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Edited by
Dr. Evgenia Pavlaku
Dr. Konstantinos Kalachanis

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Volume of Proceedings

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**MESSAGE FROM THE PRESIDENT
OF NEW YORK COLLEGE EDUCATIONAL GROUP,
Dr. ELIAS FOUTSIS, *Hon PhD***



Distinguished members of the academic and research community,

It is a great pleasure to introduce the Proceedings Volume of the 8th Annual PhD Conference, held at the Athens Campus of New York College on December 11-12, 2025.

The volume you are holding represents the culmination of the core principles of New York College: innovation, education, and academic excellence.

Since its establishment, New York College has prioritized cultivating an academic environment that inspires knowledge, creativity, and interdisciplinary collaboration. By supporting pioneering research efforts, we provide our students with opportunities to develop their skills and advance both professionally and academically.

This volume showcases the exceptional work of our students, who, through New York College, have the opportunity to earn their doctoral degrees from a distinguished British institution, the University of Greater Manchester. In close collaboration with their supervisors and with the support of the academic team at New York College, our students contribute to advancing science. Moreover, it also includes scientific articles from the supervisors in their academic fields, showcasing their contribution to science.

I would like to warmly congratulate all participants for their efforts and remarkable achievements. I am confident that the content of this volume will serve as a source of inspiration and knowledge for the academic community.

Sincerely,

Elias Foutsis, *Hon PhD*
President and Founder
New York College Educational Group

Αξιότιμα μέλη της ακαδημαϊκής και ερευνητικής κοινότητας,

Είναι ιδιαίτερη χαρά για εμένα να προλογίσω τον Τόμο των Πρακτικών του 8th Annual PhD Conference, που έλαβε χώρα στο Athens Campus του New York College, στις 11-12 Δεκεμβρίου, 2025. Ο τόμος που κρατάτε στα χέρια σας αποτελεί το επιστέγασμα των αρχών που διέπουν το New York College, ήτοι: καινοτομία, εκπαίδευση και ακαδημαϊκή αριστεία.

Το New York College, από την ίδρυσή του, έχει θέσει ως προτεραιότητα την καλλιέργεια ενός ακαδημαϊκού περιβάλλοντος που εμπνέει τη γνώση, τη δημιουργικότητα και τη διεπιστημονική συνεργασία. Μέσω της υποστήριξης πρωτοποριακών ερευνητικών προσπαθειών, προσφέρουμε στους φοιτητές μας τις ευκαιρίες να αναπτύξουν τις ικανότητές τους και να εξελιχθούν επαγγελματικά και ακαδημαϊκά.

Ο παρών τόμος αποτελεί δείγμα της εξαιρετικής δουλειάς των φοιτητών μας, οι οποίοι, μέσω του New York College, έχουν την ευκαιρία να αποκτήσουν το διδακτορικό τους δίπλωμα από ένα σπουδαίο βρετανικό πανεπιστήμιο, το University of Greater Manchester. Σε στενή συνεργασία με τους επόπτες τους και με τη στήριξη της ακαδημαϊκής ομάδας του New York College, οι φοιτητές μας προάγουν την επιστήμη. Εκτός αυτού όμως, περιλαμβάνει και επιστημονικά άρθρα από τους επόπτες στο ακαδημαϊκό τους πεδίο, δείγμα της συνεισφοράς τους στην επιστήμη.

Θα ήθελα να συγχαρώ θερμά όλους τους συμμετέχοντες για τις προσπάθειες και τα εξαιρετικά επιτεύγματά τους. Είμαι βέβαιος ότι το περιεχόμενο αυτού του τόμου θα αποτελέσει πηγή έμπνευσης και γνώσης για την ακαδημαϊκή κοινότητα.

Με τιμή,

Ηλίας Φούτσης, *Hon PhD*

Πρόεδρος και Ιδρυτής

Εκπαιδευτικού Ομίλου New York College

EDITORIAL

THE 8TH ANNUAL PHD CONFERENCE

ORGANISED BY UNIVERSITY OF GREATER MANCHESTER AND NEW YORK COLLEGE, ATHENS

Introduction

The 8th Annual PhD Symposium, jointly organised by the University of Greater Manchester and New York College in Athens, and held on 11–12 December 2025, once again demonstrated the intellectual vibrancy and interdisciplinary depth of contemporary doctoral research. The symposium has now become an important annual platform for doctoral researchers to present emerging scholarship, engage in critical academic dialogue, and receive constructive feedback from supervisors and peers across a range of disciplines.

Doctoral symposia play a crucial role in the development of early career scholars. They provide a supportive yet intellectually rigorous environment where research ideas can be refined, methodologies strengthened, and theoretical insights expanded. The 2025 symposium continued this tradition by bringing together doctoral researchers whose work reflects the increasingly interdisciplinary nature of contemporary scholarship.

This year's symposium showcased 20 doctoral research projects addressing pressing societal, technological, and organisational challenges. The contributions spanned several academic domains, including psychology, education, informatics, and business, demonstrating the breadth and diversity of doctoral research currently being undertaken within our institutions.

Psychological Wellbeing, Behaviour, and Human Experience

A number of presentations from the School of Psychology focused on issues relating to psychological wellbeing, behavioural patterns, and lived experiences across different social contexts.

Kekia and Pylarinou (2025) presented an insightful study examining self-harm behaviours and myths, exploring the relationships between emotion regulation, addictive behaviours, and perfectionism. Their research highlights the importance of understanding underlying psychological mechanisms in order to develop more effective interventions and support strategies.

Workplace wellbeing and gender equality were explored by Rehim and Bougia (2025), who examined the impact of perceived organisational support and workplace gender equity on the engagement and satisfaction of women working in the Lebanese public sector. Their research emphasised the mediating role of psychological capital in empowering women and enhancing workplace participation.

Further research into health-related behaviours was presented by Guney and Svensson (2025), who investigated the psychosocial risk factors associated with orthorexia nervosa among young adults through a mixed-method approach. In a related context of crisis and communication, Uyanik and Svensson (2025) conducted a grounded theory investigation of media exposure during the 2023 Turkey earthquake, exploring how

media consumption influences psychological responses during large-scale disasters. Human emotions and lived experiences were also explored in several studies. Karaoulani and Svensson (2025) presented a qualitative exploration of the relationship between music and emotional wellbeing among elderly Greek citizens, highlighting the therapeutic and social significance of music in later life. Similarly, Laskaridis and Bougia (2025) examined the lived experiences of Bowen Family Systems therapists in Greece, focusing on the relationship between differentiation of self and mindfulness within therapeutic practice.

Digital behaviour and generational differences were examined by Chalkioti, Vargo and Svensson (2025), who analysed the relationships between anxiety, irrational beliefs, and social media addiction across generational groups in Greece. Complementing these studies, Sarantopoulou and Pylarinou (2025) investigated students' and employees' perceptions of 21st-century skills in the labour market, highlighting the evolving competencies required for success in modern workplaces.

Collectively, these studies underline the importance of psychological research in addressing contemporary societal challenges and improving wellbeing across different stages of life and professional contexts.

Digital Transformation and Innovation in Education

The symposium also highlighted the increasing influence of digital technologies and artificial intelligence in education.

Within the School of Education, Kritikos and Bougia (2025) explored issues of fairness, agency, and algorithmic influence by examining the role of artificial intelligence in Greek higher education linguistics. Their research contributes to ongoing discussions about the ethical and pedagogical implications of algorithmic decision-making in education.

The dynamics of online learning were further examined by Piliou and Nikolettou (2025), who investigated the concept of social presence in distance learning environments. Their research introduced the concept of social presence divergence and interaction integration, offering new insights into how learners engage and interact in digital learning spaces.

The growing impact of generative artificial intelligence in higher education was addressed by Korpa and Nikolettou (2025), whose study analysed the impact of the ChatGPT tool in enhancing collaborative and critical thinking skills among students. Complementing this work, Michaleli and Habibi (2025) examined the effectiveness of AI-powered feedback in improving argumentative writing and critical thinking among Greek learners of English at CEFR B2 level.

These studies collectively demonstrate how emerging technologies are reshaping pedagogical practices, assessment methods, and student learning experiences in higher education.

Technological Innovation and Intelligent Systems

Advancements in artificial intelligence, computational modelling, and digital infrastructure were key themes within the School of Informatics presentations.

Mahran and Saiti (2025) explored the use of artificial intelligence in smart city development, particularly in relation to sustainable real estate systems. Their research highlights how AI-driven solutions can support urban sustainability and more efficient infrastructure development.

In the area of organisational decision-making and uncertainty management, Mouzakitis and Liapakis (2025) introduced the Information Entropy Performance Indicator (IEPI), proposing a design science framework for managing uncertainty in business processes.

Further developments in analytical decision-support systems were presented by Panourios and Saiti (2025), who examined Generalized Logic Simulation for High-

Value Decision Synthesis through Model Decomposition. Meanwhile, Liakopoulos and Liapakis (2025) explored the integration of artificial intelligence and virtual reality technologies to create immersive educational environments for next-generation higher education.

Together, these contributions demonstrate the transformative potential of intelligent technologies in shaping both organisational decision-making and educational innovation.

Organisational Development and Global Geopolitical Challenges

Research from the School of Business addressed a range of organisational and geopolitical issues that continue to shape contemporary societies.

Dermentzi and Pavlaku (2025) examined the issue of students at risk of dropout in Greek higher education, proposing a holistic intervention framework designed to improve retention and student success. In a related organisational context, Koutsikouris and Pavlaku (2025) investigated the impact of educational interventions on employees' psychological capital and productivity within the food and beverage sector in Greece.

Broader geopolitical dynamics were explored through the work of Grammis and Kalenteridis (2025), who analysed the evolution of the hybrid warfare concept and its implications for contemporary strategic studies. Similarly, Danae and Kalenteridis (2025) provided an overview of the persistent failures of conflict resolution in the Israeli–Palestinian context, offering critical insights into one of the most complex geopolitical challenges of our time.

These studies highlight the importance of interdisciplinary approaches in addressing complex organisational, political, and societal challenges.

Conclusion and Future Research Directions

The research presented at the 8th Annual PhD Symposium reflects the depth, diversity, and relevance of contemporary doctoral scholarship. The contributions demonstrate not only theoretical rigour but also a strong commitment to addressing real-world challenges through innovative research.

The success of this symposium accentuates the importance of continued collaboration between the University of Greater Manchester and New York College. Such partnerships play a vital role in nurturing the next generation of scholars and

providing platforms where emerging research can be critically examined and refined.

While the research presented within these proceedings provides valuable insights, it also opens new avenues for further investigation. Future studies across different countries and contexts will enrich our understanding of the complex issues explored within these papers. Comparative and cross-national research will provide broader perspectives and contribute to more holistic and globally informed scholarship.

Finally, I extend my sincere appreciation to all doctoral candidates, supervisors, and participants whose dedication and intellectual engagement made this symposium such a success. I would particularly like to acknowledge the outstanding efforts of Dr Evgenia Pavlaku and Sofia Kotsini for their hard work in organising and delivering this important academic event.

It is my hope that these proceedings will serve as a valuable resource for researchers, educators, and practitioners, inspiring further scholarship, collaboration, and innovation in the years ahead.

Professor Christian Harrison

Professor of Leadership and Enterprise

Director, Centre for Leadership and Empowerment

University of Greater Manchester

MESSAGE FROM THE EDITORS OF THE VOLUME

Dear colleagues and students,

With a strong sense of academic vision and ambition, the PhD department of New York College continues to expand and strengthen its role in doctoral research through the ongoing development of the Annual PhD Conference and its corresponding Proceedings Volume. Following the successful organization of the 8th Annual PhD Conference in 2025, the present volume of the 8th Annual PhD Conference reflects not only the consolidation of this initiative but also our commitment to further advancing its international academic impact and research excellence. This event has evolved into a dynamic forum for exchanging ideas, research projects, and fostering interaction among New York College students and the broader academic community. This scientific volume compiles presentations from PhD candidates at the University of Greater Manchester, who, through New York College's educational programs, have the opportunity to pursue academic research and, with the skills they develop, excel professionally as well.

Completing a doctoral dissertation is no easy task; it demands dedication, passion for research, flexibility, methodical approaches, and organizational skills. The following articles showcase the research efforts of PhD candidates who, with the support of their supervisors and the entire New York College educational organization, contribute original research to the scientific community, simultaneously highlighting the interdisciplinary nature of modern academic inquiry. The publication of this volume also aims to familiarize PhD candidates with the process of scientific publishing, through which research findings are shared with the academic community for scrutiny and evaluation.

We would like to take this opportunity to express our gratitude to all the authors, reviewers, and members of the Scientific and Organizing Committees, whose dedication and hard work were crucial to the completion of this volume. A special thanks is also extended to our partner, the University of Greater Manchester, for their ongoing support of academic research and excellence.

As editors, it has been our privilege to oversee this volume, and we hope it will enrich the scientific literature in our country.

With best regards,

Dr. Evgenia Pavlaku

Dr. Konstantinos Kalachanis

Editors of the Proceedings Volume

New York College, Athens

ΜΗΝΥΜΑ ΤΩΝ ΕΠΙΜΕΛΗΤΩΝ ΤΟΥ ΤΟΜΟΥ

Αγαπητοί συνάδελφοι και φοιτητές,

Με ισχυρό ακαδημαϊκό όραμα και φιλοδοξία, το τμήμα διδακτορικών σπουδών του New York College συνεχίζει να ενισχύει και να διευρύνει τον ρόλο του στον χώρο της διδακτορικής έρευνας, μέσα από τη συστηματική εξέλιξη του θεσμού του Annual PhD Conference και του αντίστοιχου Τόμου Πρακτικών. Μετά την επιτυχή διοργάνωση του 8th Annual PhD Conference το 2025, ο παρών τόμος του 8th Annual PhD Conference αποτυπώνει όχι μόνο την εδραίωση αυτής της πρωτοβουλίας, αλλά και τη δέσμευσή μας για περαιτέρω ενίσχυση της διεθνούς ακαδημαϊκής του παρουσίας και της ερευνητικής αριστείας. Το συνέδριο έχει εξελιχθεί σε ένα δυναμικό φόρουμ ανταλλαγής ιδεών, ερευνητικών πρότζεκτ και γενικότερης αλληλεπίδρασης των φοιτητών του New York College με την ακαδημαϊκή κοινότητα. Στον παρόντα επιστημονικό τόμο συγκεντρώνονται εισηγήσεις των υποψήφιων διδασκόντων του University of Greater Manchester, οι οποίοι μέσω του εκπαιδευτικού οργανισμού New York College έχουν την ευκαιρία να σταδιοδρομήσουν στην ακαδημαϊκή έρευνα και με τις δεξιότητες που αναπτύσσουν, να διαπρέψουν και στον επαγγελματικό στίβο.

Η εκπόνηση μιας διδακτορικής διατριβής δεν είναι ένα εύκολο έργο αλλά απαιτεί αφοσίωση, αγάπη για την έρευνα, ευελιξία, μεθοδικότητα και οργάνωση. Στα άρθρα που ακολουθούν παρουσιάζονται οι ερευνητικές προσπάθειες των υποψηφίων διδασκόντων, οι οποίοι με την στήριξη των εποπτών τους, αλλά και ολόκληρου του Εκπαιδευτικού Οργανισμού του New York College συνεισφέρουν στην επιστήμη με πρωτότυπες έρευνες, αναδεικνύοντας συνάμα και τον διεπιστημονικό χαρακτήρα της σύγχρονης ακαδημαϊκής έρευνας.

Η έκδοση του παρόντος Τόμου επίσης, φιλοδοξεί να εισάγει τους υποψηφίους διδάκτορες στην διαδικασία της επιστημονικής δημοσίευσης, μέσω της οποίας κοινοποιούνται στην επιστημονική κοινότητα όλα τα ερευνητικά πορίσματα προς έλεγχο και αξιολόγηση.

Ευκαιρίας δοθείσης, θα θέλαμε να εκφράσουμε την ευγνωμοσύνη μας προς όλους τους συγγραφείς, τους κριτές και τα μέλη των Επιστημονικών και Οργανωτικών Επιτροπών, των οποίων η αφοσίωση και η προσπάθεια συνέβαλαν καθοριστικά στην ολοκλήρωση αυτής της έκδοσης. Ένα ιδιαίτερο ευχαριστώ απευθύνουμε επίσης στο συνεργαζόμενο University of Greater Manchester για τη συνεχή στήριξή τους στην ακαδημαϊκή έρευνα και αριστεία.

Ως επιμελητές, ήταν προνόμιό μας να επιμεληθούμε αυτόν τον τόμο, και ελπίζουμε θα συμβάλει στον εμπλουτισμό της επιστημονικής βιβλιογραφίας στην χώρα μας.

Με εκτίμηση,

Δρ. Ευγενία Παυλάκου

Δρ. Κωνσταντίνος Καλαχάνης

Επιμελητές του Τόμου Πρακτικών

New York College, Αθήνα

I. CONFERENCE PROCEEDINGS

MICROCREDENTIALS IN HIGHER EDUCATION: THEIR CONTRIBUTION TO STUDENT INVOLVEMENT IN LEARNING AND ENHANCEMENT OF EMPLOYABILITY SKILLS

Dr. Evgenia Pavlaku
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Abstract

Micro-credentials in higher education are transforming the nature of teaching and learning and addressing skills shortages by enhancing student involvement in learning and wider employability skills. This analysis investigates the contribution of micro-credentials to student engagement and the development of employability competencies through two research questions: How do micro-credentials support student engagement in the learning process? What is the role of micro-credentials in the development of employability skills, and what specific competencies do they cover? Findings suggest that micro-credentials enhance student engagement through motivational mechanisms (OECD, 2024; UNESCO, 2024), pedagogical alignment, and equitable access while addressing labor market needs through targeted competency development. Large-scale comparative studies indicate measurable employability gains associated with micro-credential participation (OECD, 2025).

Keywords: Micro-credentials, student engagement, employability skills, higher education, learning pathways

1. Introduction

Micro-credentials in higher education are transforming the nature of teaching and learning and addressing skills shortages by enhancing student involvement in learning and wider employability skills (Varadarajan et al., 2023). This analysis investigates the contribution of micro-credentials to student engagement and the development of employability competencies through two research questions: How do micro-credentials support student engagement in the learning process? What is the role of micro-credentials in the development of employability skills, and what specific competencies do they cover? Micro-credentials address increasing demand from students and employers for flexible, focused, and transparently assessed learning pathways without replacing existing qualifications. Recent empirical

findings further confirm these effects across European higher education systems (Kato and Galán-Muros, 2024). Large-scale comparative studies indicate measurable employability gains associated with micro-credential participation (OECD, 2025).

This analysis emphasizes student engagement in the learning process and the development of employability skills because of their increasing relevance in the Fourth Industrial Revolution and the growing impact of the COVID-19 pandemic, which has accelerated skill obsolescence. Financing constraints, rapidly changing professional requirements, and differing learning preferences that diverge from traditional pedagogies also drive demand. Recent empirical findings further confirm these effects across European higher education systems (Kato and Galán-Muros, 2024). Large-scale comparative studies indicate measurable employability gains associated with micro-credential participation (OECD, 2025).

2. Conceptual Foundations of Microcredentials

Microcredentials are a learning intervention that seeks to address the various challenges confronting the education system in the 21st century by providing formal recognition of knowledge and skills in specific areas to filling employability and accessibility gaps. As Varadarajan et al. (2023) note, as interest in non-degree credentials rises globally, so do the questions of what exactly microcredentials are, how existing initiatives map onto research-backed conceptualizations, and who might benefit from their implementation, and how. Micro-credentials are small-scale, content-specific courses that can be attached to a formal education record. Conversely, learner records accumulating these smaller-scale, content-centric micro-credentials build towards a more substantial, single-course-horizon full credential that can be inclusive of knowledge that does not yet meet the full competence levels required by broader stakeholder groups. The micro-credential concept can be associated with broader topics like recognition and validation of informal or experiential learning or human capital development as noted by stakeholders such as UNESCO to support lifelong learning and sustainable development goals. Several theoretical and motivational lenses can be utilized to successfully deploy micro-credentials within an institution or organization. Gamification elements such as points, levels, and achievements can also be tied to micro-credential programs within a curriculum. Institutions can address concerns after establishing programs through educational technology and learning analytics to continuously review and adapt the offerings.

