *Own elaboration based on survey results.*

Table 1. *The popularity of AI tools among economics students*

Tool	ChatGPT	Grammarly	DeepL	Brainly	CapCut	Julius	Bielik
Number of users	47	33	28	22	19	11	11

Source: *Own elaboration based on survey results.*

The data analysis indicates that ChatGPT is the most popular, used by as many as 47 people, which accounts for 94% of all respondents. Julius and Bielik are the least popular of the tools surveyed, each used by 11 people, which accounts for 22% of all respondents. The low share of these tools may be due to their less universal nature or limited awareness among students.

Based on these results, it can be concluded that economics students are most likely to use AI tools that support writing, translation and natural language processing. The percentage differences in the popularity of individual tools highlight the diversity of educational needs among students.

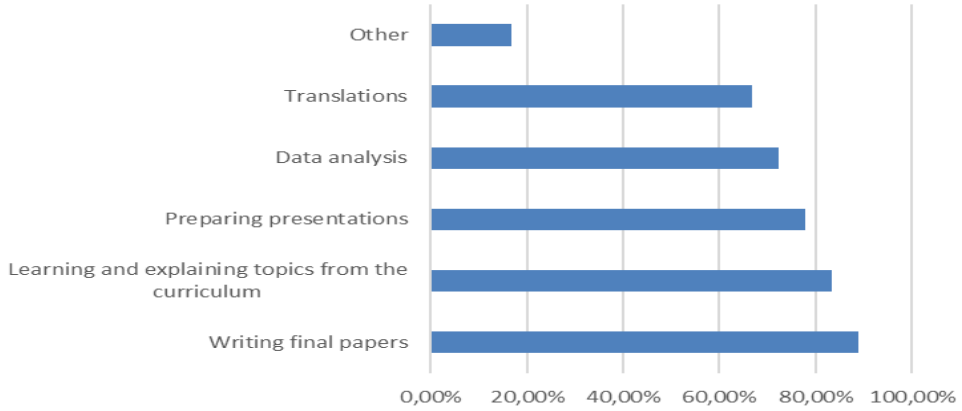
Students indicated various situations in which they use AI tools, and the distribution of these indications is presented in Figure 2.

The analysis of students' responses shows that the most common situation in which students use AI tools is when writing term papers – 44 respondents (88%). In second place was learning and explaining topics from the curriculum, which was declared by 42 students, or 84% of respondents. Preparing presentations was the third most common situation in which AI tools were used – 39 people indicated this, which corresponds to 78% of all respondents.

The results show that economics students most often use AI tools in tasks related to content creation (e.g. final papers, presentations) and in the learning process. The lower number of responses for translation and data analysis may be due to the more

specialised nature of these tasks. Students also answered the question: 'When using AI tools, do you encounter difficulties in their use?' Table 2 presents the distribution of responses.

Figure 2. *Situations for using AI tools*



Source: *Own elaboration based on survey results.*

Table 2. *Difficulties in using AI tools*

Difficulty	Number of students	Percentage (n=50)
I do not encounter any difficulties	45	90%
Problems with formulating queries (prompts)	2	4%
Incorrect or imprecise results	2	4%
No access to advanced features	1	2%

Source: *Own elaboration based on survey results.*

The data analysis shows that the vast majority of respondents, as many as 45 people (88%), declared that they had no difficulty using AI tools. This indicates the overall ease of use of these technologies and the high level of intuitiveness of the tools available to students. These results suggest that AI tools are perceived by most students as easy to use, with only a few difficulties arising from more advanced aspects of their use, such as prompting or access to specialised functions.

Students assessed the extent to which the use of AI improves their learning efficiency. The data shows that the vast majority of students have a positive opinion of the impact of AI tools on their learning efficiency. As many as 39 people (78%) believed that AI definitely improves their efficiency, and another 8 people (16%) indicated that it rather improves it.

This means that a total of 94% of students see a positive impact of AI on the learning process. Only 3 respondents (6%) answered neutrally, indicating that they do not notice a clear impact of AI on the effectiveness of learning. None of the students indicated that AI rather does not improve or definitely does not improve the

effectiveness of learning, which clearly emphasises the positive perception of these tools. The average rating is 4.72, which indicates a very high assessment of the impact of AI on learning among students. This result demonstrates the high acceptance and conviction of students about the usefulness of AI tools in the educational process.

Students also assessed whether AI tools can replace traditional teaching methods. The data shows that the majority of students are convinced that traditional teaching methods can be replaced by AI tools. As many as 33 people (66%) answered definitely yes, and another 11 people (22%) indicated that they rather agree. This means that a total of 88% of respondents believe that AI can perform this function.

