AI in the Tourism sector

Rens I. van den Berg

Breda University of Applied Sciences

Year 2 Block A (Retake)

Author Note

Correspondence concerning this article should be addressed to
Rens I. van den Berg, Breda University of Applied Sciences.

December 30, 2024

Abstract

This study investigates the role of Artificial Intelligence (AI) in tourism education at Breda University of Applied Sciences (BUas) through a mixed-methods approach. Quantitative data from 51 survey responses examine whether AI knowledge correlates with professional experience, explores differences in average and median AI expertise among educators, students, and support staff, and assesses whether AI proficiency relates to academic performance. A Chi-Square test showed no statistically significant association between professional experience and AI knowledge. Visual and descriptive analyses revealed educators generally report the highest AI expertise, followed by students and then supporting staff, although the small subgroup sizes limit broad conclusions. A Pearson correlation test ($r = 0.21, p = 0.51$) indicated no significant link between AI knowledge and academic performance within this sample.

Qualitative interviews with students and an e-tourism lecturer complemented the survey data, providing insights into AI's perceived advantages—such as time-saving and the ability to manage large information loads—and its potential drawbacks, namely overreliance, erosion of critical thinking, and ethical concerns around AI-generated outputs. Overall, these findings underscore the nuanced impact of AI in tourism education: while AI can enhance learning efficiency, educators and students alike emphasize the importance of responsible integration, source validation, and the preservation of analytical skills.

Introduction

Artificial Intelligence (AI) has emerged as a powerful force shaping the tourism industry, influencing everything; from destination management to customer service and data-driven decision-making (Buhalis & Leung, 2018; Xiang & Fesenmaier, 2017). As AI tools become more prevalent, understanding how educators, students, and support staff in tourism-related programs adapt to and integrate these technologies is increasingly critical. Recent studies indicate that while AI can enhance efficiency, personalization, and predictive capabilities, it also raises concerns about ethical usage, transparency, and the preservation of essential human skills such as critical thinking (Chen, Chen, & Lin, 2020).

In the context of higher education, AI's broad impacts can be divided into three main areas: administration and management, teaching, and learning (Chen et al., 2020). When applied to tourism education, these areas translate into automated task support (e.g., grading or scheduling), AI-driven instructional methods (e.g., chatbots, intelligent tutoring systems), and more immersive or personalized learning experiences (e.g., destination simulations). Despite its potential, debates persist regarding how much AI knowledge tourism faculty and students possess, whether substantial disparities in expertise exist, and whether AI proficiency correlates with academic performance.

Beyond these quantitative concerns, educators and students alike must grapple with AI's qualitative impacts. On one hand, AI-generated summaries can speed up research and enhance accessibility to complex information. On the other, reliance on these automated solutions may reduce independent analytical engagement, potentially eroding essential research and problem-solving abilities. Moreover, the credibility and ethical dimensions of AI outputs—particularly when sources are opaque or biases embedded—pose significant challenges for maintaining academic integrity and critical scrutiny.

This study addresses both the quantitative and qualitative dimensions of AI in tourism education at BUas. Quantitatively, it investigates the general AI expertise level among tourism faculty, students, and support staff, examines potential knowledge gaps across roles, and explores whether AI literacy is linked to higher academic achievement. Qualitatively, it delves into how AI tools shape students' study habits and learning strategies, as well as the perceptions of both students and educators regarding the reliability and ethical implications of AI-generated content. Through this combined lens, the research

aims to clarify the opportunities and risks AI presents in tourism academic programs and to offer insights that may guide responsible, effective integration of AI into the future of tourism education.

Literature Review

Recent advancements in artificial intelligence (AI) have significantly reshaped the tourism industry, influencing destination management, customer service, and operational optimization (Buhalis & Leung, 2018; Xiang & Fesenmaier, 2017). As AI technologies become more common in tourism-related contexts, it is essential for both faculty and students to develop relevant skills and understanding. Notably, this need for AI competency extends beyond practical application; it includes exploring how AI shapes learning, teaching, ethical considerations, and academic performance.

