

Educational Leadership in the Era of Emerging AI Adoption: An Exploratory Study of Human - AI Collaboration in Higher Education

Bogdan Costache

Bucharest University of Economic Studies

ABSTRACT: *The rapid emergence of generative artificial intelligence (AI) is reshaping teaching, learning, and academic work, creating new opportunities and challenges for educational leadership. While recent studies have documented increasing AI adoption in higher education, existing evidence is largely derived from technologically advanced contexts and early adopters, offering limited insight into institutions where AI integration remains in its initial stages. Consequently, there is a need to better understand how emerging AI practices may influence future leadership strategies and human–AI collaboration in higher education.*

This exploratory study investigates the patterns of AI use among students and educators within an emerging adoption context. Drawing on survey data collected from 76 university students and 38 higher education educators from multiple institutions, the study examines the educational tasks supported by AI, perceived benefits and challenges, and expectations regarding the evolving role of AI in academic activities. Rather than measuring institutional AI maturity or leadership effectiveness, the study seeks to identify early signals of human–AI collaboration that may inform educational leadership in the context of gradual AI adoption.

The findings indicate that AI is primarily employed to support routine educational activities, including information retrieval, content summarization, brainstorming, text improvement, lesson preparation, and administrative tasks. Both students and educators perceive AI predominantly as an augmentation tool that enhances productivity and facilitates learning rather than as a substitute for human expertise. However, concerns regarding academic integrity, critical thinking, overreliance on AI-generated content, digital competencies, and the absence of institutional policies remain significant barriers to broader adoption. These findings suggest that higher education institutions are currently experiencing an early phase of AI integration in which leadership priorities extend beyond technology implementation toward fostering responsible AI use, developing digital capabilities, and establishing governance mechanisms that support effective human–AI collaboration.

The study contributes to the emerging literature on educational leadership by extending discussions of AI adoption beyond technologically mature environments and highlighting the importance of leadership preparedness during the early stages of organizational AI adoption. Rather than offering generalizable conclusions, the findings provide exploratory evidence that can support the development of future conceptual models and empirical research on educational leadership, human–AI collaboration, and institutional AI governance across diverse higher education contexts.

KEYWORDS: educational leadership; artificial intelligence; human–AI collaboration; higher education; AI adoption; generative AI; educational governance; exploratory study.

1. Introduction

Generative artificial intelligence has moved rapidly from experimental use to routine presence in higher education. Large language models now support activities such as information retrieval, summarisation, brainstorming, academic writing, lesson preparation, feedback generation, assessment design, and administrative communication. This expansion has intensified debate about whether artificial intelligence should be understood primarily as an instructional technology, a productivity instrument, a source of academic risk, or a new

participant in educational work. Systematic reviews conducted before and after the widespread release of generative AI show that artificial intelligence applications in higher education have developed unevenly across institutions, disciplines, and professional roles [1,2]. Earlier research concentrated largely on prediction, profiling, assessment, and adaptive systems, while more recent scholarship has shifted towards generative tools that are accessible directly to students and educators and can be incorporated into everyday academic tasks with limited technical expertise [2-4].

The educational significance of this transition extends beyond the technical capabilities of particular platforms. Generative AI alters how academic tasks are distributed between people and digital systems, how students engage with knowledge, how educators design learning activities, and how institutions define acceptable academic practice. Large language models can assist users in producing explanations, examples, summaries, drafts, and structured recommendations, yet the educational value of these outputs depends on the way they are interpreted, evaluated, revised, and integrated into learning or professional practice [3,4]. Consequently, the central issue is not simply whether students and educators use AI, but how they use it, which cognitive and professional activities they delegate, what forms of human judgement they retain, and how institutions govern the resulting relationships.

This distinction is particularly important because the adoption of AI may produce either augmentation or automation. Augmentation occurs when AI supports human reasoning, creativity, productivity, or decision-making while the user retains responsibility for interpreting and evaluating the output. Automation involves transferring a more complete task or decision sequence to the technological system, potentially reducing direct human engagement. Research on human-AI collaboration suggests that the greatest organizational value often emerges from complementary arrangements in which computational capabilities are combined with contextual knowledge, ethical judgement, and professional expertise [5-7]. Jarrahi conceptualises such arrangements as a form of human-AI symbiosis in which AI contributes analytical capacity while people retain the contextual and intuitive capabilities required for complex decisions [5]. Dellermann and colleagues similarly argue that productive collaboration depends on configurations that combine human and machine intelligence rather than treating automation as a straightforward replacement for human work [6].

Within higher education, however, the boundary between augmentation and automation remains unstable. A student who asks an AI system to clarify a concept may be using it as a cognitive scaffold, while a student who delegates the production of an assessed response may be replacing rather than supporting the intended learning process. An educator who uses AI to generate preliminary lesson ideas may preserve pedagogical authority, whereas reliance on unverified AI-generated materials can transfer important elements of instructional judgement to a system that lacks contextual awareness and accountability. These differences cannot be inferred solely from the presence of AI use. They require attention to the purpose of the interaction, the complexity of the delegated task, the degree of human evaluation, and the educational consequences of the resulting output.

Cognitive offloading provides a useful perspective for examining this issue. The concept refers to the use of external actions or resources to reduce the cognitive demands of a task [8]. Digital technologies have long supported external memory, navigation, calculation, and information retrieval, but generative AI expands offloading from storing or locating information to generating interpretations, arguments, and decisions. Earlier research on the so-called Google effect showed that access to digital information can change what individuals remember and how they approach knowledge retrieval [9]. With generative AI, the concern is broader because learners may delegate not only remembering but also analysing, evaluating, and creating. These activities correspond to different levels of cognitive engagement described in Bloom's revised taxonomy [10]. Nevertheless, applying Bloom's taxonomy directly to AI-generated actions requires caution, since a model's production of an analytical or creative output does not demonstrate that the student has engaged in the corresponding cognitive process. The relevant educational question is therefore not what cognitive category an AI output appears to represent, but what intellectual work the learner performs before, during, and after interacting with the system.

The growing use of AI also creates a leadership challenge. Educational leadership has traditionally involved shaping institutional direction, supporting teaching and professional learning, allocating resources, fostering

organizational trust, and creating conditions for sustainable improvement [11-14]. These responsibilities acquire new meaning when technology adoption develops faster than institutional policy, professional development, or shared norms. Leaders are increasingly required to make decisions about AI literacy, assessment design, staff support, data protection, academic integrity, procurement, and accountability, often while evidence about educational effectiveness remains incomplete. The challenge is not limited to implementing new tools. It concerns the institutional capacity to align AI adoption with educational purposes, professional standards, and the legitimate interests of students and educators.

Research on successful educational leadership consistently indicates that leadership effects are mediated through organizational conditions, professional capacity, and the quality of teaching and learning processes rather than through isolated managerial actions [12,13]. This insight is highly relevant to emerging AI adoption. Providing access to generative AI does not by itself improve education, just as restricting access does not resolve the pedagogical and ethical questions created by widespread availability. Leadership must instead establish the conditions under which AI can be used critically and responsibly. Such conditions include clear expectations, opportunities for experimentation, appropriate oversight, professional learning, student guidance, and mechanisms for reviewing unintended consequences. In this sense, AI adoption becomes an organizational learning process rather than a purely technological intervention.