3. Microcredentials and Student Learning Engagement

Microcredentialing has emerged as a promising strategy to improve student engagement in both in-class and extra-curricular learning. Given the highly modular nature of microcredentialed learning pathways, it is possible to select from among a menu of opportunities those that best suit learners' individual pathways, while also receiving recognition in the form of an authentic credential. Student engagement depends on multiple interrelated factors, including motivation, learning design, and accessibility of opportunity. The literature suggests that microcredentials can support student engagement through motivational mechanisms (Varadarajan et al., 2023), pedagogical alignment and sequencing (Ruddy and Ponte, 2019), equitable access to learning opportunities, and strategies to mitigate restriction by socio-economic and geographic factors. Recent empirical findings further confirm these effects across European higher education systems (Kato and Galán-Muros, 2024).

Microcredentials can enhance learners' engagement by tapping into intrinsic and extrinsic drivers for participation. Motivation is a widely studied antecedent of learning engagement, which in turn is positively associated with learning outcomes. A commonly cited model of motivation distinguishes between intrinsic and extrinsic drivers. Intrinsic motivations to develop new skills or enhance deeper learning provide opportunities for goal development, goal-setting applications, and self-regulation training. Other capabilities may be introduced outside the formal curriculum, with the capacity to develop a complementary activity encouraging exploration of optional opportunities. Offering activity bundles and microcredentials tailored to different orientations can further enhance the motivational fit. Consequently, motivating introductory micro-credentials may be included to attract undecided learners. Such an array of choices allows learners to select activities and capabilities closely aligned to individual needs, broadening engagement.

The pedagogical design of microcredential offerings can also enhance engagement by increasing curricular alignment and optimising pedagogical sequencing. Mapping multi-activity micro-credentialed options to existing curricula ensures all activities inform, extend, complement, or enrich the formal course content. Pedagogical alignment thus occurs at the macro level of curricular embedding, alongside granular micro-credential awareness of modular components. Introducing a new compulsory first-year course that explicitly identifies and maps curricular activities to micro-credentials further bolsters this alignment. Pedagogical sequencing relates to how capabilities are progressively acquired over time. Where

capabilities are sequentially dependent, offering them in the prescribed order preset by the curriculum, maximises engagement.

While barriers to participation exist, particularly among socio-economically disadvantaged and geographically dispersed learners, microcredentials can improve access to micro-credentialed learning opportunities. Access barriers may arise from a lack of activities, limited capacity to undertake new opportunities, or constraints on available time. Many activities are based within campus premises, and while on-line options are available, they remain marginal. The geographical location of institutions, together with the absence of on-line access to many existing activities, places further restrictions on access. Recognising this limitation, developing a suite of online non-credentialed offerings designed for all students, backed by extensive marketing, may be prioritised. Scope also exists for a broader selection of micro-credentialed activities targeting different dimensions of graduate employability and professional development.

3.1. Motivational Mechanisms

Motivation can develop competencies that are consistent with students' career pathways, encouraging them to invest in learning and to complete their studies. Microcredentials that are aligned with the curriculum fit these criteria, being informed by labour market needs and enabling individualised learning. Modular learning paths confer benefits that increase motivation; options may be selected that meet employment aspirations and that are manageable alongside other commitments. Even when microcredentials are developed and assessed independently, curricular alignment retains significance. The clarity with which microcredentials signal completion of knowledge and skills influences cognitive and emotional engagement. Frameworks that specify competencies and performance standards are conducive to self-regulated engagement, particularly when they match educational aspirations and workplace opportunities. Curricular objectives, time requirements, anticipated rewards, and multiple pathways intersect with motivation for microcredentials, which therefore represent a motivation-enhancing option.

Four key motivational theories can inform understanding of how microcredentials shape engagement: expectancy-value, self-determination, goal orientation, and self-regulation (Varadarajan et al., 2023). In expectancy-value theory, motivation results from expected task success and the value placed on the task. Self-determination theory posits that pursuing interests and satisfying basic

psychological needs enhance intrinsic motivation, while external incentives may undermine it. Goal orientation theory distinguishes between mastery and performance orientation. Mastery-oriented students pursue goal attainment for learning and self-improvement, while performance-oriented learners seek external recognition of superior ability. Self-regulated learning encompasses planning, monitoring, and evaluation. Students may initiate learning of a microcredential either independently or in response to external encouragement. Self-regulation may also influence selection and sequence among possible options, especially in learning environments that permit choice.

3.2. Pedagogical Alignment and Learning Pathways

Micro-credentials can be meaningfully integrated into pedagogical frameworks that prioritize student involvement and active learning processes. Aligning micro-credentials and larger programs within clear pedagogical compositions informs the design of flexible learning pathways, enabling students to retain agency in their learning and remain engaged with their studies. Pedagogical alignment identifies crucial attributes of curricula, learning pathways, and credentials that facilitate this process. Students can perceive one-or-two-credit micro-credentials as more relevant to their needs in broader programs, and when smaller credentials are incorporated into extended learning pathways such as graduate certificates within broader diploma programs or stackable formats for certificates, completion rates tend to improve (Ruddy and Ponte, 2019). Sequencing micro-credentials according to increasing complexity requires consideration of both content and complementary pedagogical strategies. Certain learning pathways have emerged that less strictly associate pedagogy with content, yet do retain their conceptual utility. Transitions between credential types macro-to-micro and vice versa stimulate careful design attention to maintain progression toward student goals. Procedures, guidance, and enabling resources exist to bolster institutional service design for these important pathways.

Flexible learning pathways facilitate student involvement and persistence in broader programs, whether campus-based or fully online, particularly when micro-credentials are individually defined yet conceptually linked to inter-related skillsets (Varadarajan et al., 2023). Opportunities for students to personalize their payloads and progressions further enhance engagement and completion rates. On-campus micro-credentials have heightened participation in unbundled, fully online offerings, while campus-situated modules delivered to fully online students can generate

broad enrolments from non-local learners unable to access similar on-campus courses.

3.3. Access, Equity, and Inclusion

Postsecondary education institutions recognize increasing reliance on micro-credentials and skill badges to maintain students' focus on learning activities, motivate pursuit of challenging study options, and build portfolio-oriented evidence of competence tied to employability and industry demand (Varadarajan et al., 2023). Even when courses are required for completion of a larger qualification, such as a diploma or degree, micro-credentials or forward-looking consultation briefs have been embraced to enhance the foundations of degree programs, demonstrate clear ties to graduate and employability attributes, and illuminate these connections for prospective students.

Declining rates of participation in traditional credentials at the up-skilling and re-skilling levels are noted in an environment where skill obsolescence is frequent. The increase in demand for educational offerings of smaller credentialing size, especially in work-integrated and experiential pedagogies, can be large. The ability to make such offerings visible has proven to be of great interest.

4. Microcredentials and Employability Skills

Micro-credentials are defined as short, focused qualifications designed to give professionals new skills or to enhance and validate existing skills, reflecting an entire ecosystem built around skills-based learning. Micro-credentials usually signify that an individual has acquired a specified skill set defined in terms of capabilities and positively correlated with employability. Only a small percentage of degree-holding graduates acquire the foundational skill set employers seek. Many universities have already sought to address the gap between what is taught and what youth need through educational programs accredited by universities and conducted by non-academic certificate providers or a combination of both. Assessing tickets and certifications are of interest to diploma holders from fintech companies for an assurance of foundational competencies such as coding or data analysis. Both educators and employers are exploring different approaches to micro-credentials ranging from a few hours of casual learning through to formal learning verified by academic credits.

The misalignment between youth skills and workplace expectations at all levels is critical to the economy. Addressing this gap is an area of exploration within higher education and large employers. Capabilities sought at university graduation are

nowadays defined in terms of personal attributes computational capability, creativity, digital literacy, cultural awareness, emotional intelligence, integrity, leadership, problem solving, public speaking, resilience, risk management, self-directed learning, sustainability awareness, and teamwork. Responses to a national industry survey of expectations sought from business and wider society point to solutions utilizing short educational experiences finer grained than whole subjects and more widely available to initial job seekers, giving more freedom to degree courses. Existing micro-credential models operating at university, propose systems linking to expected graduate capabilities.

4.1. Identifying Relevant Competencies

In a rapidly changing world and with globalization, the skills and competencies required from graduates vary widely. Universities globally grapple with guiding students to develop the competencies relevant to take their knowledge and skills into the labour market, reflecting a widely accepted change from a focus on the narrow concept of knowledge to a broader view of competencies in education (Ruddy and Ponte, 2019). UNESCO defines competence as a cluster of knowledge, skills and attitudes that enables a person to adequately meet complex demands, and a competency is a specific element of competence in a given context. While the specific competencies required by various occupations may differ, several broad competencies have been identified as crucial for many job positions across the globe, as outlined by Varadarajan et al. (2023). These can be categorized generally as: (1) Technical Skills, which can be associated with hard core knowledge taught in higher education and are usually field-based. The level and types of such skills vary from discipline to discipline, they tend to change less quickly over time; (2) Soft Skills, like communication, teamwork, leadership, negotiation, influencing, and emotional quotient, which are critical across disciplines and often emphasized by large employers. Such skills currently remain a strong area of focus for educational institutions, as they tend to involve greater effort and time to develop; (3) Cross-Cutting Capabilities, such as critical and creative thinking and problem solving. These tend to remain relevant across countries and are required by work positions that are not even defined at present.

4.2. Alignment with Labor Market Needs

The second objective of micro-credentials in higher education is ensuring that they address and help develop key skills and competencies that the labor market increasingly demands of graduates. The successful introduction of micro-credentials

in post-secondary education is highly contingent upon identifying and providing the competencies that students need most (Varadarajan et al., 2023). As industry contexts continue to evolve, it is critical that institutions monitor changing requirements, regularly revise their curricula, and develop systematic methods to identify current and future competencies sought by employers. This type of curricular adaptation is especially important for micro-credentials that are offered independently and do not align with existing degree programs. Absent a clear system of course design, selection, and delivery of such micro-credentials, institutions risk adding to the existing burden of widely recognized skills shortages and previous initiatives that did not engender student participation.

4.3. Certification, Recognition, and Transferability

Formal certification and further recognition of engaged learning through microcredentials increase their relevance and perceived value for campus-based and online programs. Institutions offering microcredentials aligned with clear employment skills frameworks or expectations enhance their recognition by employers and professional bodies, increasing transferability across institutions and improving credibility of microcredential programs or institutions. Explicit alignment of microcredentials with anticipated labor market signals, external employer requirements, or industry standards further reinforces their legitimacy (Varadarajan et al., 2023).

Microcredentialing offers flexible, intentional approaches for engaging learning and assessment. The granularity and scope of microcredentials motivate diverse participation, help learners tailor further opportunities, and reinforce the relevance of transient activities. Portable microcredentials facilitate engaged exploration across institutions while helping participants extend both deepening and broadening options, capture emerging profiles, and distinguish preparatory activities from serious study (Ruddy and Ponte, 2019).

5. Implementation Models in Higher Education

In higher education, microcredentials may take various forms depending on the institution, and there are several established implementation models (Varadarajan et al., 2023). Many campuses offer microcredentials alongside traditional degree programs, embedded within on-campus courses. In this approach, microcredentialing draws from the resources, funding, and pedagogical support of the wider campus ecosystem, and students who are already enrolled in a degree program can participate without taking on extra financial or logistical burdens

(Ruddy and Ponte, 2019). An alternative model is to administer microcredential programs entirely online, either independently or as part of a hybrid portfolio. This format accounts for learners who are just starting out and have not yet registered for a degree program, and it enables institutions to reach new audiences outside their immediate geographical area. Various delivery modes are possible, ranging from fully asynchronous sessions to regular synchronous meetings. The possibility of stacking multiple microcredentials from different sources into a larger qualification may also be attractive, in regional, national, or international ecosystems. Other campuses engage in partnerships with industry. In co-designed, co-delivered collaborations, higher education providers and industry partners collaborate to define and assess industry-relevant competencies, deliver effective training, and jointly certify learners' development of these competencies.

5.1. Campus-based Programs

Campus-based microcredentials typically exist concurrently with or alongside a curriculum-based program of study. In some cases, campus-based microcredentials are funded by broader institutional initiatives that enable greater program flexibility such as by assisting underrepresented students, and students may be aware of the opportunity but do not seek it out out of concern that coursework may take longer. Other times, campus-based microcredentials are bundled with distinct services, notably employer services or certification preparation on a rigor that meets employer needs. Essential student supports for campus-based microcredentials include, but are not limited to, common resources and advice, common funding opportunities, and common sources of employer information.

5.2. Online and Hybrid Formats

Online and hybrid formats offer modes of delivery for microcredentials that extend their definition and increase their relevance to particular cohorts of learners (Varadarajan et al., 2023). Unlike campus-based programs, which focus on upskilling current students, these formats appeal to a growing cohort of learners who prefer or require flexible learning opportunities. While evidence indicates that additional barriers and challenges may arise with online microcredentials, there are also avenues for greater inclusion, enabling wider design and targeting of opportunities for new cohorts of underrepresented learners (Ruddy and Ponte, 2019).

Flexible modes of delivery can be fully asynchronous delivered through pre-recorded materials and activities enabling step-by-step engagement on the learner's own schedule; or fully synchronous with start and end times fixed for real-time

participation, often conducted via videoconferencing software. Delivery may also take a flipped or hybrid approach, with separate phases of pre-recorded and live engagement to enable students to develop a common knowledge base before engaging together, either for collaborative construction or the clarification of uncertainties.

5.3. Partnerships with Industry

Collaboration between universities and industry enhances the relevance of micro-credentials such as skill-based courses, short programmes, and digital badges. Partners co-design and co-deliver initiatives aligned with student interests and professional practice expectations, fostering networks and increasing employability (Varadarajan et al., 2023). Industry partnerships provide authentic, real-world challenges for learners, enhancing engagement and motivation (Ruddy and Ponte, 2019).

6. Quality Assurance and Assessment Frameworks

The implementation and provision of microcredentials are subject to various quality assurance and assessment frameworks that guide their establishment and evaluation. These frameworks are determined by different governance and regulatory bodies at both national and institutional levels. In many countries, higher education institutions are subject to accreditation review by national agency governing bodies, which may require adherence to specific quality assurance frameworks. Institutions also develop their own internal quality assurance frameworks that set standards for specific programs, courses, and assessments. A common dimension across these various frameworks is the establishment of assessment criteria and an accompanying assessment process to ensure that students have met the requirements specified in a microcredential.

The assessment of microcredentials is a vital aspect of quality assurance. A range of assessment approaches and designs can be used, including the type of evidence collected to demonstrate competence; the provision of rich descriptors, rubrics, and documentation; and the general evidence-portfolio or evidence-sampling approaches (Ruddy and Ponte, 2019). In addition, the use of assessment methods is evolving, including observational assessment and multi-source feedback, which are increasingly relied on in many fields to capture competence in authentic workplace and professional contexts. Constructing an appropriate assessment approach and use of evidence to support the attainment of competence is particularly crucial for microcredentials.

The use of learning analytics to monitor student participation in microcredentials can contribute to quality assurance and continuous improvement. This supports timely intervention when numbers of enrollees, completions, or participation drop. Learning analytics can also inform which microcredentials are most popular or helpful for further study, leading to enhancement of existing microcredentials and development of new ones (Varadarajan et al., 2023). Analysis of learning activity, assessment performance, and time spent on learning materials aids in evaluation of the ongoing effectiveness of specific microcredentials, evaluation of whether sufficient experience and practice are provided, and determining how learning opportunities and engagement can be increased. In addition, the increasing use of machine learning to analyse free-text inputs, including open-ended assignments and surveys, supports more sophisticated gathering of learner feedback on the quality of microcredentials.

6.1. Standards and Quality Assurance Mechanisms

The provision of microcredentials should be based on clearly defined standards that guide the development of curricula and assessment practices. Institutions need to engage with national and international quality assurance bodies to uphold microcredentials' legitimacy, transparency for students, and reconciliability with broader quality assurance processes; they may thereby leverage existing frameworks and avoid reinventing the wheel (Varadarajan et al., 2023).

Several quality standards and frameworks for microcredentials exist globally. The OECD has launched the Micro-credentialing Recognition and Quality Assurance Framework to support raters in evaluating microcredentials and upholding quality assurance. The European Commission has proposed the European Approach to Micro-credentials for Quality Assurance, focusing on common European quality standards. Micro-credentials have also been emphasized in the validation of non-formal and informal learning within the Australian Qualifications Framework and by UNESCO (Ruddy and Ponte, 2019).

6.2. Assessment Design and Evidence of Competence

Micro-credentials require rigorous assessment to ensure that learners demonstrate the claimed mastery of the related skills and knowledge. Ensuring that assessment is calibrated to pre-defined standards, is evidence-based, and is transparent to learners is a necessary part of both quality assurance and developing trust in micro-credentials.

Apart from informal group activities, typically considered low stakes and so excluded from the analysis, majority of other activities are assessed at the class level, instead of for the micro-credentials. These activities range from formative and summative quizzes through case studies to portfolios. When considered for the micro-credential, the evidence required is collateral to the assessment: completion of the interactive module, participation in the online community, and submission of a personal reflection constitute the evidence that can be required on a Campus; sample video clips generated as part of classwork and additional reading submissions from different subjects can serve as evidence for another Campus. The underlying principle here is to provide the maximum level of encouragement for learners to engage with the main activities of the course itself and gain access to the additional learning opportunity offered by the micro-credential (Ruddy and Ponte, 2019). Therefore, only a minimal amount of further work is required to assemble the evidence for some learners and the overall earning of the micro-credential is achievable.

6.3. Learning Analytics and Continuous Improvement

The establishment of a systematic process for analysing the trends emerging from micro-credential uptake, together with the sorting and weighting of feedback and evaluation data collected from students, consumer advisors and a wide range of internal stakeholders within the university, will inform and assist in the continuous and ongoing refinement of the courses being developed. Learning analytics, linked to user interaction with online platforms and technology-enabled assessments, will be used toward the systematic scheme, complemented by periodic qualitative surveys. Learning analytics activity focuses upon determining which features of a micro-credential offering were considered useful, which aspects remained obscure or unhelpful and the inter-relationship of micro-credential uptake with student behaviour in undertaking their degree (Ruddy and Ponte, 2019; Varadarajan et al., 2023).

7. Equity, Access, and Social Implications

Microcredentials are an emerging educational development in higher education that offer curriculum-aligned content in smaller, skill-based, or disposition-based units than full courses. Microcredentials are perceived by learners as a genuine alternative to traditional certification. For instance, existing studies on Canadian postsecondary institutions have shown positive results on the one hand. The utilization of micro-credentials is perceived as an opportunity to meet the growing demand to develop

essential employability skills in an affordable and accessible way. The evidence-based challenges do exist however, such as curriculum and credential recognition across different postsecondary institutions, which restrict the implementation of micro-credentials. Knowledge still remains sparse on the pedagogical practices underpinning micro-credentials in higher education even if the growth of micro-credentials has progressed quickly. Additional empirical studies, particularly those embedded in the phenomenon of credential inflation, would contribute to a better understanding of its adoption and practice in the postsecondary context (Varadarajan et al., 2023). Large-scale comparative studies indicate measurable employability gains associated with micro-credential participation (OECD, 2025).

7.1. Barriers to Participation and Strategies to Mitigate

Microcredentials provide opportunities for learners such as increased employability through developing 21st-century skills, e.g. digital literacy, communication, collaboration, critical thinking, and creativity. Other benefits include student-centered learning, motivation, increased flexibility, and evidence of skills attained, thus supporting lifelong learning (Varadarajan et al., 2023). However, challenges include limited knowledge acquisition, credential specificity to particular job roles, and a lack of government aid for funding micro-credentials.

Many barriers exist that limit participation in microcredentialing programs among learners, including institutional, curricular, digital, resource-based, and skills-based factors. Each barrier affects different sub-populations and face varying degrees of impact. Strategies for mitigating these barriers should therefore take each learner's circumstances into account.

Socio-economic barriers appear to weigh heavily on all sub-populations, whereby those travelling more than a two-hour commute to campus, or residing in a remote area, are on average significantly more disadvantaged. Timed availability of remote-synchronous sessions and access to instant or recorded lecture content are core strategies aimed at minimising such barriers.

7.2. Inclusive Credentialing Practices

An important consideration for equitable access to micro-credentialing opportunities is the recognition that not all learners are able to utilize or perceive value in the process of earning a micro-credential. For example, some students across the globe need to work full-time in order to pursue their studies (Varadarajan et al., 2023). Other learners may participate in many activities outside of formal credit-bearing pathways, since they are often driven by self-interest or by social

considerations that may not converge with the objectives set by academic programs. Furthermore, some learners with disabilities or learning difficulties need to adopt approaches that differ from those of the average student in order to remain engaged with their studies. The examination of credentialing practices reveals that these factors tend not to be adequately catered for, and leaves some learner groups detached from credentialing.