Only 6 students (12%) chose the answer ‘difficult to say’, which may indicate a lack of complete certainty or knowledge about the potential limitations and possibilities of AI in the context of teaching.

Importantly, none of the respondents selected the options ‘rather no’ or ‘definitely no’, which indicates a clearly positive perception of AI tools as a support in education. The average rating is 4.54, which indicates a high level of student confidence in the potential of AI in education and its ability to replace traditional teaching methods.

Students also assessed the potential of AI to improve the teaching process at the university. The results indicate that the vast majority of students rate the potential of artificial intelligence to improve the teaching process as very high or high. As many as 42 respondents (84%) gave a very high rating, and another 5 (10%) chose a high rating. This means that a total of 94% of students see great potential for AI in the context of academic teaching.

Only 3 people (6%) considered the potential of AI to be average, while none of the respondents rated it as low or very low. These results indicate that AI is recognised as a valuable tool supporting the teaching process at the university. The average rating is 4.78, which highlights the exceptionally positive attitude of students towards the use of AI tools in education.

Students gave their opinion on the introduction of AI technology into the teaching process. The survey results show that all students surveyed expressed a positive opinion on the introduction of AI technology into the teaching process. As many as 45 people (90%) strongly support this initiative, and another 5 people (10%) also expressed their approval by selecting the answer ‘rather yes’.

There were no neutral or negative responses, indicating clear support for the integration of AI tools into the academic teaching process. The average rating is 4.90, reflecting the students' very high conviction about the need to implement AI in education.

The last question concerned the inclusion of AI tools in compulsory teaching activities. The survey results indicate students' support for the inclusion of AI tools in compulsory teaching activities. As many as 100% of the students surveyed answered affirmatively to the question of whether AI should be an integral part of the curriculum.

The lack of negative responses confirms that students recognise the potential of AI tools and consider their presence in the teaching programme to be important. This may be related to students' belief in the practical usefulness of AI in the teaching process and its role in preparing them for the contemporary demands of the labour market.

Pearson's correlation analysis was performed to examine the relationship between the frequency of AI tool use and the assessment of their effectiveness in learning. The results indicate a high positive correlation between these variables. The correlation coefficient was $r = 0.90$, indicating a strong relationship.

Furthermore, a statistical significance test showed that this relationship is significant at the $p < 0.001$ level, confirming the reliability of the results. Hypothesis 1 was therefore confirmed. Students who use AI tools more frequently perceive them as more effective in the learning process.

An analysis was conducted to examine whether participation in AI courses or training affects the frequency of use of AI-based tools. The analysis was performed using a Student's t-test for independent samples. A value of $t = 4.00$ at $p < 0.001$ indicates a statistically significant difference between the two groups. In addition, the effect size (Cohen's d) was calculated between the average level of AI usage frequency among students who completed AI courses and the average level in the group that did not participate in these training courses.

The obtained coefficient $d \approx 0.88$ can be classified as a large effect according to Cohen's convention. This means that the difference is not only statistically significant but also has practical significance. Therefore, participation in AI courses or training has a significant impact on the frequency of AI tool use by students. Hypothesis 2 has been confirmed. Students participating in AI courses use AI tools more often than those who did not participate in such courses.

However, it is worth noting that due to the observational nature of the study and the fact that students decided independently whether to participate in the courses (which may indicate a tendency for those interested in AI to voluntarily seek training), the results do not determine the direction of causality.

It is likely that it was interest in new technologies that prompted a specific group to participate in the courses, and not the other way around. This selection bias should be taken into account when interpreting the results.

In further research, an experimental or controlled approach (e.g., randomised assignment to training) could be helpful to clearly confirm the impact of participation in AI courses on the frequency of use of artificial intelligence tools.

A t-test for independent samples (Welch's variant) was performed to compare the assessments of AI potential between first-cycle (n_1=23) and second-cycle (n_2=27) students. The result was t(≈43)= -1.90; p=0.064, which means that no statistically significant differences between the groups were found at the α=0.05 level.

The estimated 95% confidence interval for the difference in means (II-I) is [-0.009; 0.309], and the effect size Cohen's d ≈ 0.55 (moderate). Due to the pilot nature of the study and the limited size of the groups (n=50), the conclusions should be treated as preliminary and requiring replication on a larger sample.