Established technology-adoption theories help explain why students and educators may accept or reject AI tools. The Technology Acceptance Model emphasises perceived usefulness and perceived ease of use as central determinants of technology acceptance [15], while the Unified Theory of Acceptance and Use of Technology incorporates performance expectancy, effort expectancy, social influence, and facilitating conditions [16]. Diffusion of Innovations theory further demonstrates that adoption unfolds unevenly and is shaped by perceived advantage, compatibility, complexity, trialability, and observability [17]. At the organizational level, the technology-organization-environment perspective draws attention to the interaction between technical characteristics, institutional capacity, and external pressures [18]. These models offer valuable explanatory concepts, but generative AI introduces issues that extend beyond conventional acceptance. A system may be easy to use and perceived as useful while still producing unreliable information, encouraging inappropriate dependency, or conflicting with assessment expectations. Adoption should therefore be analysed together with trust, AI literacy, ethical awareness, institutional policy, and the preservation of human agency.

These concerns are especially important in contexts where AI use remains emergent rather than institutionally mature. Much of the current discussion is shaped by highly visible cases from technologically advanced universities, platform-specific usage reports, or samples composed of early adopters. Such evidence is valuable, but it cannot be assumed to represent higher education systems in which generative AI is used more selectively, informally, or at a basic level. Platform-based analyses also capture only the interactions occurring within a particular service and cannot establish how users combine multiple tools, whether reported outputs are incorporated into academic work, or whether AI use improves learning. Short observation windows may overlook changes across the academic year, while discipline classification can obscure interdisciplinary practice. In addition, interaction data alone cannot reliably distinguish students from educators when account-based identification is imperfect.

The present study addresses this underexamined stage of adoption by investigating AI use among 76 university students from different years of study and 38 educators teaching at different higher education institutions in Romania. The national setting is not treated as representative of all Romanian higher education, nor are the findings intended to support statistical generalisation to other systems. Rather, the context provides an opportunity to examine early patterns of use in an environment where generative AI is employed mainly for discrete educational tasks and where institutional integration remains uneven. This positioning is important because emerging-adoption contexts may reveal leadership needs that are less visible in institutions where AI infrastructure, policy, and professional support are already comparatively developed.

The study focuses on the tasks for which students and educators use AI, their perceptions of its benefits and risks, the extent to which use reflects augmentation or automation, and their expectations concerning its future role in higher education. It also examines how these patterns may inform educational leadership without

claiming to measure leadership effectiveness directly. The analytical interest lies in identifying early signals of human-AI collaboration and considering what institutional capabilities may be required as adoption expands. Particular attention is given to routine uses such as information retrieval, summarisation, brainstorming, text improvement, instructional preparation, and administrative support, as these activities may constitute the practical entry points through which more extensive forms of AI integration later develop.

Academic integrity is an unavoidable part of this analysis. Generative AI complicates established distinctions between legitimate assistance, authorship, collaboration, and misconduct [19,20]. However, an exclusive focus on cheating may produce policies that fail to address the broader educational transformation. Prohibition-oriented responses can obscure legitimate uses of AI for feedback, language support, accessibility, and idea development, while permissive approaches can underestimate risks related to dependency, fabricated information, and the erosion of independent judgement. Human-centred AI offers a more balanced orientation by treating reliability, user control, transparency, and accountability as design and governance requirements rather than optional safeguards [21,22].

At the institutional level, responsible adoption also requires governance principles that connect innovation with human rights, fairness, transparency, responsibility, and oversight. International frameworks developed by UNESCO, the OECD, and the European Union establish broad expectations for trustworthy and human-centred AI [23-25]. Yet these principles must be translated into educational practice through policies, assessment rules, staff development, student support, and clearly assigned responsibilities. The gap between high-level ethical principles and everyday academic practice is therefore a leadership problem as much as a regulatory one.

Against this background, the study examines three connected questions: how students and educators in an emerging-adoption context currently use generative AI for educational work; how they perceive its benefits, limitations, and risks; and what these early patterns imply for educational leadership, institutional preparedness, and human-AI collaboration. By combining the perspectives of students and educators, the study seeks to avoid analysing adoption through a single stakeholder group. Its contribution lies not in claiming a comprehensive account of AI use, but in showing how limited, task-specific practices can provide early evidence about future institutional needs.

The article argues that educational leadership during the initial stages of AI adoption should focus neither on rapid technological expansion nor on generalized restriction. A more defensible approach is to develop institutional capacity for informed experimentation, critical evaluation, and accountable human-AI collaboration. This requires leaders to recognise that basic uses are not trivial. They shape habits, expectations, and norms that may influence later forms of adoption. Understanding these practices at an early stage can therefore help institutions prepare governance arrangements, professional learning initiatives, and pedagogical guidance before AI use becomes more deeply embedded in academic work.

2. Literature Review

The rapid integration of generative artificial intelligence into higher education has generated an interdisciplinary body of research spanning educational leadership, digital transformation, technology adoption, organizational behavior, learning sciences, and human-computer interaction. While early studies primarily examined artificial intelligence as a technological innovation capable of automating educational processes, more recent scholarship increasingly conceptualizes AI as a collaborative partner that augments human cognition, supports professional decision-making, and reshapes institutional practices [1,2]. This conceptual transition has profound implications for educational leadership because it reframes AI from being merely another educational technology to becoming an organizational capability that influences teaching, learning, governance, and strategic decision-making. Understanding this transition requires integrating perspectives from educational leadership theory, AI adoption research, human-AI collaboration, cognitive psychology, and responsible AI governance.

2.1 From Artificial Intelligence Adoption to Human-AI Collaboration

Artificial intelligence has been investigated in educational settings for more than two decades, although the nature of research has evolved considerably. Earlier studies focused predominantly on intelligent tutoring systems, adaptive learning environments, learning analytics, automated assessment, and predictive models designed to support student retention and institutional performance [1]. These applications generally positioned AI as an analytical technology operating behind educational processes rather than as a visible participant in daily academic activities.

The emergence of large language models fundamentally altered this perspective. Unlike previous AI applications that required specialized institutional infrastructures, generative AI became directly accessible to educators and students through conversational interfaces capable of producing coherent text, explanations, summaries, lesson plans, programming code, and creative content [2-5]. Consequently, AI shifted from being primarily an institutional technology to becoming an individual productivity tool integrated into routine academic work.

This transformation has encouraged scholars to reconsider the relationship between humans and intelligent systems. Rather than describing AI as a replacement for human expertise, contemporary literature increasingly emphasizes complementary interaction. Wilson and Daugherty introduced the concept of collaborative intelligence, arguing that competitive advantage emerges when organizations combine human creativity, contextual judgment, and ethical reasoning with the computational capabilities of artificial intelligence [11]. Brynjolfsson and McAfee similarly argue that technological progress creates greater value when digital systems complement rather than substitute human capabilities [7,8].