A comprehensive review by Chen, Chen, and Lin (2020) demonstrates that AI is transforming education by impacting three principal areas: (1) administrative tasks, (2) instruction, and (3) learning processes. While these authors focus broadly on AI's role across various educational levels and fields, their analysis yields key insights that are relevant for tourism education within the faculty of BUas as well:

Administration and Management: AI-driven systems can automate grading, scheduling, and student feedback, freeing educators to concentrate on deeper student engagement (Chen et al., 2020). This administrative support has the potential to streamline tourism course management—particularly valuable when classes involve field work or are offered across multiple campuses. However, reliance on AI for tasks like essay grading also raises ethical concerns about transparency and the risk of biases embedded in algorithms.

Instruction and Teaching: AI-based instruction methods such as chatbots, intelligent tutoring systems, and adaptive learning platforms can personalize educational content, allow continuous feedback, and foster collaborative learning (Chen et al., 2020). In the tourism domain, these platforms may help students master concepts like destination marketing or revenue management by simulating real-time decision-making scenarios. Nevertheless, both students and educators can develop varying degrees of trust or skepticism regarding AI outputs, especially if the content lacks transparency or verifiable sources—an issue addressed in the context of reliability and ethical implications in quantitative research question 2.

Learning: Chen et al. (2020) emphasize how AI provides a customized and more engaging learning experience, especially when integrated with mobile and web-based tools. For tourism students, AI can simulate hotel operations, flight scheduling, or destination

marketing campaigns, offering experiential and immersive learning environments. However, if students over-rely on AI-generated summaries or resources—as predicted in the hypothesis for research question 1—they may reduce their independent research efforts and critical thinking development.

The growing incorporation of AI in tourism underscores the importance of preparing students for AI-driven roles in travel agencies, airlines, hotels, and destination management organizations. Although Chen et al. (2020) focus on general education contexts, their findings correlate with earlier tourism-specific research:

Typical Levels of AI Expertise Tourism educators and students vary widely in their comfort with AI tools (Lei & Law, 2019). Some faculty may have a theoretical grasp of AI's strategic value but limited hands-on skills, while digitally native students may experiment freely with AI-driven applications (Ivanov & Webster, 2019). This diversity directly informs Research Question 1 (Quantitative) about the typical (median/average) AI knowledge in tourism programs.

Disparities in Knowledge Levels Educators and students often exhibit different strengths. Educators possess domain expertise and may view AI critically, focusing on pedagogical outcomes and ethical considerations. Students might have greater technical fluency but lack a broader theoretical framework (Mariani & Baggio, 2022). These contrasts tie closely to Research Question 2 (Quantitative), which examines whether staff members and students display notable differences in their AI knowledge.

AI Knowledge and Academic Performance Chen et al. (2020) observe that better AI literacy can enhance academic outcomes by enabling learners to engage in data-driven projects and simulations. In a tourism context, this could mean stronger performance in tasks like forecasting tourism demand, analyzing traveler behavior, or evaluating dynamic pricing strategies. However, uncritical reliance on AI may undermine essential research and problem-solving skills (Tussyadiah, 2020). Whether these gains from AI literacy translate into measurable grade improvements is addressed in Research Question 3 (Quantitative), which seeks a correlation between AI knowledge and academic performance.

Hypotheses

Quantitative Research Questions

Research Question 1: Is there a relationship between AI knowledge and professional experience within the tourism sector at BUas?

Hypothesis: Individuals with greater professional experience in the tourism sector will exhibit higher AI knowledge scores than those with less experience.

Research Question 2: What are the median and average levels of AI knowledge among educators, students, and supporting staff at BUas?

Hypothesis: Educators will demonstrate the highest average AI knowledge, followed by students, while supporting staff will report the lowest levels overall.

Research Question 3: Is there a correlation between AI knowledge and academic performance among tourism students at BUas?

Hypothesis: Students who possess higher AI knowledge will also achieve higher grade points, reflecting a positive correlation between these two variables.

Qualitative Research Question

Research Question 4: How do students and and tourism educators perceive the advantages and drawbacks of using AI tools in tourism-related coursework, and what insights do they offer on balancing efficiency with critical thinking and ethical considerations?

