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How Will Artificial Intelligence Perception Shape the Careers of Tourism Students? An EEG-Based Study

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Abstract

This study explores how tourism students, as future hospitality professionals, respond emotionally and cognitively to AI framed as either an opportunity or a threat. Unlike prior research relying on self-reports, this study uses electroencephalography (EEG) to capture implicit affective and cognitive responses. Forty students were randomly assigned to view positive AI statements (efficiency, sustainability, customer experience) or negative ones (job insecurity, reduced human interaction, ethics), after a baseline recording. EEG measured valence, arousal, approach–withdrawal orientation, and alpha synchronization. Results revealed a clear duality: positive statements produced positive valence, lower arousal, and higher alpha synchronization, indicating comfort and openness; negative statements triggered negative valence, higher arousal, and alpha desynchronization, reflecting stress and vigilance. Students recognized AI's benefits while remaining alert to its risks. The study highlights EEG's value in revealing subconscious responses complementing self-reports, underscoring the need for balanced educational strategies supporting sustainable AI integration in hospitality.

Keywords: Artificial intelligence; Tourism and hospitality; EEG; Emotional responses; Career planning

1. INTRODUCTION

Artificial intelligence (AI) has rapidly emerged as a disruptive force in the global hospitality and tourism industry, transforming customer service, operational management, and workforce dynamics. From chatbots and recommendation systems to automated check-in services and service robots, AI is increasingly embedded into hospitality operations, offering opportunities for efficiency, personalization, and innovation (OECD, 2024). The Artificial Intelligence market worldwide is expected to achieve a remarkable value of US $617.62 billion by the year 2026. (Statista, 2026). AI represents the embodiment of human intelligence in machines, enabling them to perform tasks and even mimic human problem-solving processes (Russell & Norvig, 2016; Lai & Hung, 2018).

In the context of hospitality, AI has been shown to significantly enhance operational efficiency, guest experience, and service quality (Malelak et al., 2024). However, the adoption of AI also raises critical concerns, particularly among young professionals preparing to enter the sector. For tourism and hospitality students, AI evokes ambivalence: enthusiasm about innovation and efficiency, but also anxiety regarding job insecurity, reduced human interaction, and threats to the authenticity of service encounters (Li et al., 2024). Previous research has explored employees' and students' perceptions of AI primarily through surveys and interviews, often revealing a mix of excitement and fear (Bastiaansen et al., 2022; Koo et al., 2021; Lu et al., 2019; Law et al., 2024).

Recent studies focusing specifically on students highlight this duality. Lestari et al. (2021) found that hospitality students associate AI and service automation (RAISA) with both enhanced career competencies and uncertainties about future opportunities. A survey of 234 tourism students revealed generally positive attitudes toward AI, with frequent use of AI tools for learning and research, but relatively low levels of negative attitudes (Kırkar & Buzlukçu, 2024). Similarly, Küçükergin (2025) reported that while students see AI as creating economic opportunities, some expressed concern about job replacement, noting that confidence in AI grows when its applications are better understood. These findings underscore the importance of investigating not only what students say about AI, but also how they process it emotionally and cognitively.

Traditional self-reported methods, while valuable, cannot fully capture the implicit affective and cognitive mechanisms underlying such perceptions. Neuroscientific approaches, particularly electroencephalography (EEG), offer a complementary perspective by measuring brain activity in real time and linking it to emotional dimensions such as valence, arousal, and attentional engagement (Lei, 2024). In tourism research, EEG has already been applied to topics such as destination marketing, consumer decision-making, and experience design (Li et al., 2022). Still, it has rarely been used to explore how future professionals react to AI narratives specifically.

Evidence from related fields demonstrates the feasibility and value of EEG in educational and design contexts. In education, EEG-based systems have been used to distinguish attentional states during online learning (Al-Nafjan et al., 2022; Apicella et al., 2022). In design education, Wang et al. (2025) showed that AI-generated content tools enhanced concentration and reduced cognitive fatigue, as reflected in beta and alpha band activity. Together, these studies suggest that EEG can provide a robust methodology for capturing subtle affective–cognitive responses to technology—responses that may remain hidden in traditional surveys.

Against this backdrop, our study addresses a critical gap in tourism research by examining the EEG-based responses of tourism students to positive and negative AI narratives. Specifically, we analyze emotional valence, physiological arousal, the approach–withdrawal (AW) index, and alpha ERD/ERS patterns. Preliminary results show a consistent duality: positive AI statements (e.g., improved customer experience, sustainability, innovation) evoke comfort and openness, while negative statements (e.g., job insecurity, reduced human interaction, ethical concerns) induce vigilance, stress, and heightened cognitive engagement. By revealing not only what students articulate about AI but also how they neurophysiologically process it, this study provides unique insights for tourism educators, managers, and policymakers seeking to guide the balanced and sustainable integration of AI into hospitality.