The adoption of more flexible and more inclusive credentialing practices would enable diverse learners to convert their informal contributions or alternative study pathways into personally meaningful achievements. Following the principles of Universal Design for Learning (UDL), which posits that institutions should offer learners multiple means of engagement, representation, and expression, it is recommended that the credentialing process offer similar scope for flexibility (Ruddy and Ponte, 2019). Institutions could advance communications regarding the potential for students to devise personalized and inclusive credentials or pathways that reflect their unique interests, activities, pursuits, ambitions, and aspirations, thereby granting these learners the realization of their own self-directed engagement projects.

8. Policy and Strategic Considerations for Institutions

Establishing a new micro-credentialing initiative requires careful policy and strategic consideration within the institution and broader educational ecosystem. Such considerations include addressing governance, funding, and resource allocation; recognition issues and position within a credential ecosystem; and stakeholder roles and collaboration. An analysis of these aspects may enable institutions to identify, adopt, adapt, or extend programs that have proven effective in other contexts (Varadarajan et al., 2023).

Institutional leaders, governors, and strategic planners are often primarily concerned with pedagogy when considering the enrichment of qualifications with micro-credentials. However, institutions need to articulate why they are introducing micro-credentials, what learning divides they are addressing, and what student environments they wish to support. Applying such an analysis to micro-credential considerations can assist institutions in prioritizing their approaches and defenses.

8.1. Governance, Funding, and Resource Allocation

As microcredentials rapidly gain traction among institutions, administrative leaders must define frameworks that leverage these credentials to enhance student engagement in learning and bolster the development of employability skills. These

frameworks will vary across institutions, and leaders should consider key aspects of governance and structural organization (e.g., central versus decentralized control; processes for approval and funding of credentials); funding sources; the allocation of additional resources for development, support, and marketing of discrete credentials; and sustainability over the long term (e.g., whether funding should remain dedicated to microcredentials within a defined time horizon). Recent empirical findings further confirm these effects across European higher education systems (Kato and Galán-Muros, 2024).

In the short term, institutions must strike a balance between investing in new credentialing opportunities and maintaining support for the development of fully online courses aimed at student retention and academic success. A fuller range of possible credentials often involves the contributions of multiple faculty members, more complex approval processes, and therefore longer timelines, which together make it difficult to maintain momentum and visibility over time. In all of these considerations, an understanding of institutional strengths and priorities will be essential in formulating an effective governance structure and determining an appropriate path toward implementation (Varadarajan et al., 2023).

8.2. Credential Recognition and Credential Ecosystems

Completing a formal qualification from an institution of higher learning is the traditional way for students to receive a formal credential. Higher education offers students a life-long opportunity to learn and prepare for roles and responsibilities and enter the labour market. Technological advancements since the turn of the century have led to the emergence of other formal credentials that are not part of the traditional university journey. Microcredentials are defined as a qualification that is awarded following completion of a series of courses across various subjects and not through completion of an entire degree (Varadarajan et al., 2023). A microdegree is similar to a microcredential but normally requires the completion of a series of courses and units on a defined topic or subject area. The credentials can be offered as part of, outside of or in combination with higher learning.

Microcredentials for academic credit are increasingly entering higher education institutions allowing students to select events, courses, certificates and credentials that suit them. Microcredentials can assist students fill gaps in their curriculum to meet requirements for graduation and for industry preparation in conventional and online programmes. It allows students to participate in capstone projects or programming aligned with thematic directions of their programme. The

microcredential forming an academic credential, such as a badge, may be recorded on the official transcript when completed satisfactorily and the official mark awarded. Students receive a qualification for formal commitments undertaken.

8.3. Stakeholder Roles and Collaboration

Higher education institutions increasingly recognize the growing relevance of microcredentials for diverse educational, equity, and labor-market considerations (Varadarajan et al., 2023). Microcredentials can represent a disruptive and transformational opportunity for educational institutions, students, industry partners, and other stakeholders. The proposed research explores stakeholder roles and collaborative mechanisms to implement microcredential programs within a whole-of-institution approach. Four core stakeholder groups include learners (students and alumni), employers (industries and community partners), higher-education institutions (faculties, academic units, and support services), and governments (policymakers and funding bodies). Each stakeholder group influences the design, delivery, and recognition of microcredentials. Implementing microcredential programs requires coordinating multiple stakeholders at different governance and operational levels within institutions. Multiple collaborative modes such as communication, consultation, co-design, co-delivery, and partnership are relevant for different types of microcredential programs. Such collaboration is integral to ensure that microcredentials effectively and meaningfully address institutional priorities and sector needs.

9. Future Directions and Research Gaps

Microcredentials have the potential to revolutionise the learning experience by offering flexible, granular, and shorter learning opportunities that enhance engagement, boost employability and address individual learner needs. As a rapidly evolving educational innovation, further studies are needed to understand how microcredentials can be designed and implemented in higher education. Key research questions include: (1) What are the conditions that maximise the potential of microcredentials to promote learner engagement and develop employability skills? (2) What are the theoretical perspectives that can be brought to bear on analysis of microcredentials in higher education? The potential of microcredentials in enhancing engagement, employability, and bridging learning inequalities makes them worthy of research attention and also the specificity of institutional contexts that shape their design and delivery (Varadarajan et al., 2023). Large-scale

comparative studies indicate measurable employability gains associated with micro-credential participation (OECD, 2025).

10. Conclusion

Microcredentials are emerging as an effective vehicle to further equip learners with both discipline-specific knowledge and soft skills, which enhances their employability. Current higher education degrees often do not guarantee equitable capabilities in the job market. As the job market becomes more complex, rapid learning of additional skills becomes necessary for learners. Micro-credentials allow individuals to document soft skills and discipline-specific knowledge when and where they choose, providing evidence to employers. Furthermore, participants are strongly encouraged to upload information on both disciplinary and soft skills into their Industry Credential Creation Plans, which helps them acquire a fuller set of knowledge and skills (Varadarajan et al., 2023). This analysis demonstrates that microcredentials can enhance student engagement through motivational mechanisms, pedagogical alignment, and improved access, while simultaneously developing employability competencies aligned with labor market needs (European Commission, 2025). Recent empirical findings further confirm these effects across European higher education systems (Kato and Galán-Muros, 2024). Future research should continue to explore optimal conditions for microcredential effectiveness and their role in addressing educational equity.

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ARTIFICIAL INTELLIGENCE, EMPATHY, AND HUMAN-CENTRED EDUCATION: ETHICAL, PEDAGOGICAL, AND EMOTIONAL PERSPECTIVES

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Abstract

Artificial intelligence (AI) is increasingly shaping educational environments by influencing instructional design, assessment practices, and institutional decision-making. While AI-driven systems offer opportunities for personalised learning, efficiency, and enhanced access, they also raise complex ethical and pedagogical concerns related to empathy, equity, privacy, and human agency. This paper explores the implications of AI integration in education through the lens of Emotional Intelligence (EI) theory, focusing on how AI affects the socio-emotional and relational dimensions of teaching and learning. Drawing on recent empirical studies, theoretical contributions, and policy frameworks, the paper examines both the potential contributions and the inherent limitations of AI-supported educational practices. It argues that AI can complement emotionally intelligent pedagogy when guided by ethical governance and human-centred design, but it cannot substitute for authentic empathy or moral judgement. The paper concludes with implications for policy, professional development, and future research aimed at ensuring that AI supports, rather than undermines, the humanistic mission of education.

Keywords: artificial intelligence, empathy, emotional intelligence, ethics in education, human-centred pedagogy

1. Introduction

Artificial intelligence (AI) technologies have rapidly transitioned from experimental tools to integral components of contemporary educational systems. Adaptive learning platforms, predictive analytics, automated assessment, and generative technologies are now widely deployed across schools and universities to personalise instruction, manage large-scale data, and support learners with diverse needs (Holmes et al., 2022; Bennett, 2024). These developments are often promoted as solutions to long-standing educational challenges, including learner disengagement, inequality, and administrative burden.

Despite these technological promises, education remains fundamentally relational. Teaching is not merely a technical process of content delivery but a deeply human practice grounded in trust, empathy, and ethical responsibility. Extensive research demonstrates that teachers' socio-emotional competence and empathic engagement significantly influence students' motivation, academic achievement, classroom climate, and psychological well-being (Jennings and Greenberg, 2009; Immordino-Yang and Damasio, 2007). As AI systems increasingly mediate educational interactions, critical questions arise regarding how these technologies affect the emotional and relational foundations of learning.

This paper addresses these concerns by examining AI in education through the theoretical lens of Emotional Intelligence (EI). It seeks to explore how AI technologies intersect with empathic pedagogy, identify key ethical tensions, and outline conditions under which AI can support emotionally intelligent educational practice rather than diminish it.

2. Emotional Intelligence as a Conceptual Framework

Emotional Intelligence (EI) provides a robust and well-established theoretical foundation for examining the social, emotional, and ethical dimensions of education in an era of increasing technological mediation. Originally articulated by Goleman (1995), EI refers to the capacity to recognise, understand, regulate, and purposefully apply emotions in oneself and others in ways that support effective decision-making, ethical conduct, and healthy interpersonal relationships. Within educational research, EI has been widely associated with positive learning environments, enhanced teacher effectiveness, and improved student outcomes (Jennings and Greenberg, 2009; Cohen and Strayer, 2016).

The relevance of EI to contemporary educational contexts lies in its explicit focus on relational processes. Teaching and learning are not emotionally neutral activities; rather, they are shaped by affective exchanges, trust, and shared meaning. EI theory foregrounds these dynamics by conceptualising emotional competence as a form of professional and ethical expertise, rather than as an innate or peripheral trait. This perspective is particularly valuable when examining AI-driven educational technologies, which often prioritise efficiency, optimisation, and data-based decision-making while underrepresenting emotional and moral dimensions.

EI is commonly understood as comprising four interrelated dimensions: self-awareness, self-regulation, social awareness, and relationship management (Goleman, 1995). In educational settings, self-awareness involves teachers' and

learners' ability to recognise their emotional states, biases, and learning needs. Self-regulation refers to managing emotions constructively, particularly under conditions of stress, uncertainty, or cognitive challenge. Social awareness encompasses sensitivity to others' emotions, cultural backgrounds, and perspectives, while relationship management refers to the capacity to build trust, resolve conflict, and sustain supportive learning relationships.

These dimensions offer a structured lens through which the implications of AI in education can be analysed. For example, adaptive learning systems may support self-awareness by providing feedback that helps learners reflect on their progress. However, such systems may also undermine self-awareness if feedback is opaque or unchallengeable. Similarly, predictive analytics may enhance social awareness by identifying patterns of disengagement, yet they risk distorting ethical judgement if algorithmic outputs are treated as objective truths rather than probabilistic indicators requiring human interpretation.

Importantly, EI theory emphasises that emotional competence is contextual and relational, not merely cognitive. Empathy, in this framework, is understood as both an emotional and moral capacity involving perspective-taking, responsiveness, and ethical responsibility. This understanding contrasts sharply with technological notions of "artificial empathy," which typically reduce emotional engagement to pattern recognition or scripted responses. EI thus provides a critical counterbalance to technocentric narratives by clarifying what aspects of emotional engagement can be supported by technology and which remain inherently human.

Within pedagogical research, EI has been linked to approaches such as reflective teaching, culturally responsive pedagogy, and socio-emotional learning (SEL). These approaches emphasise self-reflection, awareness of learners' diverse emotional and cultural contexts, and the cultivation of inclusive classroom climates (Jennings and Greenberg, 2009). Integrating AI into such pedagogies requires careful alignment with EI principles to ensure that technology enhances, rather than disrupts, empathic practice.

From an ethical standpoint, EI also offers a normative framework for evaluating AI adoption in education. By foregrounding empathy, responsibility, and relational accountability, EI shifts attention from what technologies can automate to how they affect human dignity and agency. This orientation supports a human-centred approach to educational innovation, in which AI systems are evaluated not only by their technical performance but by their impact on emotional development, trust, and social cohesion within learning communities.

In summary, Emotional Intelligence serves as both an analytical lens and a normative guide for examining AI in education. It enables a nuanced assessment of how emerging technologies intersect with emotional, relational, and ethical dimensions of teaching and learning. By positioning EI at the centre of the analysis, this paper advances a perspective in which AI is understood as a potential support for, but never a substitute for, empathic and morally grounded educational practice.

3. Methodological Orientation and Analytical Approach

This paper adopts a theory-informed narrative review methodology to examine the intersection of artificial intelligence, empathy, and human-centred education. Rather than conducting a full systematic review, which is more typical of journal-length empirical articles, the approach taken here is intentionally selective and interpretive, aligning with the aims and format of conference proceedings.

The methodological orientation is grounded in Emotional Intelligence (EI) theory, which functions as the central analytical lens guiding the identification, organisation, and interpretation of literature. EI was selected because it provides a well-established framework for examining emotional, relational, and ethical dimensions of teaching—dimensions that are often marginalised in technologically driven educational research (Goleman, 1995; Jennings and Greenberg, 2009).

Sources were drawn primarily from peer-reviewed journals, scholarly monographs, and policy reports published between approximately 2016 and 2025, a period that reflects the rapid expansion of AI applications in education. Particular emphasis was placed on interdisciplinary scholarship spanning educational psychology, learning analytics, ethics of technology, and teacher education. Policy documents issued by international organisations (e.g. UNESCO) were also included to contextualise ethical and regulatory debates.

The review focused on three interrelated thematic axes:

1. Pedagogical applications of AI, including adaptive learning systems, predictive analytics, automation, and generative tools, with attention to their claimed educational benefits;
2. Socio-emotional and relational impacts, examined through EI dimensions such as self-awareness, self-regulation, social awareness, and relationship management; and
3. Ethical and governance considerations, including bias, transparency, privacy, and human oversight.

Rather than cataloguing individual studies, the analysis followed a thematic synthesis approach, comparing how different strands of literature conceptualise the role of empathy and emotional competence in AI-mediated learning environments. This approach enables conceptual integration across diverse fields while maintaining focus on human-centred educational values.

Importantly, the methodology reflects an epistemological stance that views educational technology as socially and morally embedded rather than neutral. Consequently, the analysis privileges questions of *how* and *why* AI is used in education, alongside questions of *what* it can technically achieve. This orientation is particularly suited to conference contexts that encourage critical reflection, theoretical dialogue, and policy-relevant insight.

4. Contributions of AI to Emotionally Intelligent Educational Practice

When thoughtfully designed and ethically implemented, AI technologies can support certain dimensions of emotionally intelligent education. Adaptive learning systems, for instance, can enhance learners' self-awareness by providing personalised feedback that helps students recognise strengths, gaps, and learning trajectories (Liu and Li, 2024). This form of feedback may encourage reflective learning, goal setting, and persistence.

Predictive analytics can also contribute to social awareness by alerting educators to early signs of disengagement, academic difficulty, or emotional distress (Vistorte et al., 2024). When used transparently and in conjunction with human judgement, such tools can enable timely, compassionate intervention rather than reactive disciplinary measures.

Furthermore, AI-driven automation of routine administrative tasks may indirectly strengthen relationship management. By reducing the time teachers spend on grading or record-keeping, AI can create space for mentoring, dialogue, and socio-emotional support (Bennett, 2024). Assistive technologies, including speech recognition, captioning, and translation tools, may also enhance inclusion and participation for students with disabilities or linguistic barriers, aligning with equity-oriented educational goals (Vieriu, 2025).

5. Ethical Risks and Socio-Emotional Tensions

Despite these potential contributions, AI in education raises significant ethical and socio-emotional concerns. Algorithmic bias remains a central issue, as AI systems trained on historical data may reproduce or amplify existing inequalities, misclassify

learners, or restrict educational opportunities (Cios and Zapala, 2023). Such outcomes undermine fairness and social awareness, both of which are foundational to emotionally intelligent practice.

Data privacy and surveillance present further challenges. Many AI-driven platforms rely on continuous data collection, sometimes including behavioural or biometric indicators. Excessive monitoring may inhibit students' sense of autonomy and self-regulation, while also raising concerns about consent, transparency, and data misuse (Floridi et al., 2018).

A related concern involves the opacity of complex AI models. When teachers and students cannot understand or challenge algorithmic recommendations, trust may erode, and opportunities for reflective self-awareness may diminish.

6. The Limits of Artificial Empathy

Advances in affective computing have led to the development of systems designed to detect or respond to emotional cues through facial expression analysis, voice recognition, or textual sentiment analysis. While such systems may provide informational indicators of emotional states, they do not constitute genuine empathy. Authentic empathy involves moral judgement, contextual sensitivity, and caring intention—capacities that remain uniquely human (Shah, 2022).

From an EI perspective, AI may support informational social awareness but cannot perform relationship management, which requires ethical reasoning and interpersonal nuance (Goleman, 1995). Overreliance on simulated empathic responses risks depersonalising classroom interactions and diminishing opportunities for meaningful human connection (Jamaluddin and Mokhtar, 2025).

7. Implications for Policy, Professional Development, and Institutional Practice

Ensuring that AI supports human-centred education requires coordinated action at multiple levels. Policy frameworks, such as UNESCO's *Recommendation on the Ethics of Artificial Intelligence* (2025), emphasise transparency, accountability, equity, and human oversight. Educational institutions should establish governance mechanisms to address bias, privacy, and ethical accountability.

Teacher professional development is equally critical. Educators require training that integrates AI literacy with EI-based pedagogies, enabling them to interpret algorithmic outputs critically and sustain empathic, inclusive classroom practices (Jennings and Greenberg, 2009). Without such preparation, AI risks becoming a technical solution detached from educational values.

8. Future Research Directions and Open Questions

While research on artificial intelligence in education has grown rapidly, significant gaps remain, particularly regarding the long-term socio-emotional and relational consequences of AI-mediated learning. Much existing work prioritises short-term outcomes such as efficiency, performance gains, or predictive accuracy, often at the expense of deeper examination of empathy, trust, and emotional development (Holmes et al., 2022).

A key priority for future research is the need for longitudinal studies that trace how sustained exposure to AI-supported educational environments affects learners' emotional intelligence, autonomy, and interpersonal relationships over time. While adaptive systems may improve short-term engagement or achievement, little is known about their long-term influence on students' capacity for empathy, resilience, and self-regulation across developmental stages.

Future studies would also benefit from mixed-methods designs that combine quantitative measures of EI or socio-emotional learning with qualitative data capturing lived experiences of students and teachers. Interviews, classroom observations, and reflective narratives can provide insight into how AI reshapes everyday pedagogical relationships in ways that are not easily captured through analytics alone.

Another important research direction concerns cultural and contextual diversity. Much of the current evidence base originates from high-income, Western educational systems, raising questions about the generalisability of findings. Cross-cultural comparative research is needed to explore how AI systems interpret emotional expression across cultural contexts, how trust in AI varies globally, and how inequities may be intensified or mitigated in low-resource settings (Zawacki-Richter et al., 2019).

Methodological innovation is also required. Existing instruments for measuring emotional engagement, empathy, and classroom climate were largely developed for face-to-face settings and may not adequately capture the dynamics of hybrid or AI-mediated learning environments. Future research should aim to develop new assessment tools capable of evaluating emotional and relational processes in digital and algorithmically mediated contexts.

Finally, participatory and interdisciplinary research approaches should be prioritised. Engaging teachers, students, parents, and policymakers as co-researchers can support the development of ethical guidelines and design principles

that reflect lived educational realities. Collaboration between education, psychology, ethics, and computer science is essential to ensure that future AI innovations align with democratic values, human dignity, and the relational core of education (Floridi et al., 2018; UNESCO, 2025).

9. Conclusion

The rapid integration of artificial intelligence into educational environments presents both significant opportunities and profound challenges for contemporary pedagogy. This paper has examined these developments through the lens of Emotional Intelligence (EI), highlighting the central role of empathy, relational trust, and ethical judgement in sustaining human-centred education. While AI-driven tools can support instructional efficiency, personalised learning, and early identification of learner needs, they simultaneously introduce ethical tensions related to bias, surveillance, opacity, and the potential erosion of meaningful human relationships.