Hypothesis: Students will report that AI tools streamline tasks such as summarizing large texts and sourcing information but also express concerns about overreliance and potential erosion of their independent research skills. Meanwhile, an e-tourism educator will highlight the need to integrate AI responsibly, emphasizing ethical considerations, validation of AI outputs, and the continued importance of critical thinking in the learning process.

Methodology

This study adopts a mixed-methods design to investigate the role and impact of AI in tourism education at Breda University of Applied Sciences. The approach combines a quantitative survey, administered via Qualtrics, and a series of qualitative interviews. By triangulating insights from these two sources, the research aims to obtain both broad numerical indicators and richer, contextualized perspectives on the integration of AI tools and resources.

Participants

The survey yielded a total of 51 responses. Of these, 43 were from students, 4 were from educators, and 3 were from supporting staff. Despite efforts to achieve a larger sample size, the overall response rate remained modest, which places some constraints on the generalizability of results. The respondents' ages spanned multiple brackets: 40 participants were between 18 and 24 years old, 4 were aged 55–64, 3 were 25–34, 2 were 35–44, 1 was 45–54, and 1 was over 65. In addition to age data, respondents also reported their professional or study-related experience levels, indicating that 19 had 0–6 months of experience, 13 had 2–5 years, 9 had 1–2 years, 5 had 20 or more years, 3 had 5–10 years, 1 had 10–20 years, and 1 had 6–12 months of experience. While these distributions highlight the diversity of participants in terms of both age and career stage, the low number of responses in some categories inevitably limits the scope and strength of the statistical analyses.