2. METHODOLOGY

2.1. EEG process

EEG data were collected using the **Muse 2 headband**, a portable four-channel EEG system with electrodes positioned at AF7, AF8 (frontal), and TP9, TP10 (temporo-parietal). Signals were sampled at 256 Hz. This configuration provides acceptable signal quality for affective neuroscience studies while maintaining ecological feasibility in applied contexts such as tourism education research. EEG preprocessing was performed in Python.

1. Band-pass filtering between 1–40 Hz to remove slow drifts and high-frequency noise.
2. Independent Component Analysis (ICA) was used to remove ocular and muscle artifacts.
3. Segmentation of 10-second epochs time-locked to each statement onset.
4. Baseline correction using the 200 ms pre-stimulus interval.
5. Automatic rejection of epochs exceeding ±100 μV.

All EEG indices were calculated **relative to the 10-second eyes-closed baseline** recorded at the beginning of the session. After preprocessing, 40 participants had sufficient clean data for inclusion.

Four EEG-derived indices were computed to capture emotional and attentional responses:

- **Valence**: Estimated from **frontal alpha asymmetry**, calculated as the log-transformed difference between left (AF7) and right (AF8) alpha power. Positive values indicate greater left activity (associated with positive affect), while negative values reflect greater right activity (associated with negative affect).
- **Arousal**: Indexed by the **beta-to-alpha power ratio** across frontal electrodes. Higher ratios indicate higher arousal, reflecting greater physiological alertness or stress.
- **Awareness–Withdrawal (AW) Index**: Computed following Di Flumeri et al. (2017) as a composite measure of approach–withdrawal tendencies. Positive values denote **awareness/engagement** (approach), whereas negative values denote **withdrawal/avoidance**.
- **Alpha ERD/ERS**: Calculated as event-related desynchronization/synchronization in the 8–12 Hz band. Positive ERS values reflect increased alpha synchronization (relaxation, low cognitive load), while negative ERD values indicate desynchronization (active processing, stress, or attentional effort).

2.2. Participants

Forty undergraduate students from the Department of Tourism at Antalya Bilim University participated in the experiment (20 female, 20 male; mean age = 21.3 years, SD = 1.8). All participants were right-handed, reported normal or corrected-to-normal vision, and had no history of neurological or psychiatric disorders. They were randomly assigned to one of two groups: the **Positive group** (n = 20), exposed to positive AI-related statements, or the **Negative group** (n = 20), exposed to negative AI-related statements. Participation was voluntary, and all students signed informed consent forms in line with ethical research guidelines.

2.3. Stimuli and Rationale

The experimental stimuli consisted of ten short statements about AI in tourism. Each participant was presented with **five statements**, either all positive or all negative depending on group assignment. The items were designed to capture the dual discourse of AI in tourism: its opportunities and benefits versus its risks and concerns. **Positive statements** emphasized enhanced customer experience, operational efficiency, sustainability, personal development, and innovation. These reflect AI's potential contributions to service quality, efficiency, and long-term industry growth. **Negative statements** addressed job insecurity, reduced human interaction, unfair competition, personal stress, and ethical/privacy risks. These reflect widely reported anxieties regarding technology adoption in the hospitality sector.

A full list of the statements and the rationale for their inclusion is provided in Table 1.

Statement	Rationale
Positive AI-related statements	
Artificial intelligence systems are essential for enhancing customer experience in the tourism sector.	Reflects AI's widely reported role in improving service quality and personalization.
AI-powered applications (chatbots, recommendation systems, etc.) can improve the efficiency of tourism businesses.	Captures the operational efficiency dimension of AI adoption in hospitality services.
The use of AI in tourism can enhance sustainability and help manage resources more efficiently.	Highlights the sustainability discourse, a key concern in tourism's environmental impact.
Developing myself in understanding and utilizing AI technologies in tourism is important to me.	Represents students' willingness to engage with AI as part of their professional development.
I believe I can develop innovative AI-based solutions in the field of tourism.	Reflects entrepreneurial and innovation-oriented perspectives among future professionals.
Negative AI-related statements	
I am worried that AI systems may replace human employees in the tourism sector.	Captures concerns about employment insecurity and fears of automation.
I fear that AI-supported customer service systems (e.g., chatbots) will reduce human relationships in tourism.	Addresses anxieties that AI may diminish the human-centered nature of hospitality.
I believe AI-based pricing and marketing systems may create unfair competition in the sector.	Reflects economic and market-related anxieties tied to AI-driven systems.
Learning and using AI applications in tourism may be stressful and challenging for me.	Captures perceived personal difficulty and stress in adapting to new technologies.
I am concerned that the use of AI in tourism will increase ethical and privacy problems in the sector.	Highlights broader ethical and privacy concerns associated with digitalization.

