The Use of AI Tools for Self-study by Undergraduate Tourism Students: Gender Differences

Laura Chagas[1], Sónia Pais[2,] Ana Pires[3]

[1] CiTUR – Centre for Tourism Research, Development and Innovation; Ci&DEI, Polytechnic Institute of Leiria, Portugal
[2] CiTUR – Centre for Tourism Research, Development and Innovation, Polytechnic Institute of Leiria, Portugal; CIDMA, Center for Research and Development in Mathematics and Applications, University of Aveiro, Aveiro, Portugal
[3] CiTUR – Centre for Tourism Research, Development and Innovation, Polytechnic Institute of Leiria, Portugal

Abstract

In recent years, artificial intelligence (AI) tools have become increasingly widespread at all levels of education and are now being used for a variety of academic and personal learning purposes. As these technologies continue to evolve, it is essential for educators and institutions to understand how students engage with AI for learning. This study therefore aims to explore how students of different genders use AI tools to support their independent study. Specifically, the research focuses on undergraduate tourism students enrolled at a Portuguese higher education institution. Data were collected through a structured questionnaire designed to assess students' use of AI. The quantitative data obtained from the survey responses were analysed using SPSS to identify potential patterns and differences between genders. The findings reveal that most respondents were female, and that there were no statistically significant differences in the reported use of AI tools for self-study purposes between male and female students. These results suggest that gender does not play a decisive role in the adoption of, or attitude towards, AI-assisted learning within this student population. This study contributes to the growing body of research on AI in higher education by providing insights into how undergraduate tourism students engage with AI tools independently. The study also highlights the need for further research into how academic staff can effectively support and guide students in integrating AI technologies into their learning practices, thereby fostering more meaningful and effective academic outcomes.

Keywords: *AI tools, higher education, students, gender, tourism.*

1. Introduction

The rapid advancement of artificial intelligence (AI), particularly in the form of widely accessible tools such as ChatGPT, is reshaping teaching and learning practices in higher education. Recent research indicate that students are increasingly using AI tools for a variety of academic purposes, such as generating ideas, academic writing, preparing for exams, and clarifying concepts.[1] Research examining students' perceptions and usage patterns suggests they are generally viewed as accessible, efficient and supportive learning tools that can improve academic performance and promote self-directed learning.[2] However, despite the growing adoption of AI technologies, students' acceptance of and engagement with them is not uniform, and remains influenced by multiple factors, including perceived usefulness, ease of use, social influence, and institutional support [3]. Emerging evidence further suggests that demographic and individual differences—such as age, gender, field of study, prior digital literacy, and socioeconomic background—may influence how students adopt, utilize, and evaluate AI tools [4], [5]. As AI technologies become more embedded within higher education, there is a growing need for research that not only examines overall adoption trends but also explores how these demographic factors shape students' experiences, opportunities, and challenges in engaging with AI-driven learning tools.

2. Gender Differences

Research on students' adoption of AI tools is expanding, yet empirical work examining how gender differences may influence these adoption patterns remains relatively limited and inconclusive [6].

Some existing studies indicate that male students report more frequent use of AI tools, engage with a wider range of applications, and express stronger beliefs in the relevance of these tools for their future careers [7], [8], whereas female students tend to adopt AI tools more selectively, primarily for text-related tasks, and report greater concerns about critical thinking, overreliance on technology, and ethical implications [7]. On the other hand, no statistically significant differences were found in terms of gender regarding attitudes towards AI in the studies conducted by [6] and [8].

3. Methodology

In order to assess how undergraduate Tourism students use AI tools for self-learning in English and Mathematics, a survey was conducted using a quantitative methodology. The questionnaire used in this study was adapted from von Garrel & Mayer (2023), which was previously tested and validated as a research instrument. The instrument was divided into three different sections, namely: demographic information, general use of AI tools and main characteristics, use and purpose of AI tools for English and Mathematics. The online questionnaire was created with Microsoft Forms and shared with undergraduate Tourism students through email and learning platforms.

With the purpose of determining the minimum sample size, we used the calculation formula with correction for finite populations (Triola, 2022):

$$n = \frac{Nz^2p(1-p)}{(N-1)E^2 + z^2p(1-p)}$$

where:
- N - size of the population or universe
- z - critical value of the standard normal distribution corresponding to the degree of confidence
- E - margin of error (in this case, 7.1%)
- p - estimated proportion

For a universe of 839 students, with a degree of confidence of 90 per cent (z=1.645) and a margin of error of 7.1 per cent, considering the worst-case scenario (maximum variability: p=0.5), we found that the minimum sample size should be 116 students. We received 120 responses to the questionnaire, slightly exceeding our target of 116 responses.

Due to time constraints, only preliminary results could be extracted, as the research is still ongoing.

4. Results and Discussion

Regarding the demographic information of the participants, namely students of different courses and degrees in the field of tourism, the majority of the respondents are female (63%), aged between 18 and 20 years (75%), and undergraduate students (75.83%). This aligns with previous studies that show that most hospitality and tourism students in Portugal are female and with a similar age mean [10]. The results are presented in Table 1.