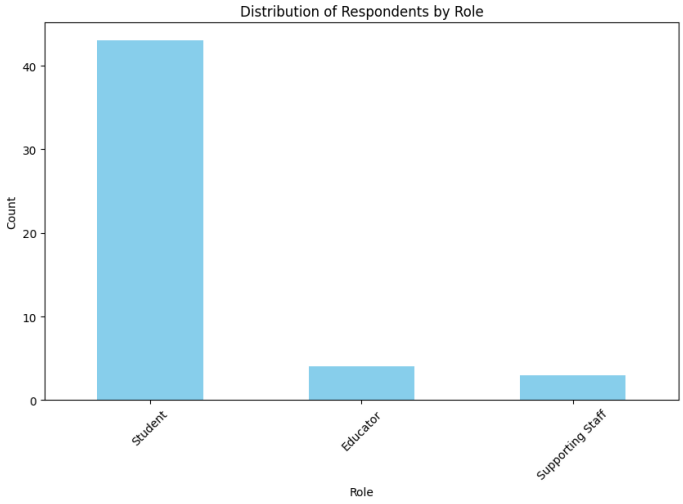

Figure 1: Distribution of respondents by Role

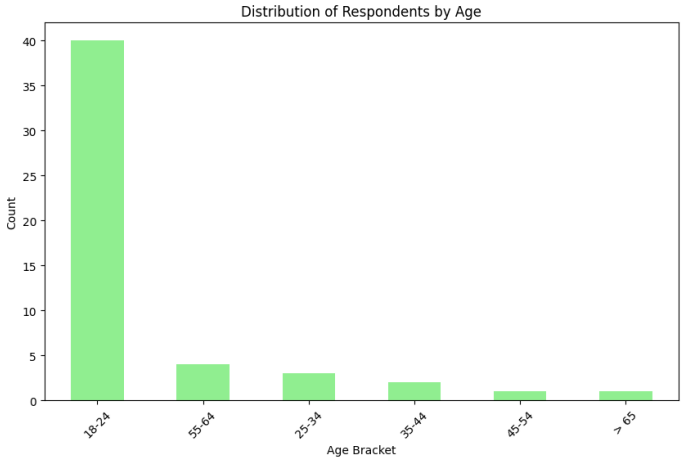

Figure 2: Distribution of respondents by age

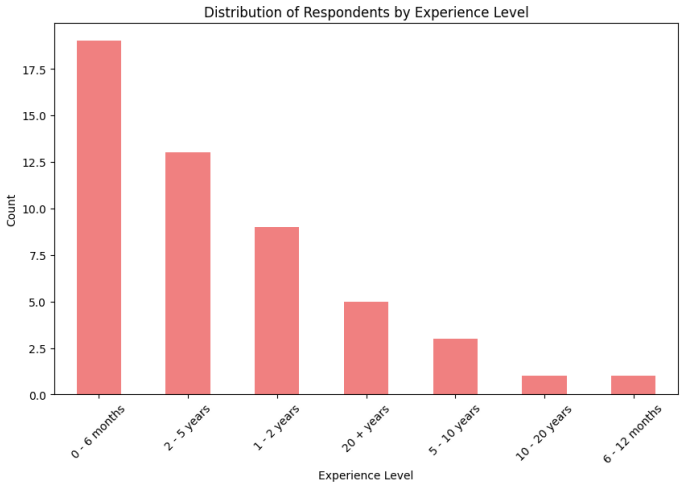

Figure 3: Experience distribution of respondents within Tourism domain

In addition to the survey participants, interviews were conducted with a small number of individuals to gain deeper insights into AI's role in tourism education. These included a BUas e-tourism lecturer, Joyce Zengerink, as well as several student interviewees. Their contributions offered more detailed perspectives on the integration of AI into coursework, the ethical and practical considerations of AI-driven tools, and the ways AI might reshape learning strategies in tourism-focused programs.

Quantitative Method: Survey

A Qualtrics survey was developed to capture self-reported AI expertise, frequency of AI use, and beliefs regarding AI's effects on tourism education and the broader tourism

industry. This questionnaire was divided into several sections to address a wide range of AI-related topics:

- Awareness:
    1. I am familiar with Machine Learning and Deep Learning technologies.
    2. I am aware of AI being used in my domain.
    3. I have taken courses related to AI in my programme.
    4. I am aware that many everyday devices and applications already use AI.
    5. I have used AI in my domain before.
- Knowledge:
    1. What is the Turing Test in the context of AI?
    2. What does the acronym "NLP" stand for in the context of AI?
    3. Which of the following is an example of an AI-based virtual assistant?
    4. What is the main challenge associated with the ethical use of AI?
    5. Which of the following scenarios is most likely indicative of the presence of artificial intelligence (AI)?
- Positive Attitude:
    1. There are many beneficial applications of AI.
    2. AI systems can replace humans in repetitive tasks.
    3. AI systems can augment/assist humans in creative tasks.
    4. I think AI will be a great asset to many businesses in my domain.
- Negative Attitude:
    1. The increase of AI usage threatens job security in my domain.
    2. I find AI scary.
    3. I am concerned about AI applications collecting my personal data.
- Acceptance:

1. I intend to use AI to automate repetitive tasks.
2. I intend to use AI to assist me with creative tasks.
3. I intend to use AI in my learning activities.
4. I intend to stay informed about emerging AI technologies.

This structure allowed the survey to gauge not only participants' familiarity and knowledge of AI, but also their attitudes—both positive and negative—and their willingness to adopt AI tools in tourism-related activities.

Data were collected electronically over a limited window, which may have contributed to the relatively small number of completed questionnaires. In processing the results, the research team performed descriptive analyses, including calculations of averages, medians, and frequencies for key variables, and considered the feasibility of inferential tests (such as correlational analyses or t-tests) depending on group sizes and response distributions. Although the sample is modest, the survey data yield initial numerical insights into current levels of AI adoption and confidence among BUas tourism students, educators, and staff.

Qualitative Method: Interviews

To enrich the quantitative findings, the research team conducted semi-structured interviews with selected participants, including an e-tourism lecturer at BUas, Joyce Zengerink, and a small number of tourism students. These interviews offered a deeper exploration of various aspects of AI in tourism education, building on preliminary insights gained from the survey.