Note. Positive statements emphasized AI's potential to enhance customer experience, efficiency, sustainability, personal development, and innovation. Negative statements reflected student concerns regarding job insecurity, diminished human interaction, unfair competition, stress, and ethical/privacy risks.

2.4. Procedure

Participants were tested individually in a quiet laboratory environment. Before the main task, each participant completed a **10-second baseline recording with eyes closed**. This reference period was used to compute relative EEG power values, ensuring that responses to stimuli reflected changes above each participant's baseline. Following the baseline, each AI statement was presented on a computer screen for **10 seconds**. During this period, participants were instructed to read and reflect on the statement. At the onset of each trial, a digital marker was inserted into the EEG recording to synchronize brain activity with stimulus presentation.

2.5. Data Analysis

All analyses were performed in **Python (version 3.10)** using standard scientific libraries. EEG preprocessing and feature extraction were conducted with **MNE-Python**, numerical operations with **NumPy** and **pandas**, and statistical analyses with **SciPy** and **statsmodels**. Visualization was carried out in **Matplotlib** and **Seaborn**. Mean values of valence, arousal, AW index, and alpha ERD/ERS were computed for each participant under their assigned condition (positive vs. negative). Independent-samples t-tests were applied to compare the groups across the indices.

3. RESULTS

The EEG results revealed clear differences in hospitality students' neurophysiological responses to positive versus negative AI-related stimuli. Overall, positive AI statements (highlighting benefits such as increased efficiency or new opportunities) elicited predominantly positive emotional reactions and a calmer neural state. In contrast, negative AI statements (emphasizing threats like job insecurity or reduced human interaction) provoked negative emotional responses and heightened arousal. Figures 1–4 summarize these findings across four key EEG indices – emotional valence, arousal, the approach–withdrawal (AW) index, and alpha band ERD/ERS – each of which is detailed below. Throughout, we interpret these results in the context of tourism and hospitality, noting implications for technology acceptance and emotional preparedness in the industry.

3.1. Emotional Valence Responses

The valence analysis revealed that students' emotional reactions were strongly aligned with the sentiment of the AI-related statements, but with nuanced differences depending on the content of each item. Positive AI-related statements generally elicited higher valence values, signaling more positive affect, whereas negative statements were associated with lower or negative valence, reflecting more negative emotions (Figure 1).

For instance, when students read that *"AI systems are essential for enhancing customer experience in the tourism sector"* or that *"AI-powered applications can improve the efficiency of tourism businesses,"* their EEG-derived valence values were markedly positive. This suggests that themes such as customer service enhancement and operational efficiency resonate positively with tourism students, reinforcing an optimistic view of AI's potential to enrich the industry. Similarly, statements emphasizing *sustainability and resource management* also elicited positive valence, indicating that students associate AI with forward-looking and socially responsible practices in tourism – an increasingly central theme in the field.

By contrast, negative statements triggered a shift toward negative valence, underscoring students' sensitivity to the potential threats of AI. The strongest negative reactions emerged in response to statements about *job insecurity* (e.g., "AI systems may replace human employees") and *the reduction of human interaction in tourism services*. These results highlight that while students are enthusiastic about efficiency and innovation, they are equally attuned to the core human values of hospitality – authenticity, interpersonal connection, and stable employment. Ethical and privacy concerns also pushed valence into the negative range, suggesting that students are aware of broader societal debates surrounding AI beyond immediate operational issues.

Taken together, these findings demonstrate a **dual emotional orientation**: optimism when AI is framed as a tool for innovation, sustainability, and personal development, but caution and negativity when it is portrayed as a threat to human roles, fairness, and ethics. This duality mirrors the ambivalence reported in hospitality literature, where employees and students alike view AI as both an enabler of progress and a source of risk. In line with prior studies noting that younger hospitality cohorts tend to hold more favorable views of AI-driven service innovations while still acknowledging their disruptive potential, our results indicate that students are emotionally receptive to AI's advantages while remaining mindful of its downsides. This cognitive-emotional balance suggests that they are not naïvely enthusiastic nor dismissively resistant, but are instead developing a critical awareness of AI's complex role in the future of tourism.