A key contribution of this paper lies in its argument that AI should be understood not as a replacement for empathic teaching, but as a *conditional enhancer* of emotionally intelligent educational practice. When aligned with EI principles, AI technologies may strengthen teachers' self-awareness, expand social awareness through data-informed insights, and free time for relationship management by reducing administrative burden. However, such benefits are neither automatic nor guaranteed. Without ethical governance, transparency, and professional preparation, AI risks reinforcing inequities, diminishing autonomy, and weakening the relational foundations upon which effective teaching depends.

The analysis further underscores the limitations of so-called "artificial empathy." Although affective computing systems may detect behavioural indicators of emotion, they lack the moral intentionality, contextual understanding, and reflective capacity that define genuine empathy. From an EI perspective, authentic empathic engagement remains an irreducibly human practice grounded in ethical reasoning and interpersonal presence. Educational technologies must therefore be designed and deployed as *supportive instruments* that prompt human care, rather than as autonomous agents of emotional interaction.

At an institutional and policy level, the findings point to the necessity of embedding AI adoption within human-centred frameworks that prioritise dignity, equity, and trust. Ethical guidelines, such as those proposed by UNESCO, provide essential direction, but their effectiveness depends on local implementation, teacher involvement, and ongoing evaluation. Equally crucial is sustained investment in

teacher professional development that integrates AI literacy with emotionally intelligent pedagogy, enabling educators to exercise informed judgement and maintain empathic classroom cultures in technologically mediated environments.

In conclusion, the future of AI in education should not be determined solely by technological capability or efficiency gains, but by normative questions about what education is for and whose values it serves. Upholding empathy, ethical responsibility, and human agency is essential if AI is to become a genuine ally in education rather than a force that reshapes learning in purely instrumental terms. By positioning Emotional Intelligence as a guiding framework, this paper contributes to ongoing scholarly and policy debates on how AI can be harnessed in ways that strengthen—rather than undermine—the humanistic mission of education.

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FROM TRADITIONAL TOURISM MARKETING TO AI-DRIVEN STRATEGIES:A COMPARATIVE STUDY OF TOURISM ENTERPRISES THEN AND NOW

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Abstract

Tourism marketing has undergone a profound transformation over the last two decades. In the early 2000s, tourism enterprises relied primarily on traditional marketing frameworks and mass promotional activities in order to attract visitors and build destination awareness. Today, however, the rapid expansion of digital technologies and the emergence of Artificial Intelligence (AI) have radically altered the way tourism organizations interact with consumers, personalize services, and remain competitive in a global marketplace. The AI in tourism market has grown from USD 2.95 billion in 2024 to projected USD 13.38 billion by 2030, reflecting the transformative impact of these technologies on the industry.

This paper offers a comparative perspective between tourism marketing practices of the early 2000s, as presented in the undergraduate thesis *Marketing of Tourism Enterprises* (Mathioudaki, 2006), and the AI-driven marketing strategies shaping tourism enterprises in 2025. Particular emphasis is placed on the shift from classical promotion to data-driven personalization, predictive analytics, generative AI applications, and smart tourism development. The study examines how digital transformation has reshaped marketing paradigms, customer engagement mechanisms, and competitive dynamics within the tourism industry, with specific focus on emerging technologies such as generative AI, which is revolutionizing content creation, personalization, and traveler experiences (Hall and Cooper, 2025).

Keywords: Tourism marketing, Artificial Intelligence, generative AI, digital transformation, hyper-personalization, smart tourism, predictive analytics, customer experience.

1. Introduction

Tourism remains one of the most significant industries worldwide and represents a critical pillar of economic growth for countries such as Greece. The sector contributed USD 11 trillion to global GDP in 2024, demonstrating its economic significance following recovery from the COVID-19 pandemic. Nevertheless, tourism

enterprises today operate within a marketplace that is fundamentally different from the one that existed two decades ago. The contemporary tourism landscape is characterized by rapid technological innovation, changing consumer expectations, and unprecedented levels of global connectivity (Gretzel et al., 2015).

In 2006, tourism marketing was described as a structured managerial process aiming to identify tourist needs and transform them into effective demand for services (Mathioudaki, 2006). At the time, marketing strategies were largely grounded in classical principles of consumer satisfaction, branding, and promotion through traditional channels. The tourism sector operated primarily through intermediaries such as travel agencies, tour operators, and traditional advertising media (Buhalis and Law, 2008).

In contrast, the tourism sector of 2025 is shaped by digital ecosystems, online platforms, and increasingly by Artificial Intelligence technologies that redefine competitiveness and customer engagement. Recent research indicates that approximately 60% of Asia-Pacific travelers are using AI tools to research and book their travel destinations, seeking to reduce booking time, secure better deals, and access reliable information (Hall and Cooper, 2025). The proliferation of smartphones, social media, and online review platforms has fundamentally altered the tourist decision-making process, shifting power from tourism providers to informed consumers (Leung et al., 2013). This transformation necessitates a comprehensive examination of how marketing practices have evolved and what implications these changes hold for tourism enterprises navigating an increasingly complex and competitive environment.

2. Tourism Marketing in the Early 2000s: Foundations and Traditional Practices

Tourism marketing during the early 2000s was heavily influenced by the well-established framework of the marketing mix, commonly referred to as the 4Ps: product, price, place, and promotion. This model provided the strategic foundation through which tourism enterprises structured their services, pricing policies, distribution networks, and promotional efforts (Mathioudaki, 2006). The application of this framework emphasized standardization and mass marketing approaches designed to reach broad market segments.

Promotion played a dominant role within this period. Tourism advertising relied primarily on brochures, printed campaigns, television commercials, and travel agencies, aiming to shape destination image and create consumer awareness (Mathioudaki, 2006). Marketing communications followed a predominantly one-way

model, where tourism organizations disseminated carefully crafted messages to passive audiences through controlled media channels (Kotler et al., 2016).

Customer interaction during this era remained largely transactional. Market research was conducted mainly through surveys and statistical analysis, while customer feedback mechanisms were limited compared to the real-time communication possibilities that exist today. The distribution system was dominated by traditional travel intermediaries who controlled access to tourism products and services, creating information asymmetries between providers and consumers (Buhalis and Law, 2008).

Furthermore, the early 2000s were characterized by relatively static competitive environments where established tourism enterprises enjoyed sustained market positions. Barriers to entry remained high due to the capital-intensive nature of tourism infrastructure and the importance of established distribution networks. Consumer decision-making processes were linear and sequential, typically involving information gathering from limited sources, consultation with travel agents, and booking well in advance of travel dates (Xiang et al., 2015).

3. Digital Transformation and the Rise of Artificial Intelligence in Tourism

The tourism industry has experienced an unprecedented digital transformation over the last fifteen years. Online travel agencies, social media platforms, and mobile applications have become central communication and distribution tools. Buhalis and Sinarta (2019) emphasize that tourism services are increasingly co-created in real time, as consumers demand immediacy, personalization, and interactive engagement. This shift has fundamentally altered the balance of power within the tourism value chain, empowering consumers with unprecedented access to information and choice.

Within this context, Artificial Intelligence has emerged as one of the most disruptive innovations in tourism marketing. AI-driven technologies allow tourism enterprises to collect and analyze vast amounts of data, forecast demand trends, optimize pricing strategies, and provide personalized recommendations to travelers. Xiang, Fesenmaier and Werthner (2021) highlight that AI adoption in tourism has become essential for the development of smart decision-making and more efficient service systems. The AI in tourism market is experiencing exponential growth, with a compound annual growth rate of 28.7% from 2024 to 2030, demonstrating the rapid adoption of these technologies across the sector (Ali and Ali, 2025).

The application of machine learning algorithms enables tourism organizations to identify patterns in consumer behavior, predict future trends, and automate routine marketing tasks (Mariani and Borghi, 2021). Recent studies indicate that approximately 80% of customer inquiries are now handled by AI-powered chatbots, providing 24/7 support and significantly reducing response times. Tussyadiah (2020) further argues that automation and AI applications are transforming the tourism experience by enabling intelligent services such as virtual assistants, robotics, and algorithmic travel personalization.

Natural language processing technologies power chatbots and virtual concierges that provide instant customer service, answer queries, and facilitate bookings without human intervention. Computer vision applications enable visual search capabilities, allowing travelers to find destinations and accommodations based on images rather than text descriptions (Neuhofer et al., 2015). Moreover, approximately 40% of adults currently use AI-powered virtual travel agents, demonstrating widespread consumer adoption of these technologies (Bulchand-Gidumal et al., 2024).

The integration of AI technologies extends beyond customer-facing applications to encompass operational efficiencies and strategic decision-making. Revenue management systems utilize predictive analytics to optimize pricing across multiple channels and time horizons. Destination marketing organizations employ sentiment analysis to monitor brand reputation and respond proactively to emerging issues. Tourism enterprises leverage recommendation engines to cross-sell and upsell complementary services, increasing customer lifetime value while enhancing the overall travel experience (Zhang and Lu, 2022).

4. Generative AI and Hyper-Personalization in Contemporary Tourism Marketing

A key difference between tourism marketing in 2006 and 2025 lies in the evolution from mass communication toward hyper-personalized strategies enabled by generative artificial intelligence. Whereas traditional tourism enterprises promoted standardized packages through general advertising channels, modern organizations increasingly rely on machine-learning algorithms and generative AI systems that customize offers and experiences for each individual traveler. Research demonstrates that AI-driven hyper-personalization can increase tourism bookings by up to 25% through better segmentation and tailored recommendations (Yu and Meng, 2025).

Generative AI represents a paradigm shift in content creation and customer interaction within tourism. These systems can generate personalized itineraries, travel recommendations, promotional content, and customer communications at scale while maintaining contextual relevance and individual preferences. For example, Iberia launched the world's first custom GPT within ChatGPT in June 2025, enabling travelers to receive AI-generated travel plans based on their specific requirements (Ali and Ali, 2025). Similar implementations by companies such as MakeMyTrip, Kayak, and Booking.com demonstrate the widespread adoption of generative AI for conversational booking experiences and personalized destination exploration.

This transformation has been described through the concept of "smart tourism," where advanced technological infrastructures enhance both destination management and tourist satisfaction (Gretzel et al., 2015). Smart tourism destinations integrate Internet of Things sensors, mobile applications, and data analytics platforms to create seamless, personalized experiences throughout the entire customer journey. Leading smart tourist destinations such as Zurich, Oslo, and Canberra demonstrate excellence in health and safety, mobility, activities, opportunities, and governance, positioning themselves as world leaders in AI-enabled tourism innovation (Bulchand-Gidumal et al., 2024).

Pricing strategies also demonstrate this shift. While tourism enterprises in the early 2000s adopted relatively static pricing models influenced mainly by seasonality, today's AI-powered systems enable dynamic pricing algorithms that adjust rates instantly according to demand fluctuations, competitor actions, and individual customer characteristics. These sophisticated revenue management systems consider hundreds of variables simultaneously, optimizing prices across multiple market segments and distribution channels. Industry surveys indicate that 63% of hotels deploy AI to enhance revenue management through data analysis, pricing decisions, and market trend tracking (Hall and Cooper, 2025).

Moreover, digital tourism platforms now allow enterprises to monitor customer sentiment in real time. Filieri, Raguseo and Vitari (2021) note that online reviews and digital word-of-mouth strongly influence purchasing intention, making sentiment analytics a crucial marketing tool. Social media listening platforms enable tourism organizations to track brand mentions, identify emerging trends, and engage with customers across multiple digital touchpoints. Virtual assistants can increase customer engagement by 30% through personalized interactions and immediate response capabilities (Bulchand-Gidumal et al., 2024).

The personalization revolution extends to content marketing strategies as well. Tourism enterprises now create dynamic, individualized content that adapts to user preferences, browsing history, and contextual factors such as location and time. Generative AI enables the creation of attractive promotional videos, virtual destination previews, and personalized travel guides at unprecedented scale and quality (Yu and Meng, 2025). Email marketing campaigns employ predictive analytics to determine optimal send times, subject lines, and content for each recipient. Website experiences dynamically adjust based on visitor characteristics, presenting relevant offers and information that maximize conversion probability (Inversini and Masiero, 2014).

5. Relationship Marketing and AI-Enhanced Customer Loyalty

The importance of relationship marketing and customer retention was already highlighted in the undergraduate thesis, where loyalty was presented as a strategic asset for tourism enterprises (Mathioudaki, 2006). However, the mechanisms and capabilities for building and maintaining customer relationships have been fundamentally transformed by digital technologies and artificial intelligence.

Today, AI technologies significantly expand the possibilities of relationship marketing. Customer Relationship Management (CRM) systems powered by predictive analytics allow tourism enterprises to anticipate visitor needs, personalize communication, and strengthen loyalty programs. These systems integrate data from multiple touchpoints across the customer journey, creating comprehensive profiles that inform targeted marketing interventions and service customization (Huang and Rust, 2021). Advanced AI systems can analyze traveler behavior patterns to predict future preferences and proactively offer relevant services before customers explicitly express needs.

Ivanov and Webster (2019) further suggest that robotics and automation will increasingly influence tourism economics, reshaping service delivery and customer expectations. Service robots in hotels and restaurants provide consistent, efficient service while freeing human staff to focus on high-value interactions that require empathy and cultural sensitivity. This hybrid model of human-AI collaboration represents a new paradigm in tourism service delivery that balances efficiency with authentic hospitality experiences.

Thus, the concept of loyalty is no longer driven solely by service quality, but also by technological engagement and digital experience management. Gamification elements, personalized rewards, and seamless omnichannel experiences create

emotional connections that transcend traditional transactional relationships. Tourism organizations that successfully integrate these elements into cohesive loyalty strategies achieve higher customer lifetime values and benefit from positive word-of-mouth effects amplified through social media networks (Kim et al., 2020).

Furthermore, blockchain technologies are emerging as potential tools for enhancing trust and transparency in loyalty programs. Decentralized systems enable secure, verifiable tracking of loyalty points across multiple tourism providers, creating ecosystem-level loyalty networks that offer greater value to consumers while reducing administrative costs for participating organizations (Öğretmenoğlu et al., 2020).

6. Social Media and Influencer Marketing in Modern Tourism

The rise of social media platforms has fundamentally altered how tourism destinations and enterprises engage with potential visitors. Unlike the unidirectional communication models of the early 2000s, social media enables continuous dialogue between tourism providers and consumers, creating communities of interest around destinations, experiences, and travel styles (Leung et al., 2013). User-generated content on platforms such as Instagram, TikTok, and YouTube has become increasingly influential in shaping destination perceptions and travel decisions, with studies showing that travelers view an average of 141 pages of travel content before booking a trip.

Influencer marketing has emerged as a powerful strategy for tourism promotion, leveraging the credibility and reach of social media personalities to promote destinations and services. Unlike traditional celebrity endorsements, influencer partnerships often appear more authentic and relatable to audiences, generating higher engagement rates and conversion probabilities. Tourism organizations collaborate with micro-influencers, macro-influencers, and celebrity influencers depending on target market characteristics and campaign objectives (Gretzel, 2018).

Social media analytics platforms enable tourism marketers to measure campaign effectiveness with unprecedented precision. Metrics such as engagement rate, sentiment score, reach, and conversion attribution provide actionable insights that inform ongoing strategy refinement. AI-powered tools automatically identify trending topics, optimal posting times, and content formats that resonate with specific audience segments. Generative AI is revolutionizing visual content creation, with platforms enabling tourism marketers to generate high-quality promotional images and videos at scale (Huertas and Marine-Roig, 2016).

7. Data Privacy, Ethics, and Challenges in AI-Driven Tourism Marketing

The extensive data collection and analysis that enable personalized tourism marketing raise important questions regarding privacy, consent, and ethical use of consumer information. Regulatory frameworks such as the European Union's General Data Protection Regulation (GDPR) and the AI Act of April 2024 impose strict requirements on how tourism organizations collect, store, and utilize personal data. Compliance with these regulations necessitates transparent data practices, robust security measures, and mechanisms for consumer control over personal information (Pesonen and Horster, 2012).

Recent cybersecurity incidents highlight the risks associated with data-driven tourism marketing. For example, Ticketmaster suffered a cyberattack in June 2024 that compromised customer details of 560 million clients, with hackers demanding approximately £400,000 to prevent data sales on the Dark Web. Such incidents underscore the critical importance of robust cybersecurity measures and responsible data governance in smart tourist destinations (Bulchand-Gidumal et al., 2024).

Beyond legal compliance, tourism enterprises face ethical considerations regarding algorithmic bias, discrimination, and transparency. AI systems trained on biased historical data may perpetuate or amplify existing inequalities in access to tourism services and experiences. Dynamic pricing algorithms, while economically efficient, may raise concerns about fairness and price discrimination. A significant challenge identified in recent research is the phenomenon of "AI hallucinations," where generative AI systems generate inaccurate or misleading information that can undermine trust and pose risks to travelers (Yu and Meng, 2025).

Transparency in AI decision-making processes represents another critical challenge. When recommendation systems or chatbots make suggestions that influence travel decisions, consumers may lack understanding of the underlying algorithms and criteria. Explainable AI approaches that provide insight into how systems reach particular conclusions can enhance trust and enable more informed consumer choices. However, only 46% of companies consider generative AI a top priority despite its potential benefits, with concerns about data security, lack of expertise, and return on investment slowing adoption (Zhang and Lu, 2022).

Furthermore, there is growing concern about the potential loss of authentic tourism experiences and cultural connections when AI intermediates the entire travel journey. While AI excels at efficiency and personalization, it cannot fully replicate the emotions, physical interactions, and spontaneous discoveries that

constitute meaningful tourism experiences. Balancing technological innovation with preservation of authentic cultural values remains a key challenge for destination managers and tourism enterprises (Hall and Cooper, 2025).

8. Conclusions and Future Directions

Tourism marketing has evolved profoundly from the traditional strategies dominant in the early 2000s to the AI-driven marketing ecosystems shaping the tourism industry today. While classical marketing frameworks such as the marketing mix remain foundational, Artificial Intelligence—particularly generative AI—has transformed tourism enterprises through personalization, automation, predictive analytics, and smart destination development. This transformation encompasses not only technological capabilities but also fundamental shifts in consumer expectations, competitive dynamics, and strategic priorities.

The comparative analysis presented in this paper demonstrates that contemporary tourism marketing requires integration of traditional marketing knowledge with advanced technological capabilities. The exponential growth of the AI in tourism market, from USD 2.95 billion in 2024 to a projected USD 13.38 billion by 2030, reflects the rapid pace of technological adoption across the sector. Tourism organizations that successfully navigate this integration gain sustainable competitive advantages through enhanced customer experiences, operational efficiencies, and data-driven decision-making. However, success in the AI era also demands attention to ethical considerations, regulatory compliance, and the maintenance of authentic human connections that remain central to tourism experiences.

Looking forward, several trends are likely to shape tourism marketing in coming years. The continued advancement of generative AI capabilities will enable increasingly sophisticated personalization and content creation at scale. The integration of augmented reality and virtual reality technologies will create new opportunities for destination marketing and pre-travel experience sampling. Wearable devices and contextual recommendation systems will provide real-time, location-aware travel suggestions that enhance the on-ground experience. Sustainability concerns and responsible tourism practices will become increasingly important factors in consumer decision-making, requiring tourism organizations to communicate authentic commitments to environmental and social responsibility (Ali and Ali, 2025).

Future research should examine the long-term impacts of AI adoption on tourism industry structure, employment patterns, and destination competitiveness. Comparative studies across different tourism contexts and market segments would provide valuable insights into optimal strategies for AI integration. Additionally, investigation of consumer perceptions regarding AI in tourism, particularly concerning privacy, trust, and service quality, would inform more effective and ethical implementation of these transformative technologies. Special attention should be given to understanding how generative AI can enhance rather than diminish authentic tourism experiences, ensuring that technological innovation serves to enrich rather than replace the fundamental human elements of travel (Hall and Cooper, 2025).

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CLIMATE CHANGE: LESSONS FROM THE PAST AND CHALLENGES FOR THE FUTURE

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Abstract

Climate change is defined scientifically as long-term alterations in the Earth's climate caused both by natural drivers and anthropogenic activity. Natural causes include orbital variations (Milankovitch cycles, axial tilt, obliquity of the ecliptic), volcanic eruptions and tectonic shifts. History shows that climate shifts have a deep impact in shaping civilizations influencing agriculture societal development and culture. Such examples include the collapse of Mycenaean world during the Greek Dark Ages, the decline of Mayan civilization due to prolonged droughts and multiple episodes of societal collapse due to climatic instability. Ancient scholars such as Theophrastus already recognised the role of extreme weather and long term trends demonstrating that awareness on climate variability has deep roots. Therefore societies need to be aware of the detrimental impacts of climate change and adapt with resilience and sustainability.