Interviews were guided by a set of open-ended questions that allowed for probing follow-ups, ensuring that the conversation could adapt to each participant's unique perspective and experience. Topics covered during these interviews included:

- **Background and Domain Experience:** Participants discussed their roles, how long they had been studying or teaching in tourism, and any prior exposure to AI tools or concepts.
- **Personal Experiences With Chatbots and AI Tools:** Interviewees described whether they had used AI-driven applications, such as chatbots for research assis-

tance or language translation, and reflected on how these experiences influenced their views of AI in tourism.

- **Knowledge About AI in One's Field:** Questions targeted participants' perceptions of AI's relevance to tourism, probing how aware they were of current AI trends and applications that might impact future job markets or course design.
- **Attitude Towards AI Introduction in Tourism:** Participants spoke about their hopes, concerns, and openness regarding increased AI integration—ranging from enthusiastic support to skepticism about potential pitfalls.
- **Concerns and Expected Challenges:** Discussions highlighted anxieties over AI's reliability, possible job displacement, or ethical ramifications such as data privacy, algorithmic bias, and academic honesty.
- **Ethical Considerations:** Interviewees raised questions about trust, transparency, and accountability when AI-generated recommendations or summaries are taken at face value. They also explored how educators might train future professionals to use AI responsibly.

All interviews were recorded (with the participants' permission) and subsequently transcribed. A thematic analysis of the transcripts revealed recurring themes such as the risk of overreliance on AI-generated summaries, the imperative to maintain and foster critical thinking skills, and ongoing debates about the credibility and ethics of AI in educational environments. This qualitative component thus provided nuanced context for interpreting the survey data, particularly around how AI tools might reshape study habits, teaching methods, and industry expectations in tourism.

Research Design

The research was structured around a series of sequential steps designed to ensure rigorous data collection and analysis. These steps included identifying relevant stakeholders, developing and distributing a survey, conducting interviews, and performing both descriptive and inferential analyses on the collected data. By following this systematic procedure, the study aimed to investigate the adoption, perceptions, and implications of AI within the tourism domain at Breda University of Applied Sciences (BUas).

Stakeholder Analysis and Literature Review

An initial step involved identifying and mapping key stakeholders in the BUas tourism context, including students, educators, and support staff who are either involved in or impacted by AI technologies. This was accompanied by an extensive review of relevant academic and industry literature to establish a theoretical grounding for AI's role in tourism. The stakeholder analysis and literature review together helped refine the research questions and guided the development of the survey instrument.

Data Management Preparation

Prior to collecting any data, a data management plan was created. This plan included documentation such as a codebook, data collection procedures, ethics review applications, consent forms, and data storage protocols. By clearly outlining responsibilities and adherence to privacy regulations (including GDPR compliance), the study maintained ethical standards in handling participant information and research outcomes.

Survey Design and Integration

Building on the refined research questions, a Qualtrics survey was designed to measure AI awareness, knowledge, attitudes (both positive and negative), and acceptance levels among BUas tourism students and staff. The survey questions were then integrated into the overarching AI-related questionnaire distributed across multiple domains at BUas, ensuring both tourism-specific inquiries and broader AI-focused items were captured.

Survey Distribution

A promotional video was recorded to highlight the purpose and importance of the research study, with a specific focus on AI technologies in the sports industry. Personalized emails were sent to staff members of BUas, providing them with a link to the online survey. Additionally, fliers containing QR codes were distributed at various locations within the university premises to encourage participation in the survey. To further increase the response count, a second round of flier distribution was conducted.

Interview Scheduling and Data Collection

To complement the quantitative data, semi-structured interviews were conducted with a small number of participants, including e-tourism lecturer Joyce Zengerink and several tourism students. These interviews provided richer qualitative insights into how AI is perceived, the practical challenges of integrating AI tools in coursework, and the ethical considerations that arise when relying on AI-generated information. Interview sessions were recorded with participant consent and later transcribed for analysis.

Data Processing and Preliminary Analysis

Once collected, both survey and interview data were checked for completeness and accuracy. Survey responses were cleaned and coded before being imported into statistical software for descriptive analysis (e.g., frequency counts, means, medians) and data visualization. Interview transcripts were subjected to thematic analysis to identify recurring viewpoints and concerns, such as overreliance on AI tools or the importance of preserving critical thinking skills.