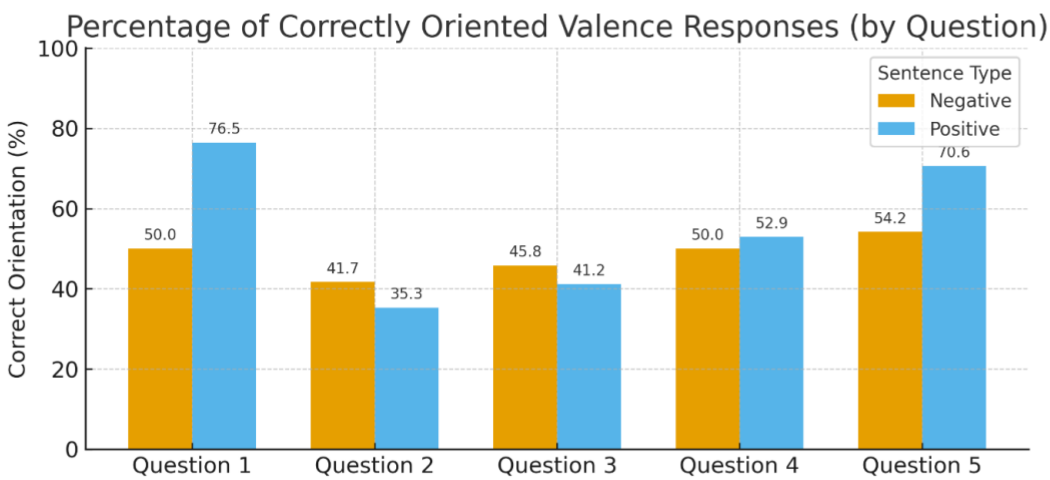

Figure 1. Percentage of students whose EEG-derived valence responses matched the expected orientation (positive valence for positive AI statements; negative valence for negative AI statements).

Results show that tourism students consistently exhibited positive emotional reactions to AI's potential benefits (e.g., improved customer experience, efficiency, sustainability) and negative emotional reactions to AI's potential threats (e.g., job insecurity, loss of human interaction, ethical concerns), indicating a clear alignment between stimulus sentiment and neural affective responses.

The arousal data provided deeper insight into how the content of AI-related statements shaped students' physiological reactions. Across the five items, **negative AI statements consistently evoked higher arousal levels** compared to positive statements, indicating that potential threats were more emotionally and cognitively activating for tourism students (Figure 2).

The strongest arousal increases appeared when participants read statements about **job insecurity** (*"AI systems may replace human employees in the tourism sector"*) and **reduced human interaction** (*"AI-supported customer service systems will reduce human relationships in tourism"*). Both issues strike at the heart of the hospitality profession, which is deeply reliant on human labor and authentic social encounters. The heightened physiological arousal suggests that students not only recognized these threats but also experienced stress and vigilance while processing them. Similarly, concerns about **ethics and privacy** (*"AI will increase ethical and privacy problems in tourism"*) triggered above-average arousal, pointing to awareness that digitalization can bring complex challenges beyond operational tasks.

By contrast, the **positive statements** produced more modest arousal levels overall. For example, references to **improved efficiency** (*"AI-powered applications can improve the efficiency of tourism businesses"*) and **enhanced customer experience** (*"AI systems are essential for enhancing customer experience"*) did not excite all students equally. While some students showed slight increases in arousal, many remained calm or disengaged, reflecting a relatively neutral stance toward AI's promised benefits. Interestingly, even statements about **sustainability and resource management**, which align with students' awareness of responsible tourism, elicited lower arousal than negative items. This pattern suggests that positive narratives may be cognitively accepted but do not generate the same visceral urgency as negative ones.

Taken together, these results reinforce a **negativity bias** in students' neurophysiological responses: threats to employment, interpersonal interaction, and ethics provoked stronger bodily reactions than promises of efficiency, sustainability, or innovation. From an industry perspective, this means that while students intellectually value AI's potential contributions, their emotional systems are more powerfully mobilized by risks. If unmanaged, such heightened arousal in response to negative narratives could translate into anxiety or resistance in workplace contexts where AI adoption is rapid. Conversely, the subdued arousal toward positive statements may indicate that managers and educators cannot assume enthusiasm for AI's benefits will arise automatically. Instead, they may need to actively frame and demonstrate those benefits in ways that are emotionally engaging, ensuring that the next generation of hospitality professionals perceives AI not only as useful but also as exciting and motivating.