Keywords: climate change, ancient times, natural disasters

1. Introduction

Climate change is one of the most important challenges that humanity has to face since its consequences vary from adverse impacts on human health, on the economy, along with many social problems. Mitigating these adverse impacts require deep scientific knowledge and the willingness both of governments, international bodies (EU, United Nations etc) to utilize sustainable solutions not undermining economical growth. In this short review, the aim is to examine the natural and anthropogenic causes of Climate Change and to explore its impact on human civilization through selected historical examples, in order to better understand the challenges that emerge for the future.

2. Defining Climate Change

The Intergovernmental Panel on Climate Change (IPCC) (2018) defines climate change as: *"a change in the state of the climate that can be identified (e.g., by using*

statistical tests) by changes in the mean and/or the variability of its properties, and that persists for an extended period, typically decades or longer.” What should be clarified is that the notion of climate is rather different from that of the weather which refers to short term and particularly everyday observations of atmospherical phenomena which are different from region to region (National Centers for Environmental Information, 2018). Moreover the Earth's climate does not remain static but according to Zerefos is a complicated result of the interaction and balance between the biosphere, the atmosphere, the hydrosphere, the cryosphere and the geosphere. This equilibrium maintained by the five spheres make adaptation of both humans and the ecosystems necessary. And as is already known the Earth's climate has undergone through several changes some of them rapid rather than gradual

The causes of Climate Change (Figure 1) are divided into the following:

1. Natural causes: A) Solar variation: changes in solar radiation, the 11 year solar cycle and the sunspot cycles affect the amount of energy reaching Earth and can lead to significant climate fluctuations. B) Volcanic eruptions: these eruptions have a significant contribution in forming the relief of the Earth's crust and in the evolution of life but they release of greenhouse gases and particles that can reduce incoming sunlight, causing short-term cooling, while CO₂ emissions are main cause for global warming. C) Axial tilt, precession & eccentricity : the astronomical cause of Climate Change that refers to the motion of axis of the Earth and its impact on the incoming amount of solar radiation along with the seasonal variations. D) Continental drift: tectonic plates change the relief of Earth creating land and oceans thus impacting the climatic conditions. E) Ocean currents: regulate climatic patterns while they transfer warm water from the equator to northern regions of the Earth.



Figure 1: a short overview of the main causes of Climate Change

Credits: <https://globalassistant.info/ten-main-causes-of-climate-change-natural-and-human-causes/>

2. Anthropogenic causes: Human activity particularly since the Industrial Revolution (c. 1760 – c. 1840) where machines were introduced into production and industry is also a major driver for Climate Change. The wide use of fossil fuel and the greenhouse gases emission since then played a crucial role in global warming (Ahmed et al. 2022). It is worth to note human activities that increase pollutant emissions into the atmosphere mostly are related to mobile sources, such as cars, trucks, buses, motorcycles, and airplanes, which release large amounts of greenhouse gases, especially CO₂. Apart from these, power plants, industry, power plant facilities, and sewage treatment facilities, have a significant contribution. Furthermore, area sources, including agriculture, livestock, fertilizer use, and oil and gas extraction, play a crucial role in emissions of methane (CH₄) and nitrous oxide (N₂O), which are highly potent greenhouse gases (Figure 2). Finally the ongoing expansion of cities and urbanization along with deforestation because of wildfires have also a detrimental impact on climate and also in biodiversity (Urban et al. 2024).

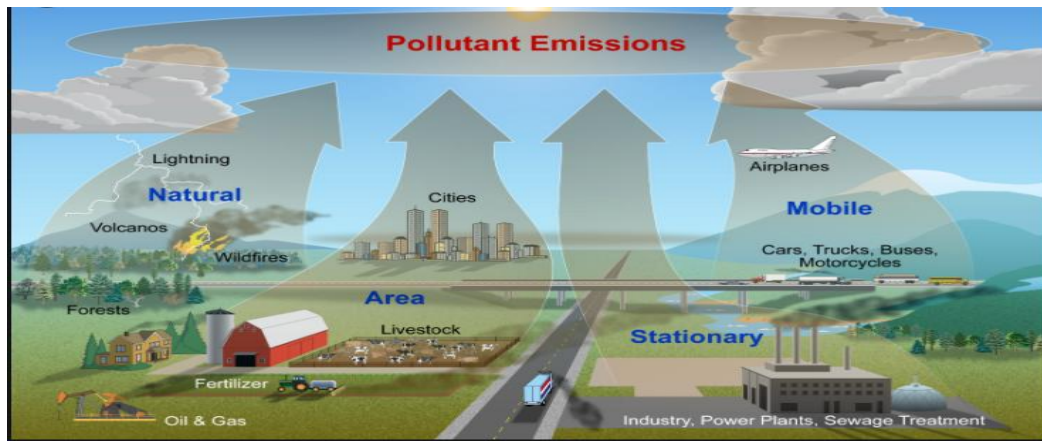


Figure 2: human activities with a detrimental effect on the environment

Credits: <https://www.nps.gov/subjects/air/sources.htm>

It is obvious that understanding the complex interactions of the various parts of the ecosystem along with the impact of human activity is essential in order to gain a basic knowledge of how climate works.

2. Impact of climate in civilization

Human activities throughout centuries were interwoven with weather conditions while civilizations flourished in times of climatic stability. When humanity experienced favourable climatic conditions that are closely associated with the rise and flourishing of major civilizations, such as during the High Middle Ages, the Renaissance, and the Enlightenment. On the other hand during periods of climatic instability such as cooling often coincide with periods of crisis and decline, highlighting the strong interdependence between environmental conditions and socio-economic development (Figure 3).

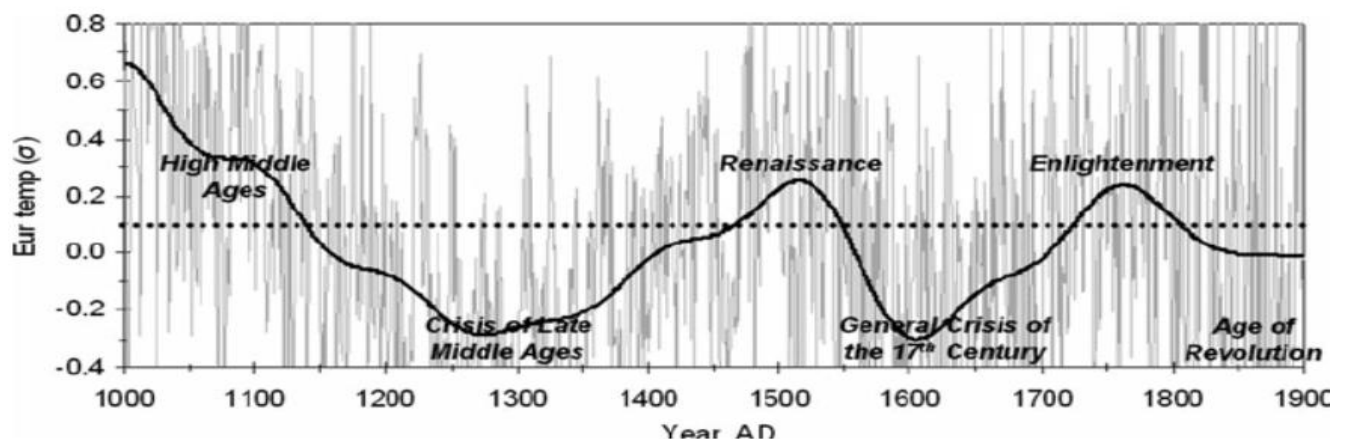


Figure 3: *the most prominent civilizations and flourishing periods in human history took place in periods of favourable climate conditions.*

Credits: Lee et al. (2015)

However, during human history there have been events of climate shift with adverse effect in civilizations and consequently on the flow of history. In the present review some of them will be presented.

A) Dark Ages (12th - 8th cen BC): this time period was crucial for the region of Eastern Mediterranean since the prominent civilizations faced a severe environmental crisis that resulted in political instability and collapse economical activity along with cultural deterioration. The Mycenaean civilization that flourished before, finally collapsed and the reduction of trading had also a detrimental effect in other states of the region of Eastern Mediterranean such as the Hittite Empire, Egypt. This drop in Mediterranean surface temperatures before 1190 BC reduced the annual flow of fresh water by lowering evaporation rates. The western winds carried fewer water vapors, a fact that meant less precipitation. Key paleoclimatic sites across the Eastern Mediterranean, including sediment core locations, speleothem oxygen-isotope records, and stable carbon-isotope data from Lake Voulkaria, reconstructing climatic conditions at the end of the Late Bronze Age. These datasets document a period of prolonged aridity between 1200 and 850 BCE, supporting recent research suggesting that intensified drought was a crucial factor for the collapse of Palatial civilizations during this time (Drake, 2012).

B) An interesting observation of climatic shift comes from Theophrastus (381-287 BC) who observed that a particular type of trees, the persea of the Lauraceae family (avocado), which could be planted and grow in regions like Rhodes, although they did not bear fruit (Historia Plantarum, III, 3, 5, 2-4). This indicates that during the 4th and 5th centuries BC the southern Aegean had high temperatures, possibly similar to those observed in our time (Morris et al., 2013). Therefore, phenomena such as rising temperatures and their consequences were already observed in ancient times thoroughly by the scholars.

C) Mayas collapse: environmental factors also played a crucial role in fall of Maya civilization. Severe droughts that lasted between roughly 750 and 950 A.D. and the reduced precipitation across the Yucatán impacted severely the water availability, agriculture, and urban sustainability, thus causing to the gradual decline and abandonment of major Maya centers (Peterson, 2005).

D) 1916, the year without summer: in 1815 the volcanic eruption of mount Tambora (Figure 4) in Indonesia caused a lot of damage in the regio of Indonesian archipelago and also emitted 60–80 megatons of sulphur dioxide into the stratosphere. Consequently these gases spreaded globally forming sulfurous aerosols that blocked an amount of sunlight from reaching the Earth surface and dropped the global mean temperature by about 0.5–1 °C for a couple of years. The atmospheric circulation changed worldwide allowing more frequent Atlantic low-pressure systems to track southward and increase precipitation over south-central Europe. These mechanisms contributed to the “Year Without a Summer” in 1816 across Europe and North America, alongside natural atmospheric variability (Rössler & Brönnimann, 2018).



Figure 4: the crater from the volcanic eruption of mount Tambora in 1815

Credits: https://en.wikipedia.org/wiki/1815_eruption_of_Mount_Tambora

3. Lessons learnt and challenges for the future

All the above are not considered as enough in order to depict the whole interaction between the environment and human activity which in many cases is harmful. Contrary to what most people believe human civilization is very fragile even in cases of low scale environmental disasters which are possibly related to Climate Change, the use of natural resources along with shifts in land use (deforestation and urbanisation). Although when talking about the environment humanity tends to forget that apart from factors related to the environment of our planet it is also space that plays a crucial role in sustaining life.

In the past extreme CMES (Coronal Mass Ejections) for our Sun that emit particles interacting with the magnetic field of our planet have caused large scale events suchs as the Carrington Effect in 1859 where a solar storm caused electrical phenomena in the telegraph networks, But in 21th century our civilization depends much more on energy and electrical grids. In that context a massive solar storm would have a significant impact on out life and economy. Moreover apart from CMES in our planetary neighborhood there are thousands of asteroids meteors along with comets from the Oort cloud from the outer layers of our solar system which pose a threat to the Earth and particularly for our civilization.

Taking into account a human life time scale such violent events (CMES massive volcanic eruptions, meteor impacts) are considered to be rare but their impacts should not be underestimated. Interconnection systems supply chain and technological infrastructure is very vulnerable to extreme events such as geomagnetic storms flooding and other large scale natural disasters and a possible disruption that affect both everyday life and economic activity.

Evidence from the past suggests that environmental and climatic changes (gradual or sudden) require adaptation and mitigation of the possible adverse effects on human life. In that case scientific knowledge plays a key role but needs to be combined with political willingness for effective decision making and long-term planning. Measures such as early warning systems, protection of critical infrastructure and a more careful use of natural resources can contribute in this direction thus ensuring sustainable economical development.

But the question arising is how such a sustainable development could be achieved. A balance between economy and environmental protection should be established. The European Union has already aligned with these needs with the 2019 Green Deal aiming in transforming Europe into the first climate-neutral continent by 2050 by reducing emissions by 2033 at least 55% and the Renewable Energy Directive (EU) 2018/2001 (RED II) that promotes the shift to more environmentally friendly resources for energy.

From all the above is obvious that a sustainable future for humanity combines lessons from the past, scientific knowledge and the will to act with respect to the environment.

4. Conclusion

In conclusion, past climatic events indicate that human societies have always been sensitive to environmental changes. This observation does not offer simple

solutions, but it does provide a useful framework for understanding future challenges for a sustainable future.

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ANXIETY, IRRATIONAL BELIEFS, AND SOCIAL MEDIA ADDICTION: A GENERATIONAL COMPARISON IN GREECE

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Abstract

Many people recognise the experience of using social media “for a moment” and realising that an hour has passed. Although problematic social media use has been linked to anxiety, less is known about this relationship in older adults, who are increasingly active on social media yet remain largely understudied in Greek research. Drawing on Griffiths’ behavioural addiction model, Social Comparison Theory, and Rational Emotive Behaviour Theory, this ongoing quantitative cross-sectional study examines problematic social media use, anxiety, and irrational beliefs in Generation Z and Baby Boomers in Greece. By comparing these two age groups, the study examines whether problematic social media use is associated with irrational beliefs related to anxiety, and whether these associations differ across generations. The findings may support public awareness, professional training, and mental health practice related to social media use and behavioural addictions.

Keywords: problematic social media use, social media addiction, anxiety, irrational beliefs, generational differences, Greece

1. Introduction

Social media users often remain on applications longer than intended, raising questions about how platforms are designed to keep people engaged. Around two-thirds of the global population use the internet, spending on average two hours per day on social media (Facts and Figures 2023 – Internet Use, n.d.; Qiu, 2021). In countries such as Greece, approximately 85% of individuals aged 16 to 74 report regular internet use (Hellenic Statistical Authority, 2023). Despite its prevalence, Greek research on addictive behaviours on networking platforms is limited, largely youth-centred and relies on inconsistent diagnostic definitions, making findings difficult to compare across studies (Dadiotis et al., 2021; Leimonis and Koutra, 2022;

Moretta and Wegmann, 2025; Pew Research Center, 2024; Sheldon et al., 2021).

For this reason, in this paper, social media addiction follows the operational definition proposed by Andreassen and Pallesen, who describe it as an excessive concern with social media, a strong urge to use it, and the investment of time and effort to the extent that social activities, occupational or academic functioning, interpersonal relationships, and psychological well-being are impaired (Andreassen and Pallesen, 2014, pp. 4053–4054). The literature also suggests that excessive social media use is associated with increased anxiety, depressive symptoms, sleep disturbances, fear of missing out, and lower self-esteem (Barbosa, 2024; Lopes et al., 2022; Pirdehghan et al., 2021; Weigle and Shafi, 2024). However, excessive social media use does not lead to problematic outcomes for all users. This may be because individuals differ not only in how they use social media, but also in how they interpret and respond to their online environments.

Twenge (2023) argues that people are grouped into generations based on shared lived experiences, such as growing up with different technologies and diverse cultural and historical contexts from one another. From this perspective, Generation Z (born between 1995-2012) were exposed to social media from an early age and tend to use multiple platforms mainly for self-expression and identity-related purposes (Lopez and Polletta, 2021). They are also heavy daily users across multiple platforms, including Instagram, TikTok, and Snapchat (Elkatmış, 2024), and experience high exposure to social comparison and constant validation (Carraturo et al., 2023). In contrast, Baby Boomers (born between 1946-1964), who adopted social media later in life, commonly use it to keep in touch with their loved ones and check the news (Carrillo-Durán et al., 2022), and are increasingly active mainly on Facebook and YouTube (Pew Research Center, 2024; Sheldon et al., 2021). Despite these differences, online networking sites themselves operate in highly specific ways.

Social media platforms expose users to frequent feedback through likes, notifications, and constantly updated content, which work as reward mechanisms by providing small and unpredictable outcomes that reinforce engagement (Macit et al., 2018; Mehta et al., 2022; Kuss and Griffiths, 2017). In this process, dopamine is involved not because the content itself is pleasurable, but because it supports anticipation (Berridge and Robinson, 2016). Users may therefore remain 'hooked' not for enjoying the content they consume, but because the next one could. Behavioural addiction, however, involves more than just one process.

Within a biopsychosocial model, problematic behaviour is understood as the result of interacting biological, psychological, and social factors. Griffiths (2005) draws on this model to conceptualise behavioural addictions through six criteria: salience, mood modification, tolerance, withdrawal, conflict, and relapse. More specifically, these criteria describe how an addictive behaviour becomes central, is used to regulate mood, increases over the course of time, causes discomfort when reduced, interferes with daily life and relationships, and often reappears after attempts to stop. Applied to social media use, addictive behaviours may do more than affect emotional regulation, such as influencing how an individual perceives themselves and others.

Social Comparison Theory holds that people evaluate their lives and abilities by comparing themselves to others (Festinger, 1954; Suls and Wills, 2024). Such comparisons may be upward, directed toward those perceived as better off, or downward, directed toward those perceived as worse off. In online environments, exposure to selective and idealised portrayals makes upward comparison particularly salient. Over time, frequent comparisons have been linked to feelings of inferiority, envy, and higher levels of anxiety, particularly when users feel they do not measure up to what they see online (Carraturo et al., 2023; Steinberger and Kim, 2023).

How such comparisons are experienced, however, depends on the assumptions individuals bring into them. Rational Emotive Behaviour Theory (REBT), developed by Albert Ellis, explains emotional distress through irrational and inflexible beliefs about oneself, others, and life (Dryden, 2021). These beliefs often appear as rigid demands, such as “I must succeed” or “others must treat me fairly,” and are widely present in social norms and everyday expectations. On social media, this may take the form of believing that one must receive likes or approval in order to feel adequate. When such demands are not met, attention tends to return repeatedly to the perceived failure or rejection. This repeated focus makes anxiety a particularly likely emotional response.

1.1 Aims of the Study

The aim of the present study is to examine how social media problematic use relates to anxiety and irrational beliefs. A further aim is to compare these relationships between Generation Z and Baby Boomers in Greece.

1.2 Hypotheses

Based on the aims of the study, the following hypotheses are tested:

H1: Higher levels of social media addiction will be associated with higher levels of anxiety and irrational beliefs in both generations.

H2: Generation Z is expected to show higher levels of anxiety related to social media use compared to Baby Boomers.

H3: The relationship between social media addiction and irrational beliefs is expected to be stronger in Generation Z than in Baby Boomers.

2. Methodology

2.1 Design and Participants

The study is cross-sectional and uses self-report standardised questionnaires at one point in time (Fink, 2003; Setia, 2016). Data collection has not yet started at the time of the current submission. Participants will be recruited in Greece and will belong to two generational groups: Generation Z (born between 1995-2012) and Baby Boomers (born between 1946-1964). The target number of participants was determined using *G*Power*, based on the sample size reported by Casingcasing et al. (2023).

2.2 Procedure and Ethics

Participation will be voluntary and anonymous. Informed consent will be obtained prior to the study. Participants will be informed of their right to withdraw from the study at any time without penalty and provided with support information. They will then complete a short demographic form followed by the study questionnaires.

2.3 Measures and Analysis

The study uses the following items:

- The Bergen Social Media Addiction Scale (BSMAS), which assesses social media addiction based on Griffiths' components model (Andreassen et al., 2016).
- The State-Trait Anxiety Inventory (STAI), which measures anxiety (Spielberger et al., 1983).
- The Irrational Beliefs Inventory (IBI), which assesses irrational and rigid beliefs based on REBT (Koopmans et al., 1994).

Data analysis will be conducted using the Statistical Package for the Social Sciences (SPSS) software.

2.4 Limitations and Expected Outcomes

Due to its cross-sectional design, the study cannot establish causal relationships. The use of self-report questionnaires may introduce response bias, and convenience sampling may limit generalisability. Despite these limitations, the study is expected to reveal generational differences in social media addiction, anxiety, and irrational beliefs, and to support future research on social media use and mental health in Greece.

3. Conclusion

This paper presented an ongoing study examining problematic social media use as a possible behavioural addiction in relation to anxiety and irrational beliefs among Generation Z and Baby Boomers in Greece. By comparing two generations using platforms with similar engagement mechanisms, the study considers whether rigid beliefs intensified by repeated content exposure relate to greater psychological strain in some users. The findings may contribute to Greek research by examining understudied age groups and inform prevention, professional training, public awareness, and mental health practice related to behavioural addictions in the digital world.