Inferential Analysis

Depending on the data distributions and group sizes, inferential tests were carried out to assess potential relationships within the survey data. For instance, t-tests were employed to compare staff and student groups on selected outcome measures, while correlation analyses and (where feasible) regression models were used to explore factors influencing participants' attitudes toward AI. These statistical insights provided an empirical backbone to the qualitative findings.

Triangulation and Interpretation

Finally, the results from the quantitative survey and the qualitative interviews were triangulated to form a comprehensive picture of AI's role in tourism education at BUas. This mixed-methods approach enabled the study to capture not only numerical indicators of AI familiarity and usage but also the nuanced perspectives of participants who experience AI's benefits and drawbacks firsthand.

Through this structured research design, the study balanced systematic data gathering with ethical and methodological rigor, ultimately offering a multifaceted view of how AI is understood, utilized, and critiqued within the tourism domain.

Results

Research Question 1

Is there a relationship between AI knowledge and professional experience within the tourism sector at BUas?

A Chi-Square test of independence was conducted to explore whether professional experience (e.g., years working or studying in the tourism sector) is associated with participants' self-reported AI knowledge. The test produced a Chi-Square statistic of 30.32 and a p-value of 0.1743. Given that the p-value exceeds conventional significance thresholds (e.g., 0.05), these results indicate that there is *no statistically significant relationship* between AI knowledge levels and professional experience categories in this sample. In practical terms, it suggests that individuals who reported longer or shorter experience in tourism are not systematically reporting higher or lower AI knowledge scores based on the observed data.

Figure 4: R code for Chi-square test

Research Question 2

What are the median and average levels of AI knowledge among educators, students, and supporting staff at BUas?

To address this question, a bar chart (Figure 5) was created to compare both the

median and the average AI knowledge scores across the three groups. The findings, as depicted in the figure, can be summarized as follows:

- **Educators:** Show the highest median (4.00) and highest mean (3.75) AI knowledge.
- **Students:** Hold a moderate position, with a median of 3.00 and a mean of 3.14.
- **Supporting Staff:** Report both the lowest median (2.00) and average (2.00) AI knowledge.