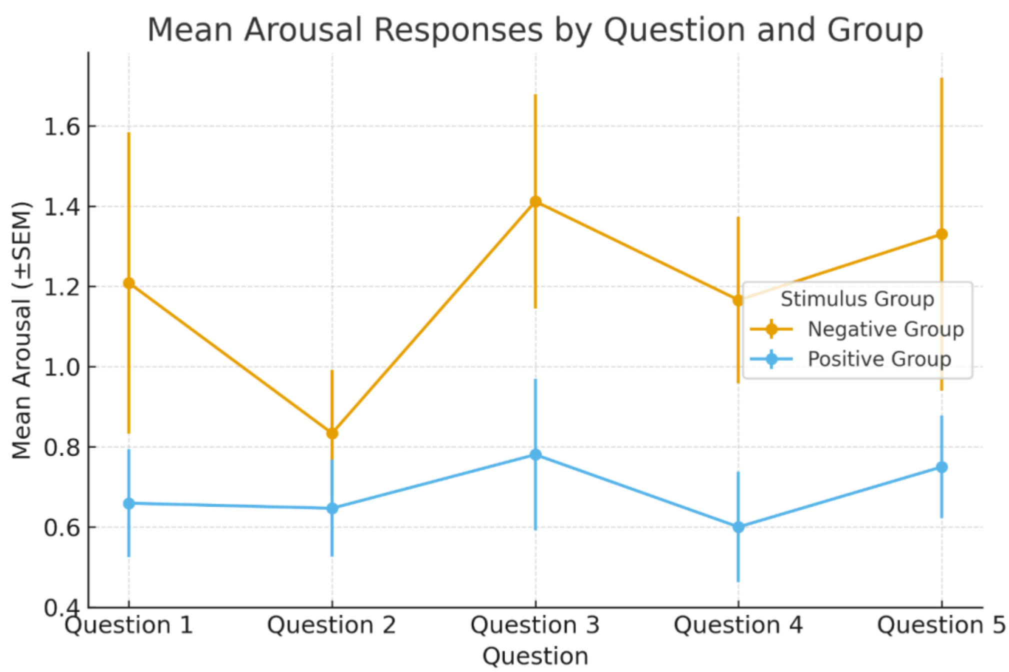

Figure 2. Mean EEG arousal responses to positive versus negative AI-related statements across five items.

In Figure 2, negative statements concerning job insecurity, reduced human interaction, and ethical/privacy risks elicited consistently higher arousal, indicating heightened vigilance and stress. Positive statements about efficiency, customer experience, sustainability, and innovation generated comparatively lower arousal, suggesting that while students intellectually recognized these benefits, they did not evoke the same level of physiological activation.

3.2. Approach–Withdrawal (AW) Index

The AW index, derived from frontal EEG asymmetry, was used to assess approach versus withdrawal tendencies. Positive values reflect greater attentional engagement or "approach," while negative values reflect withdrawal or avoidance. The results revealed a consistent pattern: **negative AI-related statements elicited a higher and more positive AW index than positive statements** (Figure 3). On average, students exhibited approach-oriented responses when confronted with threats such as *job insecurity* or *loss of human interaction*. Rather than disengaging, they leaned in cognitively, directing more attention toward the negative content. This heightened vigilance, when considered alongside the elevated arousal results, points to a state of strong emotional and cognitive engagement with AI's potential downsides. Students were not only unsettled by these threats but also motivated to process and evaluate their implications actively.

This finding aligns with prior hospitality research showing that employees' awareness of service robots and AI tends to sharpen perceptions of **job insecurity and role disruption** (Parvez et al., 2022). Our student sample, as future entry-level employees, appears similarly sensitive to threats: they interpret negative AI narratives as cues requiring closer attention. This can be understood as a form of proactive coping or realism, reflecting the students' willingness to prepare for challenges mentally AI may bring to their careers.

In contrast, the AW index for **positive AI statements** (e.g., improved efficiency, sustainability, or innovation opportunities) remained closer to neutral, sometimes even slightly negative. This suggests a lower degree of engagement with AI's benefits. Combined with the arousal findings, this indicates that while students acknowledged the value of AI's potential advantages, these benefits did not trigger the same urgency or focused attention as the threats did. From a hospitality management standpoint, this pattern highlights a critical gap: students may take the positive narratives for granted, while reacting strongly to the risks. As earlier research notes, junior or entry-level employees tend to perceive AI's risks more acutely than managers do, which may explain why the students in our study showed stronger engagement with threats than with opportunities.

For industry leaders and educators, this insight carries practical implications. If left unaddressed, such asymmetry in engagement may limit students' motivation to embrace AI positively. Training programs and experiential learning with AI tools could help increase attentional engagement with the benefits, balancing out the natural vigilance these future professionals display toward the risks. By reframing AI as both a supportive and enabling resource, managers may reduce the fear-driven vigilance and cultivate a more balanced, opportunity-oriented mindset in the workforce.