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EXPLORING STUDENTS' AND EMPLOYEES' PERCEPTIONS OF 21st-CENTURY SKILLS IN THE LABOUR MARKET

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Abstract

This study investigates how students and employees perceive the development of key 21st-century skills within contemporary labor markets characterized by uncertainty and technological change. While policy frameworks define competencies such as adaptability, collaboration, and critical thinking, little research examines how individuals experience these skills in practice. Semi-structured interviews with twelve participants were analysed using Reflective Thematic Analysis. Findings demonstrate that resilience, self-efficacy, and problem-solving are developed through feedback, mentorship, and lived challenges rather than formal instruction alone. Differences emerged across age, educational systems, and professional trajectories. The study contributes an experiential perspective to employability research and proposes pedagogical and organisational strategies to support adaptive skill development.

Keywords: 21st-century skills, employability, resilience, self-efficacy, qualitative research

1. Introduction

The rapid transformation of labour markets driven by digitalisation, global mobility, and knowledge-intensive economies has intensified interest in transferable competencies commonly labelled 21st-century skills. International organisations and educational policies increasingly emphasize adaptability, collaboration, and lifelong learning as prerequisites for employability (Rios et al., 2020; Van Laar et al., 2020). However, these frameworks tend to treat skills as measurable outputs rather than socially situated developmental processes. This paper argues that a more nuanced

understanding requires exploring how individuals interpret and construct skills across educational and professional contexts.

2. Literature and Conceptual Framework

Scholars identify resilience, self-efficacy, communication, and problem-solving as core competencies enabling individuals to navigate uncertainty (Bandura, 1994; Soh et al., 2010). Educational research highlights integrated curricula and experiential learning as effective approaches for cultivating such capacities (Drake & Reid, 2018; Stehle & Peters-Burton, 2019). Yet definitional fragmentation persists and the lived experience of skill formation remains underexplored (Dishon & Gilead, 2020). This study adopts an interpretivist stance, conceptualising skills as socially constructed and contextually negotiated outcomes shaped by relationships, institutional expectations, and personal meaning-making.

3. Methodology

The research follows a qualitative interpretivist design (Creswell, 1998). Semi-structured interviews were conducted with twelve participants, including six students and six employees representing varied educational systems and professional trajectories. Interviews lasted 25-30 minutes and encouraged narrative reflection on learning experiences, workplace challenges, and responses to failure. Sampling followed purposive logic (Kuzel, 1992). Data were analysed using Reflective Thematic Analysis, emphasising reflexivity, researcher positioning, and active theme construction (Braun & Clarke, 2019a; Berger, 2015; Finlay, 2002). Saturation was considered achieved when no new interpretive patterns emerged (Mason, 2009; Morse, 1995).

3. Findings

Analysis generated four interrelated thematic clusters as follows:

- First, resilience emerged through narratives of academic pressure, job insecurity, and personal setbacks. Participants described resilience not as an inherent trait but as something strengthened through reflection, supportive feedback, and repeated exposure to challenges.
- Second, self-efficacy was closely tied to recognition from mentors, supervisors, and peers. Participants linked confidence to small successes, internships, and collaborative achievements rather than formal assessment.

- Third, problem-solving was portrayed as a social process involving dialogue, brainstorming, and experimentation. Participants emphasised that real-world projects and group work were more influential than theoretical instruction.
- Fourth, adaptability and lifelong learning were framed as ongoing processes shaped by workplace demands, technological change, and career transitions. Younger participants highlighted internships and mentoring, while more experienced participants emphasised accumulated knowledge and professional networks.

Across all themes, family expectations, teachers, organisational cultures, and personal attitudes toward learning were identified as shaping developmental trajectories.

5. Discussion

These findings challenge instrumental approaches that treat skills as discrete competencies transferable across contexts. Instead, the results suggest that skills operate as interpretive resources shaped by relationships, institutional norms, and identity construction. Educational environments and workplaces function as meaning-producing systems where competence is negotiated and validated. Such insights support socio-constructivist approaches emphasising reflexivity and experiential learning (Luttrell, 2019; Mantzoukas, 2007).

6. Implications

For education, the findings suggest the importance of reflective assignments, project-based learning, mentoring, and structured feedback processes. For workplaces, organisations should create environments encouraging experimentation, psychological safety, and continuous learning. Policies focusing solely on competency assessment risk overlooking the relational and developmental nature of employability.

7. Conclusion

This study reframes 21st-century skills as contextual, relational, and developmental processes. Understanding how individuals experience skill formation provides valuable insights for designing educational strategies and workplace interventions aligned with contemporary labour market realities.

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MANAGING FIRST-YEAR STUDENTS IN HIGHER EDUCATION: EVIDENCE-BASED INTERVENTION FOR RETENTION IN GREECE

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Abstract

As high dropout rates continue to challenge institutions and students, the need for holistic, evidence-based strategies is vital. Research on the best practices around the world plays an important role in designing, implementing and evaluating interventions for first-year students in higher education institutions in Greece. Such initiatives aim to support them in achieving their graduation goals, reduce the risk of their potential dropout, while strengthening their academic performance, wellbeing, and resilience.

Keywords: Dropout, Psychological Capital, educational interventions, wellbeing, resilience

1. Introduction

The high rates of dropout in Higher Education remain a serious, multifaceted issue that needs to be tackled worldwide. According to surveys conducted by Eurostat in 2024, the adult students enrolling in Colleges and Higher Education reach the explicit 44,2%, increasing almost by 1% every year (Eurostat, 2025) expecting to accomplish 45% by 2030. Even though the numbers show an increase in adults' pursuit of their right of education, it seems that they usually meet challenges in fulfilling their academic goals and therefore their graduation. Especially when adults face academic challenges, socioeconomic imbalance, added by psychological difficulties, result in underachievement and dropout. Under these circumstances, the need for specialized, evidence-based programs tailored to this target group is undoubtedly rising.

2. Global dropout statistics

According to UNESCO (2025) the global gross enrolment ratio in tertiary education has risen from 19% to 43% an increase of more than 100% since 2000. Europe and Northern America and Eastern and South-Eastern Asia have the highest ratios in 2021 followed by Central and Southern Asia and Sub-Saharan Africa which have ratios at or below 30%. Even though the enrolments are on a constant rise, the dropout rates still remain at high levels.

Research has shown that the dropout has a significant impact on institutions leading to financial loss and reduced subsidies (Acevedo, 2023). However, the reasons vary in each continent, showing that the issue must be dealt with tailor-made measures. Nevertheless, common ground among the globe, concerning the reasons of dropout, shows that these can be personal and social problems, poor academic performance, financial difficulties, psychological and other mental issues as well as institutional dissatisfaction (Lorenzo-Quiles, Galdón-López and Lendínez-Turón, 2023; Garrido Silva and Pajuelo Díaz, 2023; Cabrera, Dalagan and Lugo, 2025).

The annual report of the Hellenic Authority for Higher Education (HAHE, 2025), drawing on data from Eurostat (2025), presents the 2024 total graduation rates and ranks Greece last among European countries, with a rate of only 10.1%, significantly below the European average of 23.2%. The highest shares of graduates among students in Europe are found in Ireland (39.3%) and France (30.6%). This is a significant factor to consider and extend research on this particular area.

3. Determinants of student dropout in Greek Higher Education

Despite increased international focus on dropout interventions, Greek higher education lacks systematic, evidence-based frameworks addressing both academic and wellbeing-related dropout factors. This paper proposes an integrated theoretical model tailored to the emerging Greek private higher education landscape.

Surveys in Greece conducted by Karalis, Sakkoulis and Vergidis (2025), Stylianou and Milidis (2024) and Androulakis et al. (2021), report that the main reasons of dropout in a Greek large-scale public university are mainly financial and personal referring to family problems, mental and health issues and other obligations. Also, the academic reasons showed conflicts between the students and the academic faculty, challenges in meeting courses demands and a lack of interest due to misaligned career path.

Extensive research concerning the dropout reasons in universities and ways to reduce the rates remain underexplored in the Greek academic literature.

4. Educational interventions for first-year students

Surveys around the world agree on the fact that dropout occurs during the first academic year and intervention programmes must be applied within this specific academic time frame (Pei and Zaki, 2025; Reed et al., 2009). Allegedly, identifying the early signs is vital in order to act proactively and prevent the dropout. AI-tools such as software and detection platforms can play a significant role towards a positive outcome (Times Higher Education, 2024).

The challenge is to interweave tailor-made intervention programmes according to individual risk factors. Successful intervention programmes (Reed et al., 2009) have pinpointed that designing structured courses for first year students can lead to academic success and increased grades compared to a low-intervention programme. Apart from the figures, Stanford University issued a report at the annual World Happiness Report (Pei and Zaki, 2025) analysing the need to examine interventions which include social connections and ties among the students by identifying behavioural patterns which can lead to happiness, wellbeing and therefore satisfaction and retention. Building on that, HERO-based (Hope, Efficacy, Resilience, Optimism) interventions can be embedded in order to increase the students' Psychological Capital. Studies have researched the fact that implementing the HERO model, performance and satisfaction (Luthans et al., 2007) result in restricting the high rates of dropout in Higher Education (Jaffu et al, 2024; Segar and Kosnin, 2024).

To the best of our knowledge, a holistic intervention plan combining academic support with an emphasis on wellbeing, such as successful evidence-based high-intervention courses designed to provide both learning (Reed, 2009) and wellbeing strategies (Jaffu et al., 2024; Pei and Zaki, 2025) have not yet been accommodated in the Greek Higher Education.

5. Conclusions

The broader perspective of the Greek Higher Education needs to be reviewed with knowledge drawn from best practices around the world. The figures that persistently illustrate low graduation percentages (Eurostat, 2025; HAHE, 2025), placing Greece last among other European countries, demand a strategic and holistic response that will strengthen the first-year students' Psychological Capital and boost their academic achievement. Increasing the graduation percentages is imperative as they affect not only the institutions but also the society at large (Acevedo, 2023). Therefore, the implementation of targeted intervention

programmes is not just timely but essential for the sustainability of the Greek academic landscape.

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AGING THE RISE OF ARTIFICIAL INTELLIGENCE FOR SUSTAINABLE REAL ESTATE DEVELOPMENT

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Abstract

This research investigates the transformative and disruptive role of Artificial Intelligence (AI) in sustainable real estate development, particularly in less-developed regions undergoing reconstruction. Addressing the critical gap in AI applications for urban development, the study identifies key AI applications across the development life cycle, aiming to optimize resource allocation, energy management, and waste reduction. Concurrently, it critically examines ethical considerations, operational costs, and the environmental impact of AI infrastructure. The objective is to develop a comprehensive framework and policy recommendations, using a pilot project in a war-destroyed city like Benghazi, Libya as a paradigm for future sustainable urban built environments.

Keywords: Artificial Intelligence, Urban Built Environment, Sustainable Real Estate Development.

1. Introduction

As almost 68% of the world's population is expected to live in urban areas by the year 2050, the importance of this research emerges from the multiple complex challenges that face the world's major metropolitan areas, and the consequent demographic shift that will follow this growth in urban population will also be stressful to the initiatives for environmental sustainability, resource management, and efficient urban infrastructure. (Walacik and Chmielewska, 2024)

The smart city initiatives, which utilize cutting-edge technologies to manage the outcomes of urban complexity, have recently surfaced as a remedy for these challenges, however, the real estate industry, which is the backbone of urban development, has not been as enthusiastic to adopting AI-driven sustainability solutions so far. (Khani Dehnavi et al., 2025)

This research examines the current state of AI applications in urban planning practice. Through analysis of existing platforms and case studies, it documents how these technologies are being implemented across different planning contexts.

The study categorizes available tools by function and application, evaluates their capabilities and limitations, and identifies trends that may shape future development in this rapidly evolving field.

Then, the study aims to implement a comprehensive framework that can act as the manual of guidelines for future developments that aim to integrate AI technologies in real estate and city development projects.

2. Key Application Areas and Use Cases

- **Traffic and Transportation Optimization:**

AI algorithms analyze traffic patterns, optimize transit routes, and inform infrastructure planning to reduce congestion and improve mobility. (Tekouabou et al., 2023)

- **Environmental Impact Assessment:**

AI-powered tools assess the environmental impact of development projects, analyzing factors such as noise pollution, wind patterns, and carbon emissions. (Mahmood et al., 2024)

- **Public Participation and Engagement:**

AI platforms facilitate more inclusive and participatory planning processes by enabling citizens to visualize proposed changes, provide feedback, and co-design public spaces. (Sharifi Poor Bgheshmi and Aeini, 2024)

- **Land Use and Zoning Planning:**

Generative AI helps planners to explore a wide range of land use scenarios, optimize zoning regulations, and ensure compliance with development standards. (Walacik and Chmielewska, 2024)

- **Infrastructure and Facility Design:**

AI-driven generative design tools automate the design of buildings, infrastructure, and public facilities, optimizing factors such as cost, efficiency, and sustainability. (Emedo et al., 2025)

3. Technological Trends and Future Directions

- **Integration with Large Language Models (LLMs):**

The integration of LLMs like ChatGPT and Gemini into urban planning workflows is a promising area of research. These models could be used to review development

proposals, analyze zoning changes, and even assist in the creation of city master plans. (Khani Dehnavi et al., 2025)

- Sustainability and Climate Focus:

There is a growing emphasis on using AI to address climate change and promote sustainable urban development. This includes using AI to design more energy-efficient buildings, optimize renewable energy deployment, and enhance urban resilience to climate-related risks. (Mahmood et al., 2024; Walacik and Chmielewska, 2024)

- Democratization of Planning Tools:

The development of no-code platforms and user-friendly interfaces is making AI-powered planning tools more accessible to a wider range of stakeholders, including citizens and community groups. (Sharifi Poor Bgheshmi and Aeini, 2024)

- Real-time and Continuous Planning:

The integration of IoT and real-time data is enabling a shift from static, long-term plans to more dynamic and adaptive planning processes. This allows cities to respond more effectively to changing conditions and make more informed, evidence-based decisions. (Emedo et al., 2025)

4. Detailed Analysis of Key Platforms

UrbanistAI is a platform designed to enhance participatory urban planning through the use of generative AI. It is used by public and private organizations to engage communities in the urban planning process, allowing for more inclusive and transparent decision-making. The platform supports a wide range of activities, including workshops, public engagement campaigns, and co-design of urban spaces. UrbanistAI operates as a web-based platform that can be accessed on multiple devices and supports both touch and pen input, making it user-friendly for a wide range of stakeholders, Case study: Helsinki Summer Streets – 2023.

Digital Blue Foam (DBF) is an AI-powered building design and planning software that leverages generative design and spatial analytics. The platform's DBF Engine features advanced AI algorithms and data integrations to enable generative design and spatial analytics, helping to deliver projects better, faster, and more intelligently. DBF claims to reduce project capital and operating costs by 15%, accelerate project design cycles by 50%, and streamline BIM production by 75%.

Autodesk Spacemaker is a cloud-based AI platform that augments the ability of urban designers, architects, and developers to design and build more sustainable cities. It allows users to test concepts in minutes, make smarter decisions, and

unlock their creativity with generative design.

TestFit is a real estate feasibility platform that uses AI to optimize site layouts and meet both form and design intent instantly. The platform's site planning AI automates the tedious steps in the deal process, enabling users to plan sites in hours instead of days. TestFit has recently introduced a new product called Generative Design, which focuses on AI-powered building design automation for multi-tenant dwellings.

5. Conclusion

In conclusion, this research studies AI's pivotal role in transforming real estate development towards sustainability. By identifying impactful AI applications across design, construction, and operation phases, and critically examining associated ethical, cost, and environmental challenges, this study provides a holistic perspective. The proposed framework, particularly its application in post-conflict urban reconstruction, offers a novel paradigm for fostering resilient, efficient, and equitable built environments. Ultimately, this work contributes significantly to bridging theoretical gaps and offering actionable insights for policymakers and urban planners, ensuring AI applications serve as a catalyst for efficient and sustainable urban developments, especially in underdeveloped regions.

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THE EVOLUTION OF THE ORIGINAL HYBRID WARFARE CONCEPT

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Abstract

The study aims to delineate the core characteristics of the original hybrid warfare as defined by Dr Frank Hoffman, while also contrasting them with related concepts such as gray zone, compound and unrestricted warfare. Over time, hybrid warfare progressed from initial descriptions of combined tactics to a more sophisticated model that includes terrorism, criminal activities, information warfare, both state and non-state actors, as well as the elements of simultaneity and fusion of modes. This evolution reflects a broader recognition of the increasingly blurred lines between actors, tactics, and operational environments in contemporary conflict.

Keywords: terrorism, non-state actors, simultaneity, violence, lethality

1. Introduction

The concept of hybrid warfare emerged in the West approximately 20 years ago, integrating both conventional and unconventional military strategies. This approach was largely developed in response to the 2006 conflict in Lebanon between Israel and Hezbollah, as well as the 2014 Russian intrusion in Ukraine. While hybrid warfare lacks a precise and consistent definition (Mälksoo, 2018), it is a widely recognised concept among political and military analysts and encompasses several commonly acknowledged elements.

2. Development of the concept

The term was first publicly used by U.S. Marine Corps Lieutenant General James N. Mattis in September 2005 as a proposed new tactic for warfare. Later that same year, General Mattis and Dr Frank Hoffman, a retired Marine Lieutenant Colonel and former analyst at the U.S. Department of Defense, identified hybrid warfare as a

potential model for future conflicts.

The concept began to gain significant traction among scholars after 2007 when Dr Hoffman utilised the term to analyse Hezbollah's strategies during the 2006 conflict in Lebanon, which is often cited as a prime example of hybrid warfare. Dr Hoffman argued that hybrid warfare incorporates different types of operational techniques and includes conventional and unconventional approaches, terrorist acts of varying brutality and severity, and illegal acts by both state and non-state actors (Hoffman, 2007). In 2009, Dr Hoffman explained hybrid threats as threats used by the adversary alternately or concurrently, combining the use of conventional weapons, unorthodox tactics, and terrorist and illegal acts, to achieve its political goals (Hoffman, 2009). In 2018, Dr Hoffman broadened the hybrid warfare concept and provided further analysis of the gray zone warfare, categorising both as forms of complex conflicts. Dr Hoffman argued that Russia employs a combination of political, economic, and subversive tactics without provoking a direct military response, and exploits the information domain to disseminate propaganda and "fake news" (Hoffman, 2018).

In 2014, the North Atlantic Treaty Organization (NATO) and the European Union (EU) fully adopted the term hybrid warfare to characterise the annexation of Crimea and the escalating Russian aggression in eastern Ukraine. The evolution of the term suggests that the meaning of the concept has become more extensive, becoming increasingly vague, shifting its focus increasingly toward non-military elements, in contrast to Hoffman's original military-centric definition (Bachmann et al., 2019; Caliskan, 2019; Shea, 2018). Since 2020, the concept of hybrid warfare has evolved from a simple analytical tool into a critical area of scholarly investigation, as evidenced in the works of Kähkö (2021), Caliskan and Liégeois (2021), Galeotti (2022), and Libiseller (2023).

3. Methodology

The study follows a qualitative methodology, focusing on the theoretical contributions of scholars and international organisations. Additionally, political language, including propaganda, political speeches, political interviews, and parliamentary hearings, is a common subject of discourse analysis (Dijk, 1997). Discourse analysis is employed to examine the contributions of Dr Hoffman and other scholars to the original concept of hybrid warfare.

To achieve quantitative results, two comparisons are made. In the first, each characteristic identified by Dr Hoffman and General Mattis will be treated as an

independent variable of equal weight, with one point assigned for each occurrence. The characteristics identified by Dr Hoffman in December 2007 will receive 1.5 points, as this study was his major contribution. Same or different characteristics identified in the works of other scholars or in alternative concepts will be assigned half a point. The difference in weighting of the variables stems from the study's focus on Dr Hoffman's concept of hybrid warfare. The perspectives of NATO and the EU, along with related concepts such as the gray zone, compound warfare, and unrestricted warfare, are included in the comparison. Based on methodology, the highest score that any characteristic can achieve is 20. Regarding scaling, characteristics with a score of 10 or more out of 20 ($\geq 50\%$) are the most frequent, whereas those with a score of less than 4 out of 20 ($< 20\%$) are the least frequent.