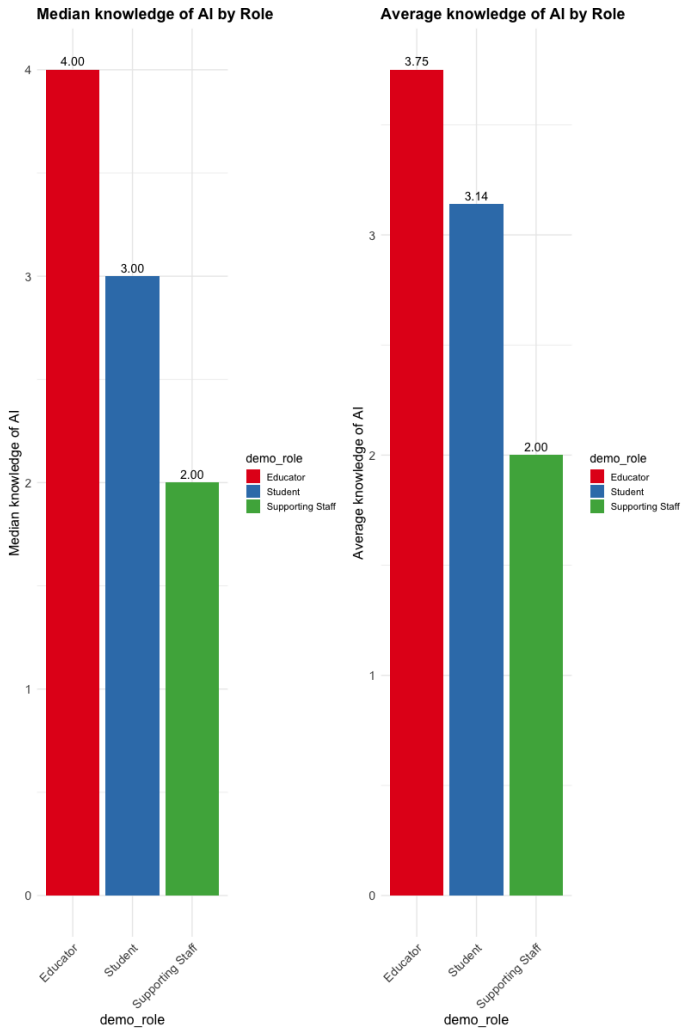

Figure 5: Median & average knowledge of AI by role

These patterns support the hypothesis that *educators tend to exhibit higher AI knowledge than students*, while *supporting staff generally report the lowest scores*. It is, however, crucial to note the limited number of educator and supporting staff responses in the dataset, which could affect the robustness of these estimates.

Research Question 3

Is there a correlation between AI knowledge and academic performance among tourism students at BUas?

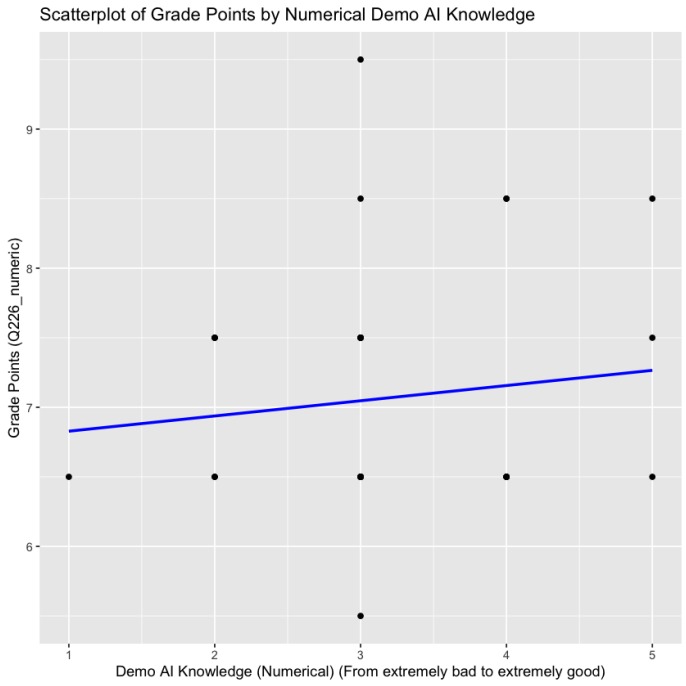

Figure 6: Scatterplot of grade points by AI knowledge (students)

A scatterplot (Figure 6) was used to illustrate the relationship between students' self-reported AI knowledge and their grade points. Although the visual suggested a slight upward trend, a Pearson correlation test (using 12 data points) revealed a correlation coefficient of $r = 0.21$ with a p-value of 0.51. This indicates that *no statistically significant* relationship was found between AI knowledge and grade points in this sample. While the direction of the correlation is positive, the data do not provide strong evidence of a robust or meaningful relationship, especially considering the small sample size. Nonetheless, the trend remains consistent with the hypothesis that higher AI knowledge *may* correspond to better academic outcomes, albeit without sufficient statistical support in this dataset.

Research Question 4

How do students and tourism educators perceive the advantages and drawbacks of using AI tools in tourism-related coursework, and what insights do they offer on balancing efficiency with critical thinking and ethical considerations?

To address this qualitative question, semi-structured interviews were conducted with a small number of students and with an e-tourism lecturer, Joyce Zengerink. An analysis of the transcripts revealed several recurring themes:

- **Convenience and Efficiency:** Students reported that AI tools (e.g., chatbots, summary generators) saved them time on research tasks and helped them manage large volumes of information more quickly. Multiple interviewees noted they felt "less pressure" meeting deadlines because AI could handle tasks like summarizing lengthy articles.

- **Risk of Overreliance:** Despite the perceived benefits, participants also expressed concern that they might depend too heavily on AI outputs. One student admitted that using AI "makes me a bit lazy," particularly when summarizing long texts. This sentiment supports the notion that relying on AI might reduce deeper engagement and self-directed research.