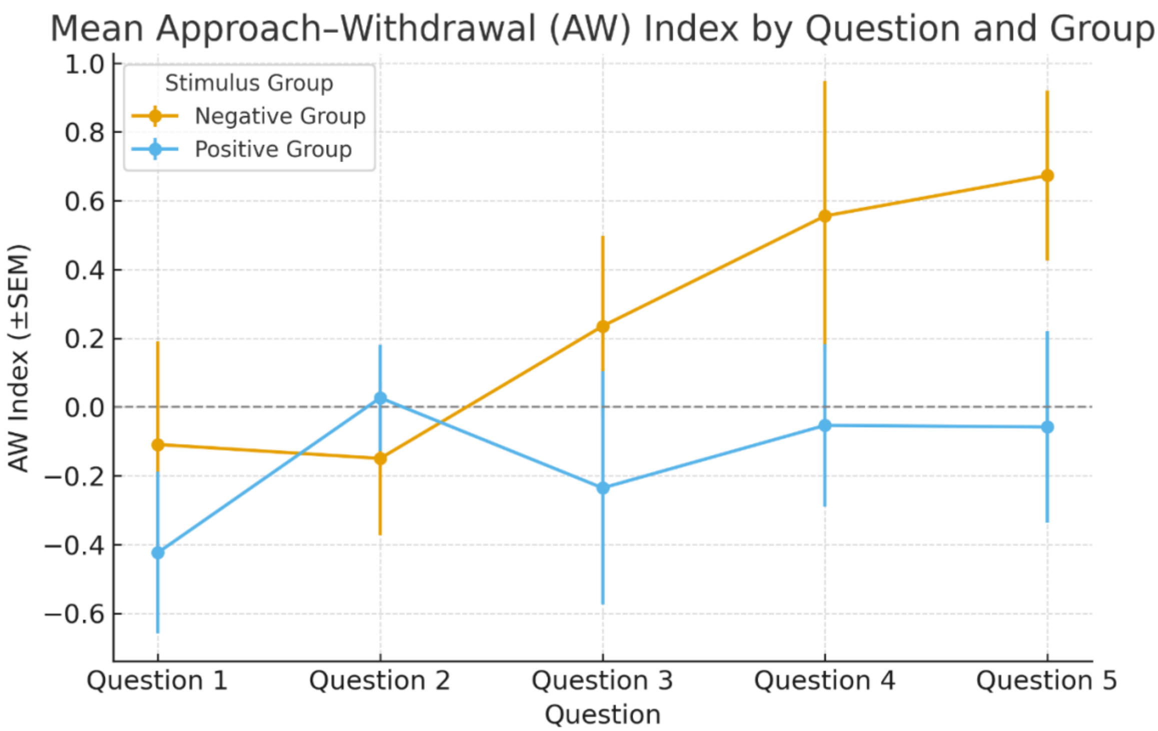

Figure 3. Mean Approach–Withdrawal (AW) index for positive and negative AI-related statements.

In Figure 3, positive values indicate approach-oriented attentional engagement, whereas negative values indicate withdrawal or avoidance. Results show that negative AI statements (e.g., threats to job security, loss of human interaction) elicited a consistently higher AW index, suggesting heightened vigilance and cognitive engagement. In contrast, positive AI statements (e.g., efficiency, sustainability, innovation) generated lower or near-neutral AW index values, reflecting less urgent attentional investment.

Alpha Band ERD/ERS Patterns

The alpha band (8–12 Hz) analysis provided further insight into the students' mental states under each condition. Positive values (ERS) typically reflect increased alpha synchronization, linked to relaxation, comfort, and lower cognitive load. In contrast, negative values (ERD) indicate desynchronization, usually associated with stress, focused attention, or active information processing. Strikingly, **positive AI-related statements produced higher ERS values**, while **negative statements were associated with ERD** (Figure 4).

This means that when students encountered positive narratives about AI—such as *improving customer experience*, *enhancing efficiency*, or *contributing to sustainability*—their brains responded with greater alpha synchronization. This pattern reflects comfort and ease, suggesting that students not only cognitively recognized the advantages of AI but also experienced them emotionally as reassuring and optimistic. By contrast, when faced with negative narratives—such as *job insecurity*, *reduced human interaction*, or *ethical/privacy concerns*—students exhibited alpha desynchronization, reflecting a more stressed and cognitively demanding state.

These results complement the valence, arousal, and AW index findings, together painting a coherent picture of students' dual orientation toward AI. In positive scenarios, students showed **positive valence, low arousal, and alpha ERS**, a profile consistent with **pleasant relaxation and openness**. This is encouraging from an industry perspective: students appear emotionally prepared to accept AI's benefits, which may facilitate smoother technology adoption in hospitality settings. In negative scenarios, however, the profile was reversed: **negative valence, high arousal, high AW index, and alpha ERD**, indicating **heightened vigilance, stress, and mental effort**. This suggests that students not only recognized AI threats but also actively allocated cognitive resources to evaluating them.