In the second comparison, the same data are included, without the contributions of Dr Hoffman and General Mattis. This enables a focused examination of other scholars and concepts. Each identified characteristic will be treated as an independent variable of equal significance, with one point awarded for each occurrence. Based on methodology, the highest score that any characteristic can achieve is 13. Regarding scaling, characteristics with a score of 6.5 or more out of 13 ($\geq 50\%$) are the most frequent, whereas those with a score of less than 2.5 out of 13 ($< 20\%$) are the least frequent.

4. Key findings

In the qualitative analysis of Dr Hoffman's texts, the primary characteristics of the original hybrid warfare concept have been delineated as follows: to have political objectives, simultaneity and convergence of the threats, flexibility and tailoring of the threats, multiple actors (states, proxies, and non-state actors), advanced technology and capabilities, terrorism, criminal activity, fusion of modes, violence and lethality.

The quantitative analysis of the first comparison leads to the characteristics that occur with greater frequency and accumulate a higher score: variety of actors involved (multiple), fusion of modes, underlying political objectives, incorporation of advanced technologies and capabilities, simultaneity and convergence, terrorism, and criminal activity. It must be noted that conventional and unconventional modes are common to all scholars and concepts. By selecting these primary characteristics, we can define the hybrid warfare concept as follows:

"Hybrid warfare is a complex form of conflict that involves multiple state and non-state actors, employing a blend of diverse warfare methods, advanced

technologies, and capabilities. It is characterised by simultaneous and convergent actions aimed at creating ambiguity and achieving political objectives. The methods of warfare encompass both conventional and unconventional tactics, as well as terrorism and criminal activities."

Qualitative and quantitative analysis of the data in the second comparison reveal that the characteristics that occur with greater frequency and receive a higher score are the underlying political objectives, tactics, and the variety of actors involved. Conventional and unconventional modes are again common to all scholars and concepts examined. By selecting the most recurrent elements, we can compile a definition for the hybrid warfare concept as follows:

"Hybrid warfare is a complex form of conflict that involves multiple state and non-state actors, employing diverse warfare methods. It is characterised by actions aimed at achieving political objectives, employing both conventional and unconventional tactics."

5. Conclusions

Our understanding of hybrid warfare has progressed from combined tactics to a more sophisticated framework that emphasises the convergence of various modes of conflict. Both definitions provided stem from characteristics already identified in the original concept or during its further expansion. The findings underscore the need for a nuanced analytical approach to current conflicts, one that considers the diverse actors involved, the interplay between military and non-military instruments, and the integration of both conventional and unconventional tactics. Research on the concept of hybrid warfare and its evolution is still ongoing, and this study aims to ignite further exploration in this area. For example, the notion of an "expanded battlefield" or "expanded battlespace" could imply the incorporation of augmented reality and artificial intelligence capabilities, which would introduce additional complexity to hybrid warfare.

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FAIRNESS, AGENCY, AND ALGORITHMS: AI IN GREEK HIGHER EDUCATION LINGUISTICS

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Abstract

The swift expansion of AI in higher education has not been matched by a clear understanding of its effective application within linguistics education, especially in Greece, where the technology is viewed as a means to advance social and economic development. This research undertakes a thorough exploration of AI integration in Greek higher education linguistics through a utilitarian perspective, centering on the experiences of instructors. It aims to shed light on the advantages and obstacles linked to AI adoption, with particular emphasis on issues of fairness and student agency. The study's goals include examining educators' experiences with AI tools, identifying perceived contributions to fairness and student empowerment, and uncovering the limitations and difficulties involved. Drawing on semi-structured interviews and focus group discussions, insights will be collected from fourteen technologically adept language educators. The ensuing thematic and discourse analyses will engage with these issues and highlight strategies to strengthen teaching practices. Ultimately, the study seeks to inform policymakers, practitioners, and stakeholders of the profound influence of AI on education, while enriching the academic conversation on this subject and proposing actionable ways to enhance teaching and learning in Greek higher education linguistics.

Keywords: AI, Utilitarianism, Fairness, Student Agency, Higher Education Linguistics

1. Introduction

Artificial Intelligence (AI) is rapidly transforming higher education, reshaping both teaching and learning practices. In linguistics education, AI-powered tools increasingly support language acquisition and research, offering substantial opportunities for personalization and efficiency. However, these developments also

raise complex ethical, pedagogical, and institutional challenges. Of particular concern are issues of fairness in AI-mediated educational processes and the preservation of student agency within increasingly automated learning environments. This study examines these challenges through a utilitarian lens, focusing on instructors' experiences with AI implementation in Greek higher education linguistics, with the aim of understanding how emerging technologies can be deployed responsibly and effectively.

2. Literature Review

AI literacy is a multi-dimensional concept that includes technical skills, ethical awareness, human-AI collaboration, and lifelong learning. It enables individuals to make informed decisions and to understand the broader societal implications of artificial intelligence (Chan, 2023). In higher education linguistics, it equips students and educators alike to effectively use AI-driven language tools, which is essential for responsible and meaningful engagement with emerging technologies.

Fairness in AI-powered learning refers to ensuring impartial, inclusive, and unbiased outcomes in higher education linguistics (Li et al., 2024). However, AI systems may reproduce language, gender, and political biases, therefore European Union guidelines emphasize both substantive and procedural fairness, advocating equitable and transparent processes in AI implementation (Smuha, 2019). From a utilitarian perspective, fair AI use aims to maximize educational and societal well-being, highlighting the need for continuous system monitoring and active stakeholder involvement.

Student agency is grounded in educational theories emphasizing cognition, socio-cultural interaction, and self-efficacy (Dewey, Vygotsky, Bandura). In AI-driven learning environments, agency is fostered by tools such as learner models, personalized feedback, and recommender systems that support informed decision-making, active engagement, and self-regulated learning (Suh, 2019). However, risks of passivity and overreliance on automated guidance remain significant challenges, with European Union guidelines highlighting that AI systems should enhance, rather than diminish, student agency (Larsson, 2020). From a utilitarian standpoint, empowering learners through responsible AI use promotes both individual growth and broader societal well-being.

Utilitarianism provides a framework for evaluating AI tools based on their consequences for overall well-being. Various forms include act utilitarianism, focusing on individual actions (Smart, 2020); rule utilitarianism, emphasizing

adherence to happiness-maximizing rules (Scarre, 2020); two-level utilitarianism, combining critical and intuitive moral reasoning (Hare, 2020); total utilitarianism, aiming to maximize overall happiness (Francis, 2022); average utilitarianism, which ensures fair distribution of happiness (Caviola et al., 2022); and negative utilitarianism, prioritizing the reduction of suffering (Gustafsson, 2023). While utilitarianism faces criticisms regarding practicality and potential neglect of justice or individual rights, its outcome-oriented, flexible, and observable nature makes it particularly suitable for assessing the impacts of AI on fairness and student agency in higher education.

The integration of AI in higher education linguistics has evolved over decades. In the 1950s–60s, early experiments focused on machine translation, followed in the 1970s–80s by advances in natural language processing (NLP), influenced by Chomskyan theories. The 1990s saw a shift toward statistical methods and the integration of NLP into educational software, whereas during the 2000s, AI tools expanded to speech recognition, synthesis, and learning management systems (LMS). Finally, the 2010s brought deep learning and big data applications that enhanced NLP and research capabilities. Today, modern AI platforms such as ChatGPT, Carnegie Learning, Fetchy, and Century Tech support personalized learning, automated grading, and real-time feedback, reshaping teaching and research practices in linguistics.

AI-driven teaching methods in higher education linguistics include personalized learning, which tailors content to individual student needs and enhances engagement (Ayeni et al., 2024), adaptive learning systems, which adjust difficulty in real time to provide targeted support (Gligorea et al., 2023), while Intelligent Tutoring Systems (ITS) further offer personalized, real-time tutoring that mimics human interaction (Alam, 2023). These approaches provide scalable, data-driven insights and can optimize learning outcomes. However, challenges such as reduced human interaction, technological disparities, and ethical considerations highlight the need for strategic planning, transparency, and a human-centered approach in implementation.

The implementation of AI in higher education linguistics offers multiple benefits, including enhanced linguistic proficiency (Karataş et al., 2024), personalized learning experiences (Rawas, 2024), and the promotion of critical thinking skills (Xiao and Zhi, 2023). In the context of Greek higher education, however, several challenges persist, such as limited technological infrastructure (Nikolopoulou et al., 2023), a strong theoretical focus in curricula (Menon et al., 2018), centralized administrative

structures (Trivella and Dimitrios, 2015), economic constraints (Stamelos and Kavasakalis, 2016), and cultural resistance to change (Kremmyda, 2015).

AI tools in higher education frequently collect personal and academic data, often without explicit consent, raising significant privacy concerns (Andreotta et al., 2022). While the GDPR provides regulatory protection, inconsistencies in global implementation persist (Schwartz, 2019). Recommended solutions include transparent data practices (Felzmann et al., 2020), differential privacy (Zhu et al., 2020), and federated learning approaches (Cheng et al., 2020). Ethically, a utilitarian framework can guide the balance between maximizing educational and societal benefits and protecting individual privacy.

Aim of the Study

Evaluate the integration of AI in Greek higher education linguistics through a utilitarian lens, focusing on instructors' experiences, benefits, and limitations in relation to fairness and student agency.

Research Questions

- How do instructors in Greek higher education linguistics experience the implementation of AI tools?
- What benefits regarding fairness do instructors anticipate from AI integration?
- What benefits regarding student agency do instructors anticipate from AI integration?
- What challenges regarding fairness do instructors identify in AI implementation?
- What challenges regarding student agency do instructors identify in AI implementation?

Methodology

This study is grounded in a constructivist ontology, which posits that reality is actively constructed through experience and reflection (William, 2024). Likewise, it is guided by an interpretivist epistemology, emphasizing the subjective and context-dependent nature of understanding (Pervin and Mokhtar, 2022). Additionally, the research adopts a value-laden axiology, acknowledging that both researcher and participant values influence the interpretation of findings (Henry and Foley, 2018).

An exploratory research design was employed to gain insights into the emerging field of AI's implementation in higher education linguistics (Swaraj, 2019). Moreover, a qualitative approach was adopted to capture complex, context-dependent, and subjective perceptions, providing depth in the subsequent analysis (Brodsky, 2016). Specifically, a phenomenological strategy guided the study, focusing on the lived experiences of participants and their engagement with AI tools in educational contexts (Jackson et al., 2018).

A non-probability, purposive sampling strategy was employed, consistent with qualitative research principles (Rai, 2015). Criterion sampling ensured that participants met specific inclusion criteria (Patino and Ferreira, 2018), including a minimum of three years of professional experience in AI in education and possession of a PhD diploma or at least a Master's degree in educational technologies or a field related to the study's aim. The final sample comprised eight participants, with data collection continuing until saturation was reached and no new insights emerged (Hennink et al., 2017).

Data was collected through the conduction of both focus group discussions and semi-structured interviews. Focus group discussions facilitated interactive sessions that captured collective insights and social dynamics (Scheelbeek et al., 2020), while also revealing shared experiences and group perspectives (Geampana and Perrotta, 2024). Semi-structured interviews combined structured and open-ended questions, providing flexibility and depth (Magaldi and Berler, 2020), both crucial in exploring participants' nuanced, individualized experiences with AI in higher education linguistics (Scanlan, 2020).

Participants were recruited via email through the English department of a private higher education institution, with voluntary participation and withdrawal rights clearly communicated (Qi et al., 2024). Data collection began with two in-person focus group sessions (four participants each, 1.5–2 hours) to encourage collaborative insights. This was followed by semi-structured interviews (45–60 minutes each) conducted via Zoom to capture in-depth, individualized reflections. All sessions were securely audio-recorded, anonymized during transcription, and will be deleted after completion to ensure participant confidentiality.

Data analysis employed inductive reasoning to build understanding from observed patterns (Sauce and Matzel, 2022). Thematic analysis was used to identify and interpret recurring patterns and themes (Clarke and Braun, 2017), particularly regarding instructors' perspectives on AI, and its impact on fairness and student agency. Additionally, critical discourse analysis examined language, power

dynamics, ideologies, and social influences (Hjelm, 2021), focusing on how educators discussed AI's impact within broader societal and institutional contexts.

Throughout the entire process, an inclusive environment was maintained while bias was minimized, and transparency and confidentiality were ensured. Importantly, reflexivity was supported through peer debriefing and reflective journaling. To enhance qualitative rigor, credibility was established via prolonged engagement (Cyprys, 2017), dependability through peer debriefing (Hadi and José Closs, 2016), transferability via detailed contextual descriptions (Treharne and Riggs, 2015), and confirmability by prioritizing participants' insights over researcher bias (Ahmed, 2024). Overall, these measures reinforced the trustworthiness and overall ethical integrity of the research (Nyirenda et al., 2020).

Conclusion

AI integration in higher education linguistics presents both transformative opportunities and ethical challenges. Instructors play a central role in guiding AI adoption, balancing innovation with responsibility. By applying a utilitarian framework, this study focuses on how AI can contribute to overall educational well-being, with particular attention to fairness and student agency. While the research is yet to conclude, it underscores the importance of careful, human-centered implementation and sets the stage for future analyses that will inform institutional strategies, policy development, and the responsible use of AI in education.

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DESIGNING THE INFORMATION ENTROPY PERFORMANCE INDICATOR (IEPI): A DESIGN SCIENCE FRAMEWORK FOR QUANTIFYING PROCESS UNCERTAINTY IN BUSINESS OPERATIONS

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Abstract

Business Process Management (BPM) frameworks optimize workflows using Key Performance Indicators (KPIs). While effective in stable environments, traditional KPIs inadequately capture uncertainty and variability, particularly in regulated domains such as accounting. This study introduces the Information Entropy Performance Indicator (IEPI), an entropy-based metric applied to BPMN 2.0 models. Grounded in information entropy and developed through Design Science Research Methodology (DSRM), IEPI quantifies process variability and supports uncertainty-aware decision-making. This phase establishes feasibility and lays the foundation for entropy-driven performance metrics across business operations.

Keywords: management information systems; continuous optimization; efficiency analysis

1. Introduction

BPM frameworks are widely used to structure workflows and optimise organisational performance (Nousias, Tsakalidis and Vergidis, 2024). KPIs function as central instruments for monitoring efficiency and compliance (Domínguez et al., 2019), yet most are grounded in deterministic assumptions that inadequately reflect structural uncertainty. In regulated and variability-intensive domains, unpredictability is embedded within decision nodes and branching logic (Jung, Chin and Cardoso, 2011).

Despite growing recognition of process complexity (Grisold et al., 2022), KPI systems rarely quantify probabilistic variability. Building on systematic research integrating BPM and information entropy (Mouzakitīs and Liapakis, 2025), this study introduces IEPI, an entropy-based performance indicator for BPMN 2.0

environments. Grounded in Shannon's entropy (Shannon, 1948) and developed through DSRM (Peffer et al., 2007), IEPI operationalises process uncertainty as a measurable construct.

2. Theoretical and Conceptual Foundation

The conceptual foundation of IEPI derives from a systematic examination of entropy-driven research within BPM. A PRISMA-based review spanning twenty-one academic databases screened over 16,000 records and identified 191 eligible studies addressing entropy across BPM, econophysics, and complexity modelling (Mouzakitis and Liapakis, 2025). Although entropy appears frequently in theoretical discussions, the review revealed significant fragmentation across disciplines and a limited translation of entropy constructs into operational performance metrics. In most cases, entropy was applied descriptively or analytically rather than embedded within KPI architectures suitable for structured process control.

From a measurement standpoint, entropy offers a formal quantification of uncertainty grounded in Shannon's information theory (Shannon, 1948). Unlike deviation-based indicators that measure divergence from predefined targets, entropy captures probabilistic dispersion within a system. Contemporary work on uncertainty quantification reinforces the need for probabilistic reasoning in complex operational environments (Abdar et al., 2021), including accounting information systems (Abad-Segura, González-Zamar and Squillante, 2021). Within BPM research, entropy-based formulations have demonstrated the capacity to measure decision-node variability, particularly in branching process structures (Jung, Chin and Cardoso, 2011). However, such approaches remain peripheral to mainstream BPM evaluation frameworks.

These findings informed the articulation of the Managerial Infophysics metaparadigm, which conceptualizes BPM systems as information structures governed by entropic dynamics (Mouzakitis and Liapakis, 2025). Within this framework, entropy becomes an operational construct, forming the theoretical basis for IEPI as a structured, uncertainty-oriented performance indicator.

3. Design and Development of the IEPI Artefact

The development of IEPI followed the structured logic of DSRM to ensure methodological rigor and artefact relevance (Peffer et al., 2007). The research process began with explicit problem identification, namely the absence of quantitative mechanisms for modelling structural uncertainty within BPM environments. The design objective was defined as the creation of a computable entropy-based KPI capable of measuring decision-point variability in process models and integrating directly with BPM infrastructures.

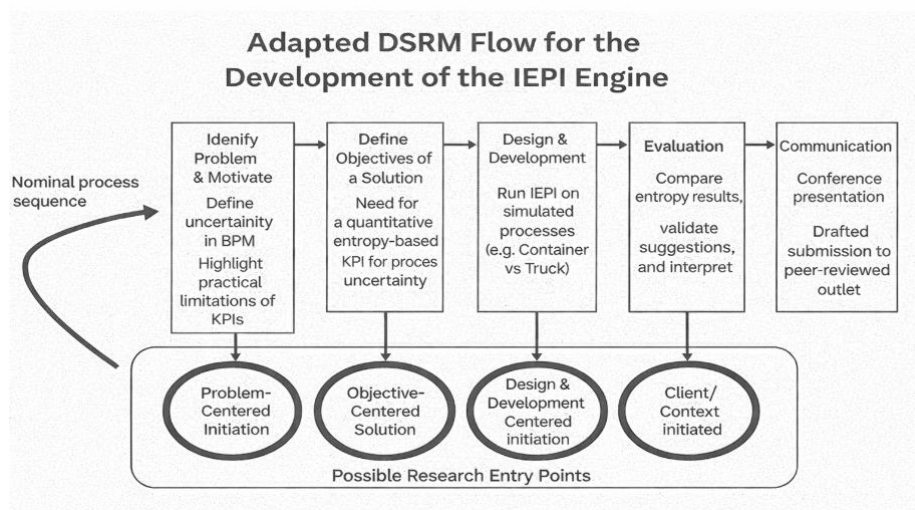


Figure 1. Adapted Design Science Research Methodology (DSRM) flow applied to the development of the IEPI Engine (adapted from Peffer et al., 2007).

As illustrated in Figure 1, the artefact was iteratively designed, demonstrated, and evaluated before formal communication. The resulting IEPI Engine was constructed as a modular entropy aggregation system. BPMN 2.0 process models are decomposed into atomic control-flow structures, including XOR, OR, AND and sequential constructs. Each gateway is modelled as a probabilistic decision node with context-specific execution probabilities. Entropy is computed locally using Shannon's formulation (Shannon, 1948), capturing structural uncertainty embedded in branching logic. These local entropy values are then aggregated to derive the overall IEPI score, representing total process uncertainty.

Architecturally, the engine operates through BPMN 2.0 XML parsing, enabling platform-agnostic deployment across BPM environments (Farshidi, Kwantes and Jansen, 2024). The modular configuration supports scalability and compatibility with runtime verification and temporal constraint analysis (Ocampo-Pineda, Posenato and Zerbato, 2022; Eder, Franceschetti and Lubas, 2022). Through this structured

design, IEPI formalises entropy as an operational performance construct suitable for computational implementation and empirical evaluation.

4. Demonstration: From Entropy Theory to BPMN-Based Computation

The computational foundation of IEPI is grounded in Shannon's entropy formulation (Shannon, 1948), where entropy quantifies the uncertainty of a discrete random variable. In BPMN environments, each decision gateway is treated as such a variable, with outgoing paths representing probabilistic events. Entropy therefore captures uncertainty embedded within control-flow logic rather than deviation from output targets.

For OR-split structures, entropy arises at two levels: activation of a path group and internal routing within that group. The extended formulation proposed by Jung, Chin and Cardoso (2011) models this layered uncertainty by combining group activation probabilities and intra-group path distributions. This gateway-level entropy is computed locally and aggregated across the process to derive the overall IEPI score.

To operationalize this logic, IEPI integrates directly with BPMN 2.0 XML exports. BPMN 2.0 is recognised as a leading modelling standard covering the majority of decision-critical BPM features (Farshidi, Kwantes and Jansen, 2024). The engine parses process structures, decomposes them into atomic control-flow components, and transforms gateways into probabilistic nodes. Entropy is calculated per node and aggregated into a total uncertainty metric.