- **Critical Thinking:** Both students and the educator emphasized the need to verify AI-generated content. There was a shared worry that automated outputs could limit the development of independent analytical skills. The educator, in particular, underscored the importance of "teaching students how to use AI responsibly," including verifying sources and applying critical judgment to AI-driven summaries or solutions.

- **Ethical and Reliability Concerns:** Participants were broadly cautious about blindly trusting AI-generated information. They pointed out the absence of transparent references and the possibility of inaccuracies or biases in AI algorithms. This aligns with the educator's focus on instructing students to question AI outputs, check facts, and remain mindful of ethical considerations like privacy, data security, and academic integrity.

- **Balanced Integration:** Despite reservations, students and the educator recognized the potential for AI to enhance learning experiences if used thoughtfully. Interviewees suggested that AI-based tools could free time for more creative or

analytical tasks, *provided* students do not treat AI outputs as unquestionable answers. Instructors, meanwhile, viewed AI as a catalyst for revamping coursework and assessments to encourage higher-order thinking.

Overall, these interview findings highlight the dual nature of AI integration in tourism education. Students appreciate the efficiency gains but remain wary of the potential erosion of research depth. The e-tourism lecturer's perspective echoes the call for ethical, informed usage, reinforcing the notion that AI in education should complement, rather than replace, critical and reflective learning practices.

Conclusion

This study aimed to investigate four key questions concerning AI knowledge, its relationship to professional experience and academic performance, and the perceived advantages and drawbacks of AI tools in tourism education at BUas.

- **Research Question 1:** *Is there a relationship between AI knowledge and professional experience within the tourism sector at BUas?*

  A Chi-Square test revealed no statistically significant association between participants' professional experience and their self-reported AI knowledge. In other words, individuals who have spent more time in the tourism field did not demonstrate systematically higher (or lower) AI knowledge compared to those with less experience. This finding suggests that factors other than length of professional involvement may play a stronger role in shaping AI-related competencies.

- **Research Question 2:** *What are the median and average levels of AI knowledge among educators, students, and supporting staff at BUas?*

  The results indicate that educators have the highest AI knowledge scores (both in terms of median and mean), followed by students, and then supporting staff with the lowest levels. This trend supports the hypothesis that role-based differences in AI awareness and skill exist, although the relatively small numbers in each subgroup should be kept in mind when generalizing.

- **Research Question 3:** *Is there a correlation between AI knowledge and academic performance among tourism students at BUas?*

  A Pearson correlation test produced a coefficient of $r = 0.21$ with a p-value of 0.51, indicating no statistically significant relationship between self-reported AI knowledge and grade points. Although the scatterplot suggested a slight positive trend, the data were insufficient to confirm a robust or meaningful association. Thus, higher AI knowledge was not conclusively linked to improved academic performance in this sample.

- **Research Question 4:** *How do students and tourism educators perceive the advantages and drawbacks of using AI tools in tourism-related coursework, and what*

insights do they offer on balancing efficiency with critical thinking and ethical considerations?

The interview findings show a consensus that AI tools confer substantial benefits in terms of speed and efficiency—particularly for summarizing large texts and performing routine research tasks. However, students expressed concerns about over-reliance on AI outputs and the potential erosion of independent critical thinking. The e-tourism educator similarly highlighted the necessity of verifying AI-generated materials, adhering to ethical standards, and integrating AI responsibly so that it augments rather than replaces in-depth learning. Together, these perspectives illustrate the dualistic nature of AI adoption, where convenience is balanced against the need for academic rigor and ethical accountability.

Overall, the study underscores the complexity surrounding AI use in tourism education. While educators appear to lead in AI proficiency, length of experience alone does not necessarily predict higher AI knowledge. Likewise, no strong evidence emerged of a clear link between AI knowledge and grades among students. Nonetheless, the qualitative insights reveal a shared commitment to harnessing AI's potential without compromising critical thinking and ethical principles. These conclusions inform how BUas—and similar institutions—might design policies, curricula, and support systems to foster both AI literacy and the essential human skills required for a forward-looking tourism industry.