If such reactions are mirrored in the workplace, they could manifest as **resistance to AI adoption or even increased turnover intentions**. Indeed, recent hospitality research highlights how employees' perception of AI as a job threat can fuel anxiety and withdrawal from the profession (Lu et al., 2019; Koo et al., 2021). On a positive note, our data also show that students did not disengage when confronted with risks; the approach-oriented AW index implies active coping and awareness rather than avoidance. This opens an opportunity for educators and managers: **by providing clear communication, training, and reassurance**, they can redirect this vigilance into constructive engagement, helping students view AI as an augmenting tool rather than a replacement.

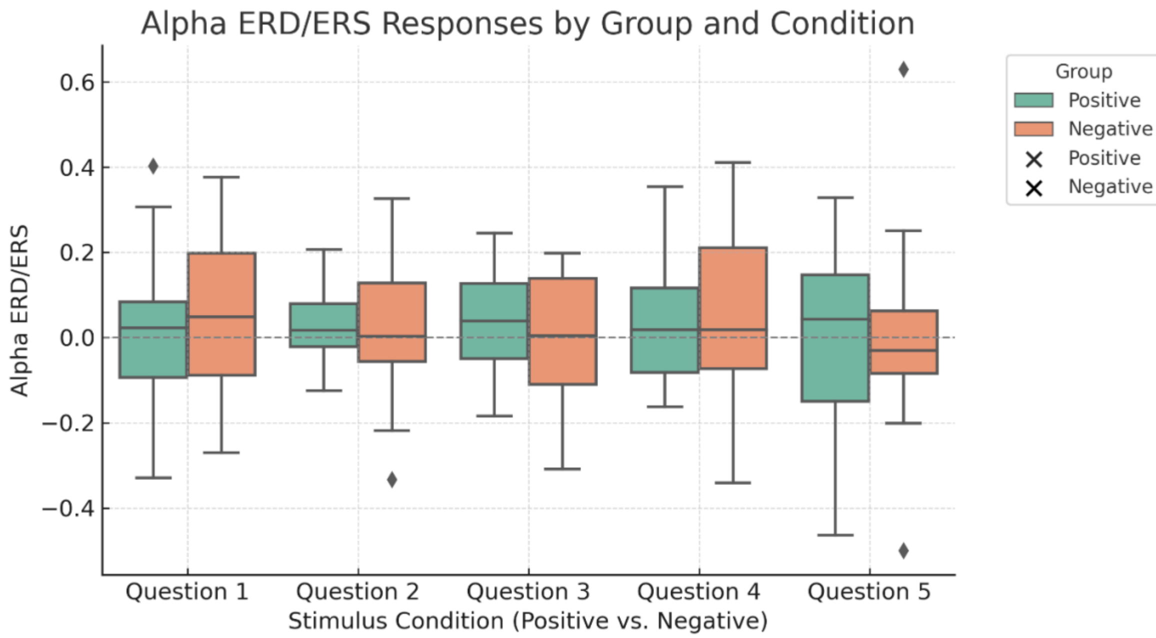

Figure 4. Distribution of Alpha ERD/ERS responses across positive and negative AI-related statements.

In Figure 4, positive ERS values indicate increased alpha synchronization (reflecting relaxation, positive affect, and lower cognitive load), whereas negative ERD values indicate alpha desynchronization (reflecting stress, attentional focus, and greater mental effort). Results show that positive AI statements (e.g., improved customer experience, efficiency, sustainability) elicited higher ERS, consistent with ease and optimism, while negative AI statements (e.g., job insecurity, reduced human interaction, ethical/privacy concerns) induced ERD, reflecting heightened stress and cognitive engagement.

4. DISCUSSION AND CONCLUSION

This study contributes to tourism and hospitality research by providing novel neurophysiological evidence of how future professionals process narratives about artificial intelligence (AI). Using EEG-derived measures of emotional valence, arousal, the approach–withdrawal (AW) index, and alpha ERD/ERS, we demonstrated that students' responses systematically differed between positive and negative AI-related statements. Importantly, these findings extend beyond self-reported perceptions by revealing implicit emotional and attentional processes, thereby offering a richer understanding of technology acceptance in tourism education and workforce development. As today's students will soon become tomorrow's managers, employees, and decision-makers, understanding how they subconsciously process AI-related narratives offers valuable foresight into how the future hospitality workforce may engage with, adopt, and shape AI-driven practices in the industry.