A comparative simulation was conducted using two BPMN-modeled logistics processes (Container and Truck; see Figure 2). Assigned probabilities were applied to XOR and LOOP gateways. The Container model yielded an entropy value of 2.5742, while the Truck model produced 1.4211, indicating higher structural variability in the Container process.

Beyond measurement, IEPI incorporates entropy-driven optimization. By adjusting dominant path probabilities and recalculating entropy (Code Snippet 1), the engine quantifies potential uncertainty reduction. Ongoing development extends IEPI toward automated visual ingestion through OCR-based flowchart parsing, enabling entropy computation irrespective of modelling format.

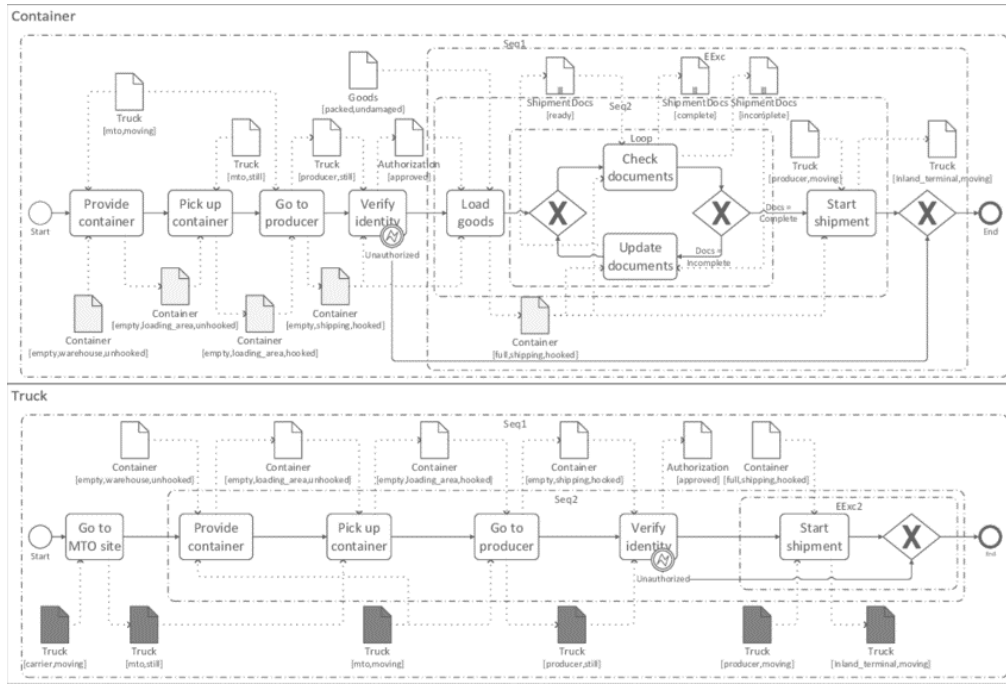


Figure 2. Comparative BPMN models of Container and Truck processes.

Code Snippet 1. Python Function for Entropy-Driven Suggestions.

```
import math
import cv2
import pytesseract
# -----
# 1. Shannon Entropy Core
# -----
def shannon_entropy(probabilities):
    """
    Computes Shannon entropy for a discrete probability distribution.
    """
    H = 0
    for p in probabilities:
        if p > 0:
            H -= p * math.log2(p)
    return H
# -----
# 2. XOR Optimization Suggestion
# -----
def optimize_xor(probabilities, adjustment=0.05):
    """
    Reduces entropy by reinforcing the dominant branch.
    Returns both original and improved entropy values.
    """
    original_entropy = shannon_entropy(probabilities)
    dominant_index = probabilities.index(max(probabilities))
    new_probs = probabilities.copy()
    # Reduce non-dominant paths proportionally
    for i in range(len(new_probs)):
        if i != dominant_index and new_probs[i] > adjustment:
```

```

        new_probs[i] -= adjustment / (len(new_probs) - 1)
# Recalculate dominant path to preserve normalization
new_probs[dominant_index] = 1 - sum(
    new_probs[:dominant_index] + new_probs[dominant_index+1:]
)
improved_entropy = shannon_entropy(new_probs)
return {
    "original_entropy": original_entropy,
    "improved_entropy": improved_entropy,
    "original_probabilities": probabilities,
    "adjusted_probabilities": new_probs
}
# -----
# 3. OCR-Based Process Extraction (Prototype)
# -----
def extract_process_text(image_path):
    """
    Extracts textual labels from flowchart images using OCR.
    Forms the basis for visual-to-graph entropy computation.
    """
    image = cv2.imread(image_path)
    gray = cv2.cvtColor(image, cv2.COLOR_BGR2GRAY)
    _, thresh = cv2.threshold(
        gray, 150, 255, cv2.THRESH_BINARY_INV
    )
    custom_config = r'--oem 3 --psm 6'
    extracted_text = pytesseract.image_to_string(
        thresh, config=custom_config
    )
    return extracted_text
# -----
# 4. Example Usage
# -----
if __name__ == "__main__":
    # Example XOR probabilities
    xor_probs = [0.7, 0.3]
    result = optimize_xor(xor_probs)
    print("Original Entropy:", result["original_entropy"])
    print("Improved Entropy:", result["improved_entropy"])
    # Example OCR call (future automation step)
    # text = extract_process_text("flowchart.png")
    # print(text)

```

5. Conclusions

The IEPI framework provides a structured and quantifiable method for assessing uncertainty within BPMN-based process models. Grounded in Shannon's entropy (Shannon, 1948) and operationalised through gateway-level formulations adapted to process structures (Jung, Chin and Cardoso, 2011), IEPI transforms entropy from a theoretical measure into a computable performance indicator. The comparative simulation demonstrated its capacity to differentiate structural variability and

identify entropy-intensive decision nodes. By aggregating probabilistic gateway metrics and generating optimization suggestions, the engine functions as both a diagnostic and prescriptive artefact. Ongoing development toward OCR-enabled process ingestion further extends its applicability, positioning IEPI as an integrative bridge between information theory and business process management.

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FAILURES OF CONFLICT RESOLUTION IN THE ISRAELI PALESTINIAN CASE: AN OVERVIEW

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Abstract

The conflict between Israel and Palestine stands as one of the world's major protracted and intractable conflicts. The outcome of the prolonged war is infinite casualties from both sides. Even if there were several peace efforts, there is no solution until today. Previous research has shown that during the long-term dispute and the various efforts towards peace building there were insufficient and poor conditions for a feasible agreement. In such complicated conflicts with peculiar characteristics, like the one between Palestine and Israel, the tools that peacemakers should have at their disposal should be used for the main purpose of bridging over the great differences and encourage the positive reinforcement rather than increasing the gap between the adversaries. Additionally, evidence shows that the design of the peace plans was based on rushed decisions and practices by the peace brokers that could not lead to positive results. The research and analysis of the failures of conflict resolution mechanisms is mandatory for the peacemakers who wish to transform or resolve the conflict. Moreover, literature refers to the tremendous vacuum that international law has left in the entire peace process due to its vagueness and ambiguity. While International law operates as the vital body of guaranteeing the smooth relation and interaction between states, it has been violated, and still is, by many actors who have an important role in the making of the peace process. As such, the creation of tangible resolution mechanisms seems to be essential more than ever.

Keywords: Intractable conflict, peace effort, peace makers, failures, conflict resolution

1. Introduction

The Israeli Palestinian conflict stands as one of the most intractable conflicts in modern history as it besets the region of the Middle East for many decades now. Its implications affect the rest of the world in so many ways. Although there have been several peace efforts to solve the dispute, none of the mechanisms of conflict resolution proved effective. It is necessary to look at the failures of previous efforts in order to arrive at those tools that could bring a positive outcome to this conflict.

2. Defining the Israeli - Palestinian conflict as Intractable

What makes a conflict intractable can be featured within a group of elements; the long duration, the difficulties to manage or resolve it, the destructive consequences for the involved parties, the failures of conflict resolution, the correlation with inherited identities and the interest of many actors in sustaining the dispute (Kriesberg, 2010). In the same way, Bar-Tal (2000) claims that intractable conflicts can be brutal in their nature, prolonged, incompatible, and those who are engaged in the conflict prefer the persistence of it. The element of identity cannot be neglected because it consists of important attributes such as history, religion, culture, and ethnicity. They create a solid bond within the societies that share these common identities, and the people who belong in these societies feel that they have an imperative to protect these identities at any cost (Kriesberg, 2010). As Tanabe (2025) argues, during intractable conflicts, collective identities become more intense than nation-state identity (p.17).

All these features are key components in the case between Israel and Palestine and play an important role to the degree of its intractability.

Historically, what any reader of this paper should know is that the region of Palestine has been sacred and precious for centuries by Christians, Jews and Muslims while Jerusalem stands as one of the most important aspirations for both sides of the dispute we discuss. The fateful incidents between the two societies have changed the way the international community fathoms the entire region of the Middle East (Montefiore, 2011). The right to "stateness", which means the entitlement of sovereignty, territorial integrity, self-determination, and autonomy, is another considerable constituent of this dispute (Sayigh, 1995). The one side of the conflict is fighting to maintain all these critical elements that makes a nation-state, and the other side is fighting for its right to stateness. The unsuccessful efforts to harmonize both objectives form what we have said in the beginning of this paper, the most intractable conflict of all contemporary conflicts (Ramsbotham, 2017).

3. Failed attempts towards peace up until now

Since the beginning of the conflict between Israel and Palestine, there were quite a few peace efforts, and each one of them led to failures. Those efforts were established with the aim of settling, transforming, or restraining any conflicting activities between the two sides, but ended up unreciprocated (Ramsbotham, 2017). The cycle of peace negotiations goes back to 1978 at Camp David, to the milestone of the Oslo Accords of 1993, the Camp David of 2000, and extends till today, to the peace plan by Trump's administration (Cruz, 2023). The background of the efforts has shown that those who worked on peace-building – the peacemakers – could not adjust themselves and their tools in accordance with the conditions of this particular conflict; in other words, they proved ineffective. Moreover, the peace plans were initially targeted at building trust between the two contradictory groups, but ultimately, they caused the exact opposite, to create more tension in and between both camps (Barak, 2005). It is very important to create a trustworthy environment between the two communities, as it could help in the long-term modify the view that one has for the other, on the societal level (Shefrin, 2024)

Additionally, what has not been done during the past peace efforts is that both sides were not treated equally, leading to perceptions of double standards, mistrust and frustration which in return led to new cycles of violence (Pappe, 2005). What seems interesting is that previous negotiations were overtly built upon the framework of imbalance of power between the two sides, a tool that for the Western brokers of peace negotiations was mistakenly rational (Elgindly, 2018). What is even more interesting is that in many cases – such as the request by the UN to stop settlement in East and West Jerusalem - international law has been violated, and the international community has not responded (Tanabe, 2025). Moreover, in the event of the Oslo Accords of 1993 or the Wye River Memorandum there was breach of the agreement or non-implementation, by both sides. It is obvious that negotiation proved deficient while it was essential for bringing peace (Kriesberg, 2001).

4. Useful observations for future conflict resolution endeavors

Conflict resolution is not an easy domain as it requires solemnity and full responsibility from everyone get involved. Ramsbotham (2017) clearly states that "conflict intractability is a complex system of interconnecting aspects. The task of conflict resolution is to unlock it" (p. 28). Theory and practice are interconnected components, and both needs expertise and the know-how from scholars, academics

and peacemakers, if the international community envisions the likelihood of a peace deal (Kriesberg, 2010).

Certainly, the outcome of any effort towards peace is unknown; there are two different conflicting parties, different perspectives, desires, and requests. Therefore, there is a need for differing approaches and techniques if peacemakers wish to manage, transform, and resolve the conflict (Kriesberg, 2001). What is important is to understand that neither side wins out in the end. They both hurt, have tremendous losses and slip into a continuous bloodshed. If both sides grasp this, then it is likely to take a step forward (Kriesberg, 2010).

5. Conclusion

The aim of this paper is to talk about one of the most intractable conflicts of our days that cause extreme suffering, casualties, and aversion to each party involved; the Israelis and the Palestinians. Highlighting what went wrong in previous peace processes can help us and those who make decisions understand what needs to be done in order to set up feasible mechanisms of conflict resolution.

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THE PSYCHOSOCIAL RISK FACTORS ASSOCIATED WITH ORTHOREXIA NERVOSA IN YOUNG ADULTS: A MIXED METHOD STUDY

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Abstract

Orthorexia Nervosa (ON), first introduced by Bratman (1997), describes an obsessive preoccupation with healthy eating, characterized by rigid dietary rules, anxiety over food quality, and potential psychosocial impairments. Despite growing recognition of its clinical significance, ON remains absent from official diagnostic classifications such as the DSM-5 and ICD-11. This doctoral research employs a mixed-methods approach to investigate the psychosocial risk factors associated with ON among multicultural young adults residing in Germany and to assess its prevalence within this demographic. The first phase of the study quantitatively examines ON symptoms using the Düsseldorf Orthorexia Scale, analyzing their relationships with psychosocial variables, including perfectionism, cognitive flexibility, body image, anxiety, social media usage, and sociocultural stress. The second phase employs semi-structured interviews with individuals exhibiting high ON tendencies to explore their lived experiences. Using Braun and Clarke's (2006) six-step thematic analysis (Braun & Clarke, 2006), this qualitative component identifies key psychological, social, and cultural factors shaping ON behaviors. By integrating quantitative and qualitative methodologies, this study aims to enhance the understanding of ON's prevalence in Germany, etiological origins, and psychosocial determinants. The findings will contribute valuable insights for clinical interventions, diagnostic processes, and future research on Orthorexia Nervosa.

Keywords: Orthorexia Nervosa, Perfectionism, Cognitive Flexibility, Body Image, Anxiety, Sociocultural Stress, Social Media Usage, Multicultural.

1. Introduction

In the modern era, global challenges such as the COVID-19 pandemic, global warming, and social media have significantly impacted our lifestyle and dietary

consumption trends. Amid these transformations, a range of dietary trends have merged, some of which exhibit pathological characteristics that increase risks to both mental and physical health. Orthorexia Nervosa (ON) is distinguished by a pathological preoccupation with consuming only foods deemed healthy or pure and clean (Braun & Clarke, 2006). While healthy eating behavior is generally encouraged, ON crosses into pathological territory when it involves rigid dietary rules, restrictive eating habits, and ritualized food preparation practices.

Despite its relevance, Orthorexia Nervosa is not yet recognized as a formal diagnosis in the DSM-5 or ICD-11 (McComb & Mills, 2019; Strahler et al., 2020). The lack of official diagnostic criteria has intensified debates about its classification, while empirical research on its prevalence, risk factors, and associated psychopathology remains limited. Recent empirical evidence clearly indicates that ON is not caused by a single factor but emerges from complex interactions among psychological and sociocultural factors (Rzeszutek et al., 2024). Previous research on ON has primarily focused on general populations and only two genders (male and female), often neglecting the role of sociocultural diversity (Koven & Abry, 2015). Moreover, past research neglects gender diversity, often focusing only on women or a strict male/female binary (Eschrich et al., 2024). This study addresses this gap by investigating the psychosocial risk factors contributing to ON within multicultural young adults residing in Germany, including male, female, and non-binary populations.

2. Literature Review

Understanding Orthorexia Nervosa

Orthorexia Nervosa (ON) is a term first introduced by American physician Steve Bratman and David Knight in 1997, describing a pathological obsession with healthy eating (Bratman & Knight, 1997). Unlike other eating disorders, orthorexic individuals focus on the quality rather than the quantity of food, meticulously analyzing its source, processing, and packaging (Koven & Abry, 2015). This preoccupation often results in rigid dietary rules, complex eating rituals, and excessive time spent researching, measuring, and planning meals.

Prevalence and Measurement Challenges

Estimating the prevalence of Orthorexia Nervosa is complicated due to the lack of standardized diagnostic criteria and measurement tools. The widely used ORTO-15

is known to heavily overestimate prevalence (Roncero et al., 2017), while the Düsseldorf Orthorexia Scale (DOS) is considered more reliable (Barthels et al., 2015). A significant contribution comes from Luck-Sikorski et al. (2018), who conducted a large, population-based telephone survey (N=1007) in Germany. Using the DOS with a cut-off score of ≥ 30 , they reported an ON prevalence of 6.9%. In a U.S. student sample, 8.0% exceeded the preliminary cut-off score for Orthorexia, with an additional 12.4% at risk (Chard et al., 2018). In contrast, extremely high ORTO-15 rates have been reported among dietitians and nutrition students in Brazil (81.9%, 88.7%) (Niedzielski & Kaźmierczak-Wojtaś, 2021; Alvarenga et al., 2012)

Psychological and Sociocultural Risk Factors

Perfectionism is a well-established risk factor for eating disorders and is significantly associated with orthorexia nervosa (ON) (Wade et al., 2025). Research consistently demonstrates a strong positive correlation between perfectionism and ON (Zydek et al., 2025; Blažev, 2025).

Anxiety: Underlying anxiety, particularly health anxiety, is frequently implicated in the development of ON (Tragantzopoulou & Giannouli, 2024). Higher anxiety levels are positively associated with ON (Farchakh et al., 2019).

The link between body image and ON is one of the most consistent in the literature. Recent research by Duradoni et al. (2025) provides strong evidence, finding significant, large, positive correlations between ON and body shape dissatisfaction. Age of healthism and age of social media, particularly visual platforms like Instagram, TikTok and YouTube have contributed significantly to the increasing prevalence of Orthorexia Nervosa (ON) among young adults (Gkiouleka et al., 2022). Multiple studies have found a strong association between higher social media use, particularly on platforms like Instagram, and increased symptoms of ON (Turner & Lefevre, 2017; Asil et al., 2023)

3. Methodology

Research Approach and Design

This study conducts an explanatory sequential mixed methods design to achieve a comprehensive understanding of Orthorexia Nervosa (ON) among young adults residing in Germany. The central assumption for adopting this design is that for a complex issue like ON, the "use of quantitative and qualitative approaches in combination provides a better understanding of research problems than either approach alone" because ON is a complex disorder (McComb & Mills, 2019; Valente

et al., 2020).

Phase 1: Quantitative

Sampling

A non-probability, purposive sampling method used to recruit approximately 210 young adults (aged 18–30) from diverse cultural backgrounds residing in Germany.

Instruments and Scales:

Demographic Online Questionnaire

Orthorexia: The Düsseldorf Orthorexia Scale (E-DOS) (Barthels et al., 2015; Chard et al., 2018).

Perfectionism: The Big Three Perfectionism Scale-Short Form (BTPS-SF) (Smith et al., 2016).

Cognitive Flexibility: The Cognitive Flexibility Scale (Martin & Rubin, 1995).

Body Appreciation: The Body Appreciation Scale -2 (BAS-2) (Tylka & Wood-Barcalow, 2015).

Anxiety: The Generalized Anxiety Disorder 7-item (GAD-7) (Spitzer et al., 2006).

Social Media: The Scale of Effects of Social Media on Eating Behaviour (SESMEB) (Keser, 2020).

Acculturation: The Multidimensional Acculturative Stress Inventory (MASI) Rodriguez et al., 2002).

Phase 2: Qualitative

Qualitative part following the analysis of the quantitative data, approximately 10-20 participants invited to participate for a semi-structured interview. Interview data were analyzed using Reflexive Thematic Analysis in NVivo software following Braun and Clarke's (2021) six-phase framework (Braun & Clarke, 2021).

Integration of Findings The qualitative themes used to explain and contextualize the quantitative results. For example, a statistical finding such as "social media use is positively correlated with ON scores" explained and enriched by qualitative themes that

4. Conclusions

This mixed-methods study aimed to investigate the psychosocial risk factors associated with Orthorexia Nervosa Tendencies (ON) among multicultural young adults residing in Germany. The researcher will present result and conclusion at

upcoming ninth Annual PhD Conference 2026.

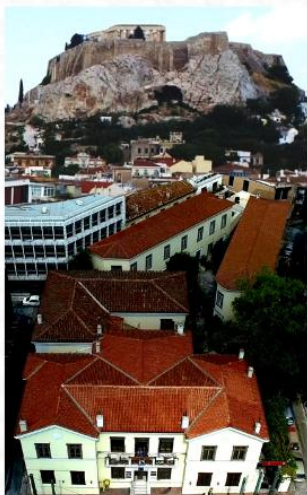
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