Table 3. *Comparison of assessments of the potential of AI in improving the teaching process between first- and second-cycle*

Parameter	First-cycle studies	Second-cycle studies
Number of students	23	27
Grade point average	4,70	4,85
Standard deviation	0,30	0,25

Source: *Own elaboration based on survey results.*

The lack of statistically significant differences between the groups suggests that a positive attitude towards AI is common to all students regardless of their level of study. Hypothesis 3 has been confirmed. No statistically significant differences were found in the perception of AI potential between first- and second-cycle students.

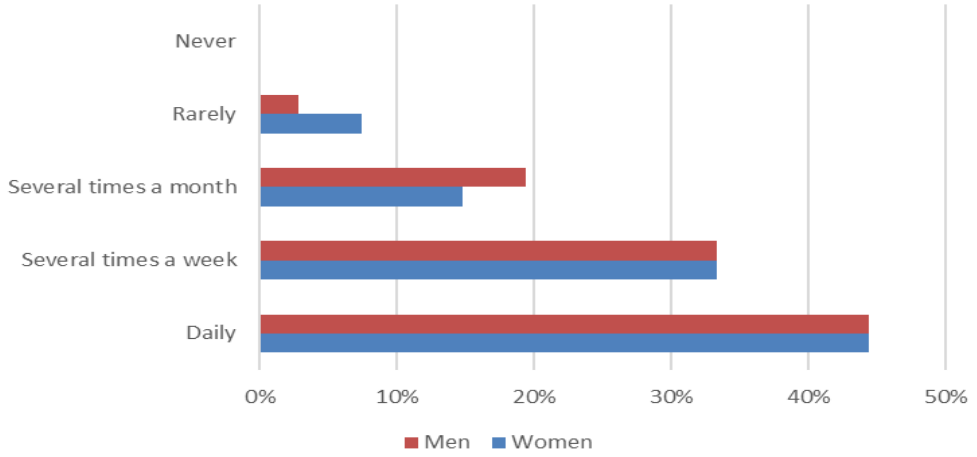
The university may treat this result as a signal to introduce AI tools into the teaching process at both levels of education, knowing that this will be positively received by students.

The results so far indicate that AI is very popular among students. However, it may be interesting to check whether there are differences in the choice of specific AI tools or in the frequency of their use between women and men.

Including gender in the analysis will allow us to check whether demographic factors influence preferences regarding the type of tools used (e.g. ChatGPT, Grammarly) or the intensity of their use.

This will complement the conclusions drawn so far and possibly suggest more personalised forms of teaching support. Figure 3 shows a comparison of the frequency of AI tool use by gender, highlighting differences in the intensity of use of these technologies between women and men.

Figure 3. *Frequency of AI use by gender*



Source: *Own elaboration based on survey results.*

The t-test for independent samples (Welch's variant) comparing the frequency of AI use between women (n=30; M=4.15; SD=0.93) and men (n=20; M=4.19; SD=0.84) did not show any statistically significant differences ($p > 0.05$). This means that gender does not differentiate the intensity of AI use in the sample studied. Women and men declare a similar frequency of use of these tools, which confirms equality in access to and use of modern technologies in the educational process.

The chi-square test used for the proportion of users of individual tools (e.g. ChatGPT, Grammarly, DeepL) did not indicate any statistically significant differences between genders ($p > 0.05$). Tool preferences are similar for women and men; the distributions confirm the universality of the main language applications in the learning process.

Although the initial analysis focused on the entire group of students, it is also worth looking at whether students from different years (e.g., first year vs. third year of the first cycle, or first year vs. second year of the second cycle) use different AI tools or use them with different frequency.

It can be hypothetically assumed that students in their final years, preparing for their bachelor's or master's theses, are more likely to use tools such as ChatGPT to generate complex content or advanced data analysis, while first-year students may focus on simpler solutions, such as DeepL or Brainly, which are useful in the early stages of learning.

The results presented in Table 4 suggest that students at more advanced stages of their studies integrate AI tools into the educational process to a greater extent, which may be related to the need to solve more complex problems, prepare specialised

projects or theses. At the same time, the high popularity of AI among all groups emphasises its importance as a key support in learning.