Our results reveal a clear duality in students' responses to AI. Positive statements—such as AI's potential to improve customer experience, enhance efficiency, or contribute to sustainability—were associated with positive valence, low arousal, and alpha synchronization (ERS). This pattern reflects comfort, optimism, and openness, suggesting that students are emotionally receptive to AI's promised advantages. From a managerial perspective, such openness is a positive signal for the future integration of AI in hospitality, as it indicates a willingness to embrace technological change when it is framed as beneficial and supportive. This receptivity also suggests that students entering the workforce may be predisposed to championing AI-driven innovations early in their careers, which could accelerate organizational adoption and reduce resistance to change at the entry level.

Conversely, negative statements—such as AI threatening jobs, reducing human interaction, or raising ethical and privacy concerns—were linked to negative valence, higher arousal, elevated AW index, and alpha desynchronization (ERD). This profile indicates heightened vigilance, stress, and cognitive effort, showing that students not only recognized AI's risks but also actively engaged with them. The strong attentional orientation to threats highlights that these young professionals are critically aware of the challenges AI may bring to their careers. This finding mirrors prior hospitality research showing that frontline employees often perceive AI as a source of anxiety and job insecurity (Lu et al., 2019; Koo et al., 2021). For tourism students specifically, this vigilance may reflect legitimate concerns about job security and career trajectory in an industry undergoing rapid technological transformation, underscoring the need for career guidance that directly addresses these anxieties before students enter the workforce.

Taken together, these results suggest that students are neither naively optimistic nor wholly resistant to AI. Rather, they hold a balanced cognitive–emotional stance, simultaneously appreciating its benefits while remaining vigilant about its risks. This nuanced profile underscores the importance of designing educational curricula and workplace training programs that acknowledge both sides of AI adoption. Such findings carry direct implications for career preparation: by identifying the specific emotional and cognitive patterns that shape students' receptivity to AI, tourism and hospitality programs can better equip graduates with the confidence, adaptability, and critical awareness needed to navigate AI-integrated roles, ultimately supporting more informed career decision-making and smoother workforce transitions.

This research has several strengths. First, it represents one of the few studies to apply EEG in a tourism education context, going beyond surveys and interviews to capture implicit emotional responses. Second, by focusing on tourism students—the future workforce—it provides timely insights into how AI adoption may be received by entry-level professionals, a group whose perceptions will significantly influence industry practices in the coming decade. Understanding these perceptions is particularly valuable for career development purposes, as it allows educators and industry stakeholders to anticipate how graduates will approach AI-related job functions, career choices, and professional development opportunities. Third, the combination of multiple EEG indices (valence, arousal, AW index, alpha ERD/ERS) allowed for a multidimensional understanding of students' affective and cognitive reactions, generating a comprehensive picture of their engagement with AI narratives. Finally, the study design balanced positive and negative stimuli, enabling clear contrasts in neural responses to opportunities versus threats.

4.1. Limitations and Future Research

Despite its contributions, this study has several limitations that open avenues for future research. First, the experiment was conducted with a relatively small sample (n = 40) from a single tourism department, which may limit generalizability. Larger and more diverse samples—including students from different cultural and institutional contexts—would strengthen external validity. Second, we employed a portable EEG device (Muse 2), which offers ecological feasibility but lower spatial resolution compared to research-grade EEG systems. Future studies could use high-density EEG to capture more fine-grained neural dynamics. Third, while we analyzed four established indices, additional neural markers (e.g., theta band oscillations, frontal midline activity) could provide further insights into emotional regulation and cognitive control processes related to AI perception. Finally, our design presented positive and negative statements in isolation. Future work could explore mixed or sequential exposures (e.g., first highlighting risks, then benefits) to examine whether framing effects influence students' responses.

Beyond methodological considerations, future research should also investigate interventions that might moderate students' reactions. For instance, exposure to hands-on AI tools, experiential learning in technology-enhanced hospitality settings, or managerial communication strategies could reduce negative arousal and increase positive engagement. Longitudinal studies could examine whether students' neurophysiological responses evolve as they gain professional experience with AI in real hospitality contexts.

This study demonstrates that tourism management students exhibit distinct emotional and cognitive responses to positive and negative narratives about AI, as captured through EEG measures. Positive statements fostered comfort and openness, while negative statements triggered vigilance, stress, and heightened attention. These findings highlight a dual orientation: students are simultaneously optimistic about AI's potential and cautious about its risks.

By moving beyond self-reported attitudes to neurophysiological evidence, our research provides a unique contribution to hospitality management scholarship. The results underscore the need for educators and managers to design strategies that both amplify students' enthusiasm for AI's benefits and address their concerns about its challenges. Preparing future professionals for a balanced and constructive engagement with AI will be essential for ensuring that technological integration in hospitality enhances—not undermines—the human essence of the industry.

Declaration of Interest Statement

The authors report there are no competing interests to declare.

Declaration of generative AI Use

The authors report that they have used generative AI to support language editing, improve clarity and enhance the readability of the manuscript.

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