Table 1. Demographic information (n=120)

	Attributes	Frequency	Percentages
Gender			
	Male	43	36.0%
	Female	75	63.0%
	Other	1	0.5%
	Rather not respond	1	0.5%
Age			
	18-20	90	75.0%
	21-23	24	20.0%
	≥24	6	5.0%
Academic Level			
	Professional Higher Technical Courses (TeSP)	29	24.17%

	1st year	28	
	2nd year	1	
	Undergraduate degrees	91	75.83%
	1st year	68	
	2nd year	19	
	3rd year	4	

In terms of previous knowledge and use of AI tools, the results show that the vast majority of students know what AI tools are (98.33%), a very large number have already used AI tools to support their studies (90.68%), but only 10.28% of respondents say they use these tools very often. A similar percentage of students say they use these tools often (37.38%) or only sometimes (37.38%). This also goes in line with similar studies, which revealed that although awareness of AI tools is widespread among higher education students, most participants don't use it very frequently, but either occasionally or frequently [11, 12]. The results are shown in Table 2.

Table 2. Knowledge and use of AI Tools (n=120)

Do you know what AI tools are?			
	Yes	118	98.33%
	No	2	1.67%
Have you ever used AI tools to support your studies?			
	Yes	107 (out of 118)	90.68%
	No	11 (out of 118)	9.32%
Frequency of use of AI in support of your studies			
	Very rarely	2 (out of 107)	1.87%
	Rarely	14 (out of 107)	13.08%
	Sometimes	40 (out of 107)	37.38%
	Often	40 (out of 107)	37.38%
	Very often	11 (out of 107)	10.28%

A statistical analysis was conducted in order to assess if there are any significant differences in the frequency of use of AI to support students in their studies (Figure 1).
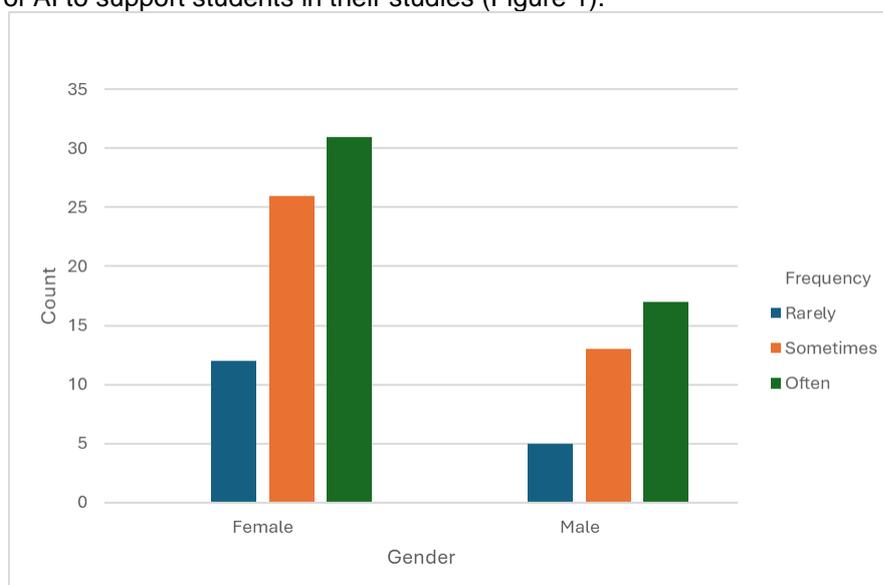

Fig. 1. Frequency of the use of AI according to gender (n=120)

From the analysis of the chart, there does not appear to be any difference in frequency of use between genders. However, we will perform a statistical test to verify whether the chart confirms this observation.

The Mann-Whitney U test (non-parametric test for two independent samples) was applied to compare the frequency of AI use between genders.

- Null hypothesis (H0): There is no significant difference in the frequency of AI use between genders.
- Alternative hypothesis (H1): There is a significant difference in the frequency of AI use between genders.

These findings reveal that when it comes to adoption behaviour, gender does not always translate into significant differences, as literature shows [13], [14]. However, when patterns seem to vary, what stands out is that female students engage in a more cautious and meaningful way, whereas male students report higher usage frequency, confidence, and behavioural intention to use AI tools [15]. The results can be seen in Table 3.

Table 3. Mann-Whitney test results (n=120)

Null Hypothesis	Test	Significance[a,b]
There is no significant difference in the frequency of AI use between genders.	Independent sample Mann–Whitney U Test	0,418

a. The significance level is 0.050. b. Asymptotic significance is displayed

The Mann-Whitney test shows that the p-value is 0.418, which is greater than the significance level of 5%. Therefore, we can conclude that the p-value there are no statistically significant differences in the frequency of AI use between female and male students in this sample.

5. Conclusions

The main contribution of our study is extending the body of research that shows that AI adoption is widespread among higher education students, especially in the Tourism field. Findings also reveal that no significant differences are found between genders, as demonstrated by previous research [13, 14, 15].