Jarrahi extends this perspective by introducing the concept of human-AI symbiosis, suggesting that artificial intelligence should be viewed as an organizational actor supporting rather than replacing managerial decision-making [5]. According to this perspective, AI contributes computational speed, pattern recognition, and information processing, while humans retain contextual awareness, ethical responsibility, intuition, and accountability. Dellermann and colleagues further conceptualize Human-AI Collaboration as a socio-technical system in which humans and intelligent systems jointly perform tasks through complementary capabilities rather than hierarchical replacement [6].

These theoretical developments have significant implications for higher education. Universities increasingly operate in environments characterized by information abundance, rapid technological change, and growing expectations regarding institutional responsiveness. Within such contexts, AI becomes valuable not because it eliminates human work but because it supports increasingly complex educational activities while preserving academic judgment and professional responsibility.

2.2 Educational Leadership in the Era of Digital Transformation

Educational leadership has traditionally focused on improving teaching quality, organizational learning, institutional effectiveness, and student outcomes through strategic vision, professional development, and collaborative organizational cultures [12-14]. Although technology has long been recognized as an important component of educational change, digital transformation has substantially expanded leadership responsibilities.

Hallinger argues that leadership influences educational outcomes primarily through its capacity to create organizational conditions that enable continuous professional learning rather than through direct intervention in classroom activities [12]. Similarly, Leithwood, Harris, and Hopkins emphasize that successful educational

leadership depends on developing shared organizational capacity, supporting instructional improvement, and creating cultures characterized by trust, collaboration, and continuous adaptation [13].

The emergence of generative AI introduces additional complexity into these established leadership functions. Unlike previous educational technologies that mainly supported existing instructional practices, generative AI directly participates in knowledge creation, communication, planning, and assessment. Consequently, educational leaders must address not only technological implementation but also ethical governance, digital competencies, institutional policies, academic integrity, and organizational preparedness.

Papa and Jackson argue that contemporary educational leadership increasingly requires strategic capabilities for managing digital ecosystems rather than isolated technological initiatives [14]. Leadership therefore extends beyond technology procurement to encompass organizational learning, institutional resilience, stakeholder engagement, and responsible innovation. This broader perspective aligns with recent discussions suggesting that AI implementation should be understood as organizational transformation rather than technological adoption alone.

Importantly, educational leadership within emerging AI contexts differs from leadership in digitally mature institutions. Organizations experiencing early AI adoption often lack formal governance structures, established professional development programs, standardized institutional policies, or comprehensive implementation strategies. Under these conditions, leadership must simultaneously encourage innovation while managing uncertainty, balancing experimentation with institutional responsibility.

2.3 Technology Adoption and Emerging AI Use in Higher Education

Technology adoption theories provide useful frameworks for understanding why educators and students decide to integrate AI into their academic activities. Davis's Technology Acceptance Model remains one of the most influential theoretical approaches, proposing perceived usefulness and perceived ease of use as the principal determinants of technology acceptance [15]. The Unified Theory of Acceptance and Use of Technology expands this perspective by incorporating additional variables including performance expectancy, effort expectancy, facilitating conditions, and social influence [16].

Although these models have been widely applied across educational technologies, generative AI introduces new dimensions that extend beyond traditional acceptance research. Users may perceive AI as useful and easy to use while simultaneously expressing concerns regarding reliability, transparency, bias, authorship, privacy, or academic integrity. Consequently, AI adoption increasingly depends not only on technological characteristics but also on institutional trust, ethical governance, digital competencies, and organizational culture.

Diffusion of Innovations theory provides additional explanatory value by emphasizing that technological adoption rarely occurs simultaneously across organizations [17]. Instead, adoption follows successive stages involving innovators, early adopters, early majority, late majority, and laggards. Much of the existing empirical literature concerning generative AI reflects early adopter environments where institutional support, digital competencies, and technological readiness are comparatively advanced. Consequently, considerably less attention has been devoted to institutions where AI adoption remains exploratory and characterized by relatively basic educational applications.

The Technology-Organization-Environment framework further suggests that successful technological implementation depends upon interactions among technological capabilities, organizational readiness, and external environmental pressures [18]. Applied to higher education, this perspective indicates that institutional AI adoption cannot be understood solely through individual behavior. Organizational leadership, digital infrastructure, professional development, regulatory requirements, and institutional culture all influence whether AI becomes integrated into everyday educational practice.

This observation is particularly relevant for the present study. Rather than examining advanced institutional AI ecosystems, the research investigates a context in which AI adoption remains largely decentralized, voluntary, and task-specific. Such contexts provide valuable opportunities to understand how organizational AI capabilities emerge before comprehensive institutional strategies become established.

2.4 Generative AI, Learning Processes, and Cognitive Offloading

Generative AI also challenges established theories of learning because it alters how students interact with information, solve problems, and construct knowledge. Rather than functioning solely as repositories of information, contemporary AI systems actively generate explanations, examples, arguments, summaries, and alternative perspectives. Consequently, they increasingly participate in cognitive processes traditionally associated with human learning.

Risko and Gilbert define cognitive offloading as the strategic use of external resources to reduce internal cognitive demands [19]. Historically, individuals have relied upon notes, calculators, maps, and digital search engines to support memory and information processing. Generative AI significantly extends these capabilities by assisting not only memory retrieval but also idea generation, text production, analytical reasoning, and problem-solving.

Earlier work by Sparrow, Liu, and Wegner demonstrated that widespread access to digital information influences memory strategies by encouraging individuals to remember where information can be found rather than the information itself [20]. Generative AI represents a further evolution because learners may now delegate portions of reasoning, drafting, synthesis, and creative production in addition to factual retrieval.

Bloom's revised taxonomy provides an important framework for interpreting these developments [21]. Educational activities traditionally progress from remembering and understanding toward applying, analyzing, evaluating, and creating. Generative AI is capable of producing outputs that appear to correspond to each of these cognitive categories. However, several recent scholars caution that AI-generated responses should not be interpreted as evidence that equivalent human cognitive processes have occurred [3,4]. Instead, educational attention should focus on the learner's engagement with AI outputs, including critical evaluation, verification, reflection, and revision.

Consequently, the educational challenge is not whether AI performs higher-order cognitive tasks but whether its use encourages or diminishes meaningful student learning. Human-AI collaboration therefore depends upon maintaining active human cognitive engagement despite increasing technological assistance.

2.5 Educational Governance, Ethics, and Responsible AI

The rapid diffusion of generative AI has intensified discussion concerning ethical governance within higher education. Unlike previous educational technologies, AI systems produce original content that directly influences teaching, assessment, research, and administrative decision-making. As a result, governance concerns extend beyond technical implementation to include transparency, accountability, fairness, explainability, privacy, intellectual property, and human oversight.

Floridi and Cowls propose five foundational ethical principles for trustworthy AI, namely beneficence, non-maleficence, autonomy, justice, and explicability [22]. These principles have strongly influenced subsequent international policy initiatives, including UNESCO's Recommendation on the Ethics of Artificial Intelligence [23], the OECD Principles on Artificial Intelligence [24], and the European Union Artificial Intelligence Act [25]. Collectively, these frameworks advocate human-centered approaches emphasizing transparency, accountability, human oversight, risk management, and protection of fundamental rights.

Within educational institutions, these principles require translation into operational policies governing acceptable AI use, assessment practices, professional development, data governance, and academic integrity. Cotton, Cotton, and Shipway argue that universities should avoid simplistic responses centered exclusively on prohibition because AI has become sufficiently accessible that long-term educational strategies must instead emphasize responsible use and authentic assessment [26]. Perkins similarly highlights that academic integrity frameworks require substantial revision to accommodate increasingly sophisticated generative AI systems [27].

Shneiderman's human-centered AI framework reinforces this perspective by arguing that successful AI implementation depends upon maintaining meaningful human control, organizational accountability, and user empowerment rather than maximizing technological autonomy [28]. Likewise, Amershi and colleagues propose practical design principles emphasizing transparency, user feedback, appropriate trust calibration, and continuous human involvement throughout AI-supported decision processes [29].

These governance perspectives are especially relevant in emerging adoption environments where institutional policies often lag behind technological availability. Educational leaders therefore play a critical role in translating international ethical principles into practical institutional strategies that simultaneously encourage innovation and protect educational quality.

2.6 Research Gap and Conceptual Positioning

The literature demonstrates remarkable progress in understanding generative AI within higher education. Systematic reviews consistently report increasing adoption across teaching, learning, assessment, and research activities [1,2,30]. Contemporary scholarship also recognizes Human-AI Collaboration as a more productive conceptual lens than automation alone, emphasizing complementary rather than substitutive relationships between humans and intelligent systems [5,6,11].

Nevertheless, several important gaps remain.

First, most empirical studies originate from technologically advanced institutions or early adopter populations where AI use is already comparatively mature. Less is known about institutions experiencing gradual or exploratory adoption, where AI supports relatively basic educational tasks rather than deeply integrated pedagogical transformation.

Second, much of the literature examines either student or educator perspectives independently. Comparative evidence incorporating both stakeholder groups remains comparatively limited despite the interdependent nature of educational processes.

Third, although educational leadership has become increasingly prominent within discussions of digital transformation, relatively few studies explicitly connect leadership theory with emerging patterns of Human-AI Collaboration. Existing research frequently discusses technology adoption, ethics, or digital competencies separately rather than integrating these dimensions within a broader organizational leadership perspective.

Finally, contemporary research increasingly acknowledges that AI functions primarily as an augmentation technology rather than a fully autonomous educational actor. However, relatively little empirical evidence explores how educators and students themselves perceive this distinction during the earliest stages of institutional AI adoption.

The present study addresses these gaps through an exploratory investigation of AI use among university students and educators operating within an emerging adoption environment. Rather than evaluating institutional AI maturity or measuring leadership effectiveness directly, the study examines how routine AI-supported educational practices may provide early evidence regarding future leadership priorities, governance requirements, and the evolution of Human-AI Collaboration in higher education. By positioning AI adoption as an organizational learning process rather than merely a technological phenomenon, the study contributes to the

growing literature connecting educational leadership with responsible, human-centered, and context-sensitive AI integration.

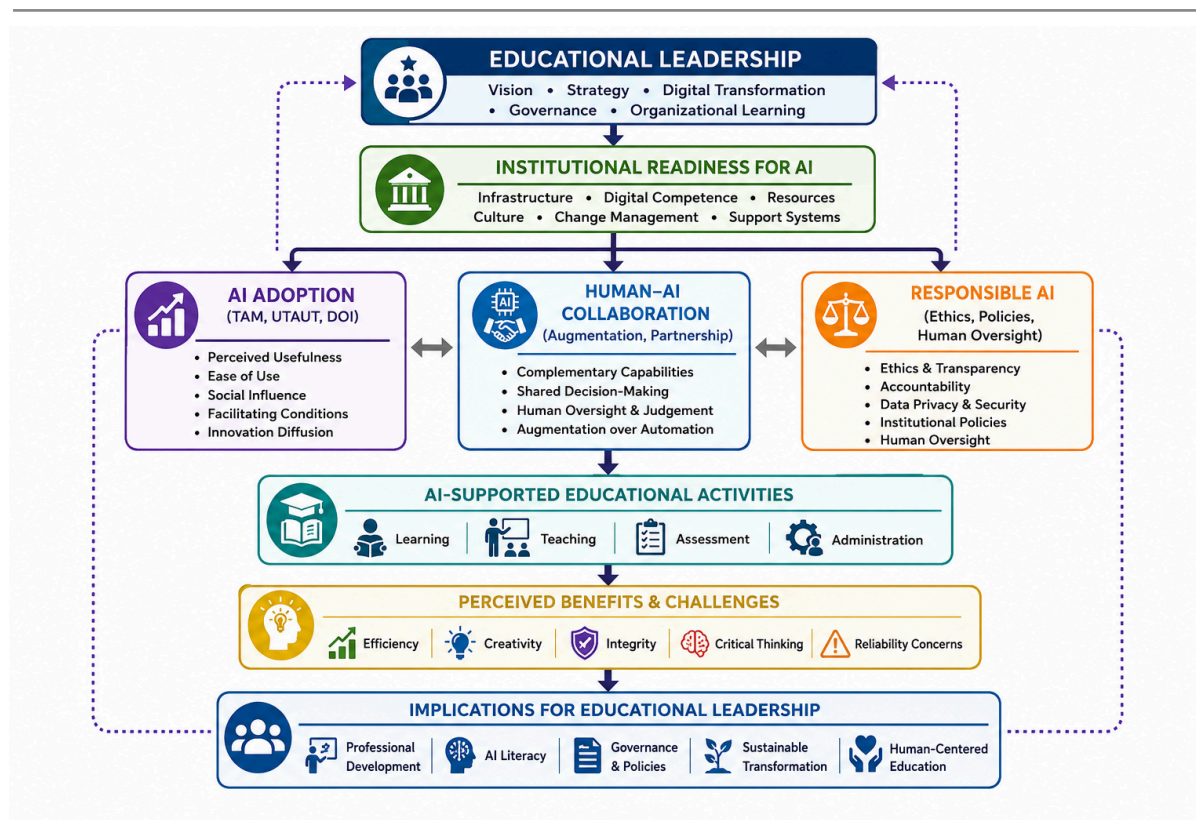
Table 1. Main theoretical dimensions underpinning the study

Theoretical Dimension	Core Concept	Representative References	Relevance for the Present Study
Educational Leadership	Leadership enables organizational learning, digital transformation, and institutional readiness	Hallinger (2018); Leithwood et al. (2020); Fullan (2016); Papa & Jackson (2018)	Explains how universities can strategically support AI integration through leadership and governance
Human–AI Collaboration	AI augments rather than replaces human expertise through complementary capabilities	Jarrahi (2018); Dellermann et al. (2019); Wilson & Daugherty (2018)	Provides the main conceptual lens for interpreting AI-supported educational activities
AI Adoption	Technology acceptance depends on perceived usefulness, organizational readiness, and innovation diffusion	Davis (1989); Venkatesh et al. (2003); Rogers (2003); Tornatzky & Fleischer (1990)	Explains factors influencing educators' and students' willingness to adopt AI
Cognitive Offloading	AI supports information processing while potentially influencing human cognition and critical thinking	Risko & Gilbert (2016); Sparrow et al. (2011)	Helps interpret AI use for summarization, brainstorming, and information retrieval
Learning and Higher-Order Thinking	AI interacts with different cognitive processes described by Bloom's revised taxonomy	Anderson & Krathwohl (2001); Kasneci et al. (2023)	Supports analysis of educational tasks performed with AI
Responsible AI and Governance	AI implementation requires transparency, accountability, ethics, and human oversight	Floridi & Cows (2019); UNESCO (2021); OECD (2019); EU AI Act (2024); Shneiderman (2022)	Explains the institutional responsibilities associated with sustainable AI adoption

Source: Authors' synthesis based on the reviewed literature [1–29].

Building upon the reviewed literature, the study adopts an integrated conceptual framework that positions Human–AI Collaboration at the intersection of educational leadership, AI adoption, cognitive support, and responsible governance. Rather than viewing these dimensions independently, the framework illustrates their interrelationships and their collective influence on emerging AI adoption in higher education. Figure 1 presents the conceptual model that guided both the questionnaire design and the interpretation of the empirical findings.

Figure 1. Conceptual framework of Human–AI Collaboration in higher education



Source: Authors' conceptual framework developed from the reviewed literature [5–29].

3. Methodology

This study employed an exploratory quantitative research design to investigate the emerging patterns of artificial intelligence use among students and educators in higher education and to examine their potential implications for educational leadership and Human-AI Collaboration. An exploratory approach was considered appropriate because generative AI adoption remains at an early stage within the investigated context, institutional policies continue to evolve, and empirical evidence regarding AI-supported educational practices is still limited. Rather than testing causal relationships or validating an existing theoretical model, the study sought to identify initial behavioral patterns, perceived opportunities, challenges, and expectations associated with AI use in everyday academic activities.

The study was conducted between May and June 2026 and involved participants from multiple higher education institutions. A total of 114 valid responses were collected, comprising 76 university students enrolled in different years of undergraduate and graduate studies and 38 educators teaching across diverse academic disciplines. Participants were recruited through convenience sampling using institutional and professional academic networks. Participation was entirely voluntary and anonymous, and no personally identifiable information was collected. Prior to completing the questionnaire, all respondents were informed about the purpose of the research, the anonymous treatment of the collected data, and their right to discontinue participation at any stage without consequence.

Although the sample cannot be considered statistically representative of the entire higher education population, it was deemed appropriate for an exploratory investigation intended to capture emerging AI practices rather than produce nationally generalizable findings. The diversity of institutions, educational roles, and academic backgrounds provided an opportunity to examine AI adoption across different educational contexts while

acknowledging that the results primarily reflect early adopters and individuals already interested in experimenting with generative AI technologies.

The questionnaire was developed following an extensive review of the literature on educational leadership, AI adoption, Human-AI Collaboration, educational governance, technology acceptance, cognitive offloading, and responsible AI [1-30]. In addition, several questionnaire dimensions were informed by the behavioral patterns reported in the **Anthropic Claude Education Report (2025)**, particularly the distinction between augmentation and automation, the categorization of educational AI tasks, patterns of interaction between users and AI systems, and the application of Bloom's revised taxonomy to educational activities. Rather than replicating the Anthropic study, the questionnaire adapted these conceptual dimensions to explore AI practices within a different educational and cultural context characterized by comparatively lower institutional AI maturity and predominantly basic AI usage.

The final questionnaire consisted of four major sections. The first section collected demographic information, including participants' educational role, academic discipline, and level of study or teaching experience. The second section examined AI usage patterns by identifying the frequency of AI use, preferred AI platforms, and the educational tasks for which AI was employed. Respondents evaluated activities such as information retrieval, summarization, brainstorming, drafting academic texts, language improvement, lesson preparation, assessment support, administrative communication, programming assistance, and problem solving.

The third section explored participants' perceptions regarding the benefits and limitations of AI adoption in higher education. Respondents assessed the extent to which AI contributed to learning effectiveness, teaching productivity, creativity, critical thinking, academic performance, time management, and professional efficiency. The same section investigated concerns regarding academic integrity, reliability of AI-generated content, misinformation, overdependence on AI, privacy, ethical issues, and the absence of institutional regulations governing AI use.

The final section focused on educational leadership and institutional preparedness. Rather than evaluating leadership performance directly, respondents were invited to express their perceptions regarding future institutional priorities, including the need for AI policies, professional development, digital competencies, governance mechanisms, ethical guidelines, curriculum adaptation, assessment redesign, and leadership support for responsible AI integration. These items were designed to identify organizational expectations associated with emerging Human-AI Collaboration rather than measure leadership effectiveness using established leadership scales.

Most questionnaire items employed five-point Likert scales ranging from strong disagreement to strong agreement, while several questions included multiple-choice responses and optional open-ended comments to capture additional qualitative insights. Prior to data collection, the questionnaire was reviewed by three academics with expertise in educational technology and research methodology to evaluate content clarity, wording consistency, and face validity. Minor revisions were subsequently implemented to improve readability and reduce potential ambiguity.

Data analysis primarily relied on descriptive statistical techniques appropriate for exploratory research. Frequencies, percentages, means, and standard deviations were calculated to summarize AI usage patterns, perceived benefits, institutional challenges, and future expectations. Comparative descriptive analyses were also performed to identify similarities and differences between students and educators across the investigated dimensions. Because the objective of the study was exploratory rather than confirmatory, no causal modeling or hypothesis testing was conducted. Instead, the findings were interpreted as indicative patterns capable of informing future theory development and subsequent large-scale empirical investigations.

The analytical framework guiding the interpretation of the results integrated three complementary theoretical perspectives. First, Human-AI Collaboration theory provided the conceptual lens for understanding AI as a collaborative partner supporting educational activities rather than replacing human expertise [5,6,11]. Second, technology adoption theories, including the Technology Acceptance Model, the Unified Theory of Acceptance

and Use of Technology, and Diffusion of Innovations theory, informed the interpretation of participants' willingness to integrate AI into teaching and learning activities [15-17]. Third, educational leadership theory provided the organizational perspective necessary to interpret how emerging AI practices may influence institutional governance, leadership preparedness, digital transformation, and professional development [12-14].

Several methodological limitations should be acknowledged. First, the relatively small convenience sample limits statistical generalization beyond the investigated participants. Second, self-reported responses may be influenced by recall bias or socially desirable reporting regarding AI use. Third, the cross-sectional design captures perceptions at a single point in time and cannot account for the rapidly evolving nature of generative AI adoption. Fourth, participants reported AI use across multiple platforms rather than a single AI application, making it impossible to distinguish platform-specific behaviors. Finally, because AI adoption remains relatively limited within the investigated educational context, many reported practices reflect basic or intermittent AI use rather than advanced pedagogical integration. Nevertheless, these characteristics represent an important strength of the study, as they provide insight into an early stage of organizational AI adoption that has received comparatively limited attention in the existing literature. Consequently, the findings should be interpreted as exploratory evidence capable of informing future comparative studies, longitudinal investigations, and the development of conceptual frameworks addressing educational leadership, Human-AI Collaboration, and institutional AI governance during the initial phases of AI integration.

4. Results

The findings indicate that the participants have entered an early stage of artificial intelligence adoption in which AI is increasingly integrated into everyday academic activities but has not yet become embedded within institutional teaching, learning, or governance processes. Across both respondent groups, AI is primarily perceived as a complementary technology that supports productivity, facilitates access to information, and reduces the time required to complete routine educational tasks. At the same time, participants consistently emphasized that human judgement remains essential when interpreting, validating, and applying AI-generated outputs. This perception aligns more closely with the concept of Human-AI Collaboration than with a fully automated educational environment.

4.1 Patterns of AI Use among Students

The survey responses reveal that students predominantly employ generative AI to support routine learning activities rather than to replace the learning process itself. The most frequently reported educational tasks include searching for information, summarizing academic materials, clarifying complex concepts, generating ideas for assignments, improving written texts, translating academic content, and organizing study materials. These activities indicate that students primarily use AI as a cognitive support tool capable of accelerating information processing while facilitating individual study.

A substantial proportion of respondents also reported using AI during the initial phases of academic writing. Rather than requesting complete assignments, students commonly described AI as assisting with brainstorming, proposing outlines, identifying relevant concepts, improving language quality, or reformulating existing texts. Such practices suggest that AI functions mainly as an intellectual companion during idea development instead of replacing students' own academic contributions. This distinction reflects the augmentation-oriented interaction patterns identified in recent platform-based analyses of AI use in higher education, where users employ AI to enhance rather than completely automate cognitive work [3,30].

Students also acknowledged that AI contributes positively to learning efficiency by reducing the time needed to locate information, organize knowledge, and prepare for examinations. Many respondents perceived AI as particularly valuable when encountering unfamiliar topics, allowing them to receive simplified explanations before consulting more specialized academic sources. Nevertheless, respondents consistently emphasized that

AI-generated information requires verification through textbooks, scientific literature, or instructor guidance, reflecting an awareness of the limitations associated with generative AI reliability.

Although the survey indicates growing student confidence in AI-assisted learning, respondents expressed concern regarding excessive dependence on AI-generated content. Many participants recognized that prolonged reliance on AI may reduce independent reasoning, critical evaluation, and problem-solving skills if used without active reflection. Consequently, students generally viewed AI as an educational assistant rather than a replacement for personal learning effort.

4.2 AI Adoption among Educators

Educators reported AI use patterns that differed from those of students while sharing several common characteristics. Rather than employing AI primarily for learning support, educators predominantly used generative AI to improve professional productivity, instructional preparation, and administrative efficiency.

The most frequently reported educational applications included preparing teaching materials, generating lesson plans, developing classroom activities, creating assessment questions, summarizing academic resources, drafting institutional communications, and improving written documents. Several respondents also indicated that AI assists in generating examples, explaining complex concepts from alternative perspectives, and adapting instructional materials for different categories of learners.

These findings suggest that educators currently perceive AI primarily as a professional support technology capable of reducing routine workload while allowing additional time for instructional design and interaction with students. Importantly, respondents consistently rejected the notion that AI should replace pedagogical expertise or independent academic judgement. Instead, they emphasized that AI-generated outputs require careful review, contextual adaptation, and professional validation before being incorporated into educational practice.

Educators also reported uncertainty regarding institutional expectations concerning acceptable AI use. Several participants highlighted the absence of formal institutional guidelines, standardized ethical policies, or professional development initiatives specifically addressing generative AI. Consequently, AI adoption frequently depended on individual experimentation rather than coordinated institutional strategies.

4.3 Human-AI Collaboration as the Predominant Pattern of AI Use

One of the most consistent findings emerging from both respondent groups concerns the collaborative nature of AI use. Participants rarely described AI as an autonomous decision-maker or complete substitute for human expertise. Instead, AI was predominantly viewed as a supporting technology that complements human capabilities during information processing, content development, planning, and communication.

This perception is reflected across multiple educational activities. Students described AI as providing alternative explanations, generating examples, improving writing quality, and facilitating conceptual understanding while retaining responsibility for evaluating and incorporating AI-generated suggestions into their academic work. Similarly, educators emphasized that AI contributes efficiency gains during lesson preparation, resource development, and administrative communication but cannot replace pedagogical knowledge, disciplinary expertise, or professional judgement.

The findings therefore support recent theoretical perspectives describing Human-AI Collaboration as complementary rather than substitutive [5,6,11]. Rather than transferring complete educational responsibilities

to AI systems, participants appear to distribute specific routine or information-intensive tasks between themselves and AI while preserving human oversight during final decision-making.

4.4 AI Augmentation versus Educational Automation

The distinction between augmentation and automation represents one of the central analytical dimensions of the study. Overall, the findings strongly indicate that participants currently associate AI with augmentation rather than automation.

Students primarily viewed AI as extending their learning capabilities by accelerating information retrieval, supporting idea generation, improving academic writing, and facilitating comprehension of unfamiliar subjects. Likewise, educators perceived AI as reducing administrative workload, accelerating instructional preparation, and improving access to educational resources without diminishing their pedagogical responsibilities.

Only a limited number of responses suggested expectations that AI could independently perform complex educational activities such as grading, curriculum design, or autonomous instructional decision-making. Instead, respondents repeatedly emphasized that human review remains essential before AI-generated outputs can be incorporated into educational practice.

These findings indicate that participants recognize the limitations of current generative AI technologies despite acknowledging their considerable practical benefits. Rather than seeking complete automation, respondents appear interested in optimizing collaboration between human expertise and computational assistance.

4.5 Perceived Benefits of AI Adoption

Across both participant groups, several recurring benefits emerged from the analysis.

The most frequently identified advantage concerned increased efficiency. Participants consistently reported that AI reduces the time required to search for information, summarize documents, generate initial ideas, improve written communication, and organize educational resources. These efficiency gains were perceived as particularly valuable given the increasing volume of academic information and administrative responsibilities characterizing contemporary higher education.

Respondents also emphasized AI's contribution to creativity and idea generation. Both students and educators reported using AI to explore alternative perspectives, generate examples, identify potential research topics, or overcome creative blocks during writing and instructional design.

Another frequently mentioned benefit involved accessibility. Participants appreciated AI's ability to provide immediate explanations, simplify complex concepts, translate academic materials, and adapt information according to individual learning needs. Such characteristics were perceived as supporting more personalized and flexible learning experiences.

Finally, respondents viewed AI as contributing to digital competence development. Continued interaction with AI systems encouraged users to formulate clearer questions, evaluate multiple information sources, and reflect more critically on the quality of generated responses.

4.6 Challenges and Concerns

Despite generally positive attitudes toward AI, participants expressed several significant concerns.

The most frequently reported challenge involved academic integrity. Both students and educators recognized that generative AI complicates traditional understandings of authorship, originality, and independent academic work. Respondents emphasized the need for transparent institutional policies clarifying acceptable and unacceptable forms of AI-assisted learning.

A second major concern involved reliability. Participants acknowledged that AI occasionally produces inaccurate, outdated, or fabricated information, requiring careful verification before educational use. This finding reinforces the importance of maintaining human oversight throughout AI-supported educational activities.

Critical thinking represented another recurring theme. Respondents expressed concern that excessive dependence on AI may discourage independent reasoning, analytical thinking, and problem-solving if learners accept generated outputs without evaluation. Consequently, participants repeatedly emphasized that AI should supplement rather than replace intellectual effort.

Additional concerns included data privacy, ethical responsibility, algorithmic bias, unequal digital competencies among users, and the absence of institutional support mechanisms capable of guiding responsible AI integration.

4.7 Educational Leadership and Institutional Preparedness

Perhaps the most important findings relate to participants' expectations regarding institutional leadership.

Both students and educators consistently indicated that higher education institutions should assume a more active role in supporting responsible AI adoption. Rather than expecting institutional leaders to restrict AI use, respondents favored leadership approaches emphasizing guidance, professional development, ethical governance, and transparent institutional policies.

Educators particularly emphasized the need for professional training capable of developing AI-related pedagogical competencies. Many respondents acknowledged that although they increasingly experiment with AI, they often lack systematic institutional support regarding instructional integration, assessment redesign, ethical considerations, and responsible classroom implementation.

Students similarly expressed expectations that universities should provide clearer guidance concerning acceptable AI use, digital literacy, academic integrity, and responsible engagement with generative technologies. These expectations suggest that institutional leadership increasingly extends beyond technological infrastructure toward cultivating organizational cultures capable of supporting effective Human-AI Collaboration.

Collectively, the findings indicate that educational leadership during emerging AI adoption should focus less on technological implementation itself and more on creating organizational conditions that enable responsible experimentation, continuous learning, ethical governance, and sustainable institutional adaptation. Rather than treating AI as a purely technological innovation, respondents implicitly frame it as an organizational capability requiring coordinated leadership, shared institutional values, and ongoing professional learning. This perspective provides the foundation for the discussion that follows, where the empirical findings are interpreted within the broader theoretical frameworks of educational leadership, Human-AI Collaboration, AI governance, and organizational transformation.

To synthesize the empirical findings, Table 2 summarizes the principal patterns identified across students and educators. Rather than presenting isolated survey items, the table highlights the dominant themes emerging from the exploratory analysis and their implications for educational leadership and Human-AI Collaboration. This synthesis provides an integrated overview of the study's main findings before their interpretation in the subsequent discussion section.

Table 2. Summary of the main empirical findings

Dimension	Students	Educators	Overall Interpretation
Primary AI Uses	Information retrieval, summarization, brainstorming, writing support	Lesson preparation, instructional materials, assessment support, administrative communication	AI is mainly used to support routine academic activities
Purpose of AI Use	Learning assistance and study efficiency	Professional productivity and instructional support	AI functions as a complementary educational resource
Perceived Benefits	Faster learning, easier access to information, improved writing, idea generation	Time savings, improved teaching preparation, enhanced productivity	Efficiency represents the most widely perceived benefit
Main Concerns	Academic integrity, overreliance, reduced critical thinking, information reliability	Academic integrity, ethical issues, lack of institutional guidance, reliability	Responsible AI use requires human oversight and verification
Perception of AI	Educational assistant rather than replacement	Professional support tool rather than substitute for educators	Participants favor augmentation instead of automation
Leadership Expectations	Clear institutional policies, AI literacy, ethical guidance	Professional development, governance, strategic leadership, institutional support	Educational leadership is expected to guide responsible AI adoption
Overall AI Maturity	Emerging and task-oriented	Emerging and exploratory	AI adoption remains at an early institutional stage

Source: Authors' own elaboration based on the survey findings.

5. Discussion

The findings of this study contribute to the rapidly expanding literature on generative artificial intelligence in higher education by offering empirical evidence from an emerging AI adoption context rather than from technologically mature institutions. While previous research has predominantly examined universities characterized by relatively advanced digital infrastructures and widespread experimentation with generative AI [2-4,30], the present study illustrates how students and educators engage with AI during the initial stages of institutional adoption. This distinction is important because leadership challenges, organizational priorities, and governance requirements differ substantially depending on the maturity of AI integration. Rather than representing a fully developed AI ecosystem, the investigated context reflects a transitional phase in which AI is primarily employed for discrete educational tasks, institutional policies remain limited, and organizational learning is still evolving.

One of the most significant findings concerns the predominance of Human-AI Collaboration over educational automation. Across both respondent groups, AI was consistently perceived as a complementary technology supporting academic work while leaving responsibility for judgement, evaluation, and decision-making to human users. This observation reinforces the theoretical arguments advanced by Jarrahi [5], Dellermann et al. [6], and Wilson and Daugherty [11], who contend that AI creates greater organizational value when integrated into collaborative rather than substitutive human-machine relationships. Within higher education, this collaborative orientation suggests that educational value emerges not from delegating intellectual responsibility

to AI systems but from combining computational efficiency with disciplinary expertise, pedagogical knowledge, and critical human reasoning.

The distinction between augmentation and automation provides an additional lens through which the findings can be interpreted. Participants rarely expressed expectations that AI should independently perform complex educational responsibilities such as curriculum design, pedagogical decision-making, or assessment without human oversight. Instead, AI was predominantly used to support information retrieval, summarization, brainstorming, language improvement, instructional preparation, and administrative communication. These activities correspond to what may be described as low-risk, high-frequency educational tasks in which computational assistance improves efficiency without fundamentally altering professional accountability. Consequently, the results support emerging perspectives that position generative AI as an augmentation technology capable of extending human capabilities rather than replacing professional expertise [7,8].

This observation also complements recent evidence presented in the Anthropic Claude Education Report (2025), which identified augmentation as the dominant pattern of AI use among both students and educators. Although the present study does not replicate the Claude analysis and investigates a substantially different educational context, the convergence of findings suggests that users frequently employ AI to enhance existing cognitive processes instead of transferring complete educational responsibilities to intelligent systems. However, an important distinction emerges. Whereas platform-based analyses typically capture interactions among active AI users, the present study reflects an educational environment where AI adoption remains comparatively limited and largely informal. Consequently, augmentation in this context often takes the form of occasional assistance during routine tasks rather than sustained integration into broader educational workflows.

The findings further contribute to discussions concerning cognitive offloading in AI-supported learning. Risko and Gilbert [19] describe cognitive offloading as the strategic delegation of cognitive demands to external resources, while Sparrow et al. [20] demonstrated that digital technologies influence how individuals organize and retrieve knowledge. Generative AI extends these dynamics by enabling users to externalize not only memory but also elements of reasoning, drafting, summarization, and idea generation. Nevertheless, the present study suggests that participants remain aware of the limitations associated with excessive cognitive delegation. Both students and educators repeatedly emphasized the necessity of verifying AI-generated outputs, critically evaluating information, and maintaining independent intellectual engagement. These responses indicate that users do not necessarily perceive AI as replacing thinking itself but rather as supporting preliminary stages of cognitive processing. Such findings reinforce recent arguments that educational effectiveness depends less on AI-generated outputs than on the quality of human interaction with those outputs [3,4].

The relationship between AI use and Bloom's revised taxonomy deserves particular attention. Recent debates frequently characterize generative AI as capable of performing tasks corresponding to higher-order cognitive categories such as analysis, evaluation, and creation. However, the present findings suggest that this interpretation should be approached cautiously. Participants generally used AI to facilitate access to information, organize ideas, or improve written communication before engaging in their own evaluation and refinement processes. Consequently, the cognitive processes occurring within the learner cannot be inferred directly from the apparent sophistication of AI-generated responses. This observation supports growing concerns that applying Bloom's taxonomy directly to AI outputs may oversimplify the distinction between machine-generated content and human learning [21]. Educational leadership should therefore encourage pedagogical approaches that emphasize critical engagement with AI rather than passive acceptance of generated material.

Another important contribution concerns technology adoption within contexts characterized by emerging rather than mature AI implementation. Traditional adoption theories such as the Technology Acceptance Model [15], the Unified Theory of Acceptance and Use of Technology [16], and Diffusion of Innovations theory [17] continue to explain important aspects of AI acceptance, particularly perceived usefulness, ease of use, facilitating conditions, and innovation diffusion. Nevertheless, the findings indicate that these models alone are insufficient for understanding generative AI in higher education. Participants frequently evaluated AI not only according to functional characteristics but also in relation to ethical considerations, academic integrity, institutional trust, digital competencies, and professional responsibility. AI adoption therefore appears to involve

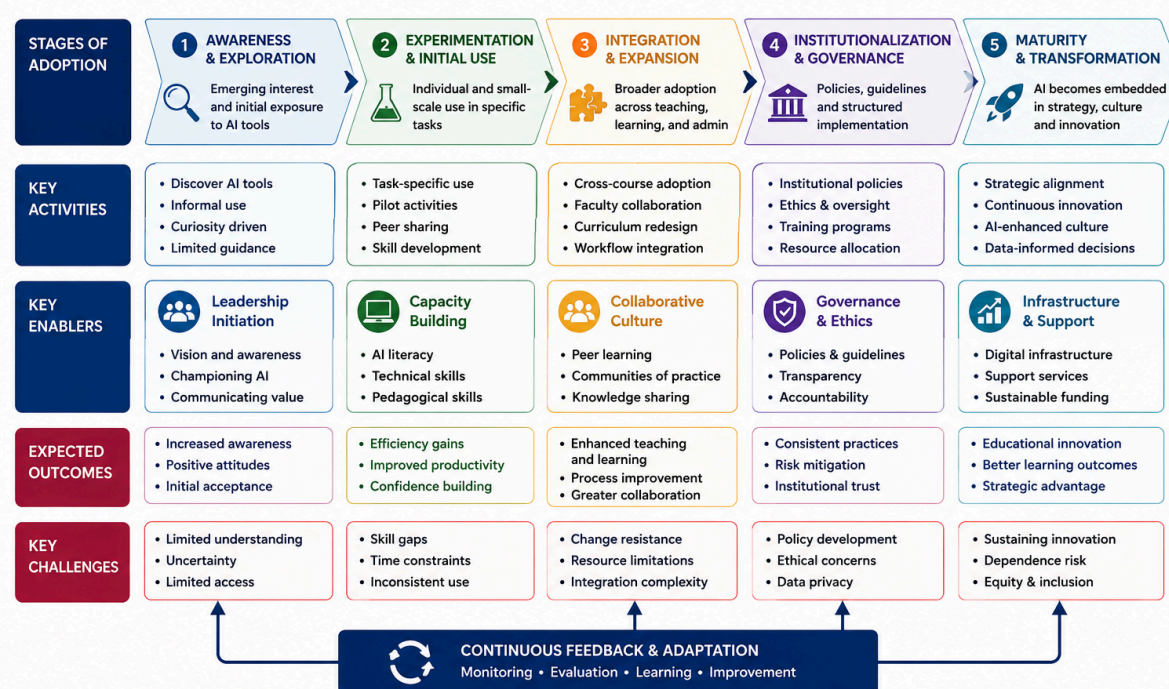
organizational, pedagogical, and ethical dimensions that extend beyond conventional models of technology acceptance. This observation supports calls for more comprehensive conceptual frameworks integrating technological readiness with institutional governance and human-centered educational values.

Perhaps the most substantial implication of the study concerns educational leadership. Rather than expecting institutional leaders to determine whether AI should be adopted, participants consistently emphasized the need for leadership capable of guiding responsible implementation. This finding aligns with contemporary educational leadership literature, which argues that leadership effectiveness depends primarily on creating organizational conditions that enable professional learning, collaboration, and continuous improvement [12-14]. Within emerging AI contexts, these responsibilities extend beyond traditional digital transformation initiatives to include developing institutional AI literacy, supporting pedagogical innovation, establishing governance mechanisms, and fostering cultures of responsible experimentation.

The empirical findings indicate that AI adoption within higher education is currently characterized by exploratory and decentralized practices rather than comprehensive institutional implementation. Building on both the reviewed literature and the results of the present study, a staged institutional pathway is proposed to illustrate how universities may progressively transition from initial experimentation toward sustainable Human-AI Collaboration. The framework emphasizes that successful AI integration depends not only on technological availability but also on leadership, governance, organizational learning, and continuous capacity building. Figure 2 summarizes this proposed evolutionary pathway.

Figure 2. Proposed institutional pathway for the adoption of Human-AI Collaboration in higher education

Figure 2. The process of AI adoption and institutional integration in higher education



Source: Authors' own elaboration based on the reviewed literature.

Source: Authors' own conceptual model developed from the empirical findings and the reviewed literature.

The absence of comprehensive institutional policies reported by many respondents further highlights the strategic role of leadership during early AI adoption. Without clear institutional guidance, AI implementation tends to remain decentralized, dependent upon individual initiative, and characterized by considerable variation

across disciplines and educators. Although such flexibility may encourage innovation, it can also produce inconsistent pedagogical practices, unequal student experiences, and uncertainty regarding acceptable AI use. Educational leadership therefore assumes an important coordinating function by translating broad ethical principles into operational institutional policies capable of balancing innovation with accountability. International governance frameworks proposed by UNESCO [23], the OECD [24], and the European Union [25] provide valuable normative guidance, but institutional leaders remain responsible for adapting these principles to local educational realities.

The findings additionally emphasize the continuing importance of academic integrity. Participants recognized that generative AI challenges traditional conceptions of authorship, originality, and independent assessment while simultaneously acknowledging the legitimate educational benefits of AI-assisted learning. These perspectives are consistent with recent scholarship arguing that universities should avoid framing AI solely as an academic