Table 4. *Frequency of AI use depending on the year of study*

Specification	Daily	Several times a week	Several times a month	Rarely	Never
First year of first cycle	2	1	2	0	0
Second year of first cycle	2	1	1	1	0
Third year of first cycle	6	5	1	1	0
First year of second cycle	4	3	1	1	0
Second year of second cycle	8	6	3	1	0

Source: *Own elaboration based on survey results.*

Table 5. *Popularity of AI tools by year of study*

Specification	ChatGPT	Grammarly	DeepL	Brainly	CapCut	Julius	Bielik
First year of first cycle	5	3	2	1	2	1	1
Second year of first cycle	5	3	2	2	2	2	1
Third year of first cycle	12	5	7	2	4	5	2
First year of second cycle	8	3	2	2	3	1	1
Second year of second cycle	15	6	7	3	4	6	1

Source: *Own elaboration based on survey results.*

Table 6 presents the popularity of AI tools among students of different years and levels of study. The results indicate a diversity of preferences in the use of AI tools depending on the stage of education.

In the lower years, tools supporting basic educational needs dominate, while in the higher years of study, the use of tools with more advanced functions increases, indicating their key role in the preparation of coursework and dissertations. The table shows that ChatGPT remains the leader in each group, confirming its versatility and versatility.

5. Conclusions

Research conducted on the use and perception of artificial intelligence tools by economics students at the John Paul II University provided valuable information on the role of AI in the educational process.

An analysis of the results of surveys conducted among a sample of 50 students revealed that all respondents reported using artificial intelligence tools. This finding

suggests that these technologies are prevalent and important in the academic environment.

The statistical analysis confirmed the research hypotheses. A robust positive correlation was identified between the frequency of AI tool utilisation and their efficacy in facilitating learning. The Pearson correlation coefficient ($r = 0.90$) indicates that students who use AI more often perceive these tools as more effective.

The relationship between these variables was found to be statistically significant at the $p < 0.001$ level. The study also demonstrated that students who participated in AI courses or training used these tools more frequently than their peers who lacked such experience. The Student's t-test confirmed a significant difference between the two groups ($p < 0.001$), emphasising the importance of education in developing the practical use of AI technology.

However, no significant differences were found in the perception of AI's potential between first- and second-cycle students. The two groups evaluated the AI's capacity for enhancing the teaching process to a similar extent, and the discrepancy in their mean ratings was not statistically significant ($p = 0.137$). These results indicate an increasing role for AI-related education and a uniformly positive perception of its potential among students.

Furthermore, the majority of students expressed a positive outlook on the integration of AI in education, with 94% of respondents believing that AI enhances their learning efficiency and 88% considering it capable of replacing traditional teaching methods. Moreover, the complete survey sample expressed support for the introduction of AI into the teaching process, with 100% of respondents in favour of its inclusion in compulsory classes.

The application of additional comparative analyses resulted in the generation of novel, significant insights, thereby enriching the research outcomes. It was observed that both males and females utilise AI tools with comparable intensity; however, there is a divergence in their preferences when selecting particular tools. Females more frequently cited Grammarly, while males more frequently opted for Julius and Bielik. This finding suggests that the diversity of needs and applications of AI is contingent on gender.

An analysis of the data by year of study revealed that older students, particularly those in their second year of master's studies, exhibited a higher frequency of AI usage and demonstrated more sophisticated utilisation of tools such as ChatGPT and Julius. Conversely, younger students more frequently indicate tools that facilitate fundamental tasks, such as Brainly and Grammarly. These results suggest that the level of study affects the scope and manner of AI tool use, emphasising the need to adapt teaching programmes to the specific characteristics and needs of students at different stages of education.

A review of research by others working in this field indicates that artificial intelligence has the potential to serve as a valuable tool that can support the process of learning, teaching and assessment. The role of AI tools in facilitating educational success for pupils/students and teachers is also emphasised. It is imperative to methodically analyse the educational behaviour of young people to comprehensively understand how AI-based technologies influence their learning process and the competencies they develop through their use.

Such an analysis will facilitate the customisation of AI tools to the requirements of pupils and students, as well as the identification of potential barriers and challenges in their implementation. In addition, it is imperative to assess the efficacy of these technologies and their influence on educational outcomes and engagement in learning. This will facilitate the conceptualisation of educational and training curricula that leverage the full potential of artificial intelligence while mitigating the risks associated with its misapplication or constrained utilisation.

In this context, further research could focus on analysing the specific educational effects of integrating AI into teaching and monitoring the long-term impact of these technologies on the development of students'/graduates' competences. Furthermore, it would be worthwhile to extend the research to other university departments, thus facilitating a comparison of how students from different fields perceive and use AI.

A fruitful avenue for future research would be to draw parallels between these results and those obtained from other domestic and foreign universities. This could offer valuable insights into the cultural, organisational and technological variations in approaches to AI-supported education.

An expanded scope of research could not only deepen our knowledge of the application of AI in education, but also identify best practices that could be adapted in various educational institutions.

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