Some other practical implications of our study have to do with higher education practice. As very frequent adoption of AI tools remains relatively limited, this may suggest the need for structured pedagogical integration, as also suggested by Iddrisu et al. [14], which highlights the need for "educators and policymakers [to] consider integrating these technologies into curricula more comprehensively. By doing so, they can better support all students in enhancing their writing skills and academic performance" (p. 109).

However, there are some limitations in our study, namely the fact that results cannot be generalised and could not grasp the specific and contextual features that underlie students' use of AI. Therefore, a mixed-method approach, especially resorting to interviews, could explain in a more detailed way the perceptions and motivations of students. Additionally, further research could be focused on assessing how higher education institutions, namely through academic staff, support AI usage for autonomous learning, namely regarding a critical and ethical use of those tools.

REFERENCES

[1] Namatovu A., Kyambade M., "Leveraging AI in academia: university students' adoption of ChatGPT for writing coursework (take home) assignments through the lens of UTAUT2", Cogent Education, 2025, vol. 12(1), pp. 2485522. https://doi.org/10.1080/2331186x.2025.2485522

[2] Stöhr C., Ou A. W., Malmström H., "Perceptions and usage of AI chatbots among students in higher education across genders, academic levels and fields of study", Computers and Education: Artificial Intelligence, 2024, vol. 7, pp. 100259. https://doi.org/10.1016/j.caeai.2024.100259

[3] Moradi H., "Integrating AI in higher education: factors influencing ChatGPT acceptance among Chinese university EFL students", International Journal of Educational Technology in Higher Education, 2025, vol. 22, pp. 30. https://doi.org/10.1186/s41239-025-00530-4

[4] Mohammed I. A., Owan V. J., Thomas G. et al., "Multi group analysis of demographic differences in higher education students ChatGPT use behaviour within a modified UTAUT2 model", Discover Education, 2026, vol. 5, pp. 19. https://doi.org/10.1007/s44217-025-01018-z

[5] Mansoor H. M. H., Bawazir A., Alsabri M. A., Alharbi A., Okela A. H., "Artificial intelligence literacy among university students—a comparative transnational survey", Frontiers in Communication, 2024, vol. 9, pp. 1478476. https://doi.org/10.3389/fcomm.2024.1478476

[6] Maxwell D., Oyarzun B., Kim S. et al., "Generative AI in Higher Education: Demographic Differences in Student Perceived Readiness, Benefits, and Challenges", TechTrends, 2025, vol. 69, pp. 1248–1259. https://doi.org/10.1007/s11528-025-01109-6

[7] Møgelvang A., Bjelland C., Grassini S., Ludvigsen K., "Gender Differences in the Use of Generative Artificial Intelligence Chatbots in Higher Education: Characteristics and Consequences", Education Sciences, 2024, vol. 14, pp. 1363. https://doi.org/10.3390/educsci14121363

[8] Stohr C., Ou A. W., Malmström H., "Perceptions and Usage of AI Chatbots among Students in Higher Education across Genders, Academic Levels and Fields of Study", Computers and Education: Artificial Intelligence, 2024, vol. 7, pp. 100259. https://doi.org/10.1016/j.caeai.2024.100259

[9] Kaya F., Aydin F., Schepman A., Rodway P., Yetişensoy O., Demir Kaya M., "The Roles of Personality Traits, AI Anxiety, and Demographic Factors in Attitudes toward Artificial Intelligence", International Journal of Human–Computer Interaction, 2024, vol. 40(2), pp. 497–514. https://doi.org/10.1080/10447318.2022.2151730

[10] Silva S., Couto M. J., "Gender Bias in the Hospitality Sector: Female and Male Jobs", International Conference on Tourism Research, vol. 6, no. 1, 2023, pp. 292–297. https://doi.org/10.34190/ictr.6.1.1095

[11] Sousa A. E., Cardoso P., "Use of Generative AI by Higher Education Students", Electronics, vol. 14, no. 7, 2025, article 1258. https://doi.org/10.3390/electronics14071258

[12] Xiao L., Pyng H. S., Ayub A. F. M., Zhu Z., Gao J., Qing Z., "University Students' Usage of Generative Artificial Intelligence for Sustainability: A Cross-Sectional Survey from China", Sustainability, vol. 17, no. 8, 2025, article 3541. https://doi.org/10.3390/su17083541

[13] Rosli M. S., Saleh N. S., Ali A. M., Abu Bakar S., "Exploring the Factors Influencing Artificial Intelligence Adoption among Gen Z University Students: The Role of Self-Efficacy and Perceived Trust", Journal for STEM Education Research, 2026. https://doi.org/10.1007/s41979-025-00171-2

[14] Iddrisu H. M., Alhassan S. I., Aminu B., "Gender Differences in the Adoption, Usage, and Perceived Effectiveness of AI Writing Tools: A Study among University for Development Studies Students", International Journal of Educational Innovation and Research, vol. 4, no. 1, 2025, pp. 100–111. https://doi.org/10.31949/ijeir.v4i1.11717

[15] Matobobo C., "A Systematic Review of Gender Differences in Students' Use of AI Tools for Learning in Higher Education", Discover Education, 2026. https://doi.org/10.1007/s44217-026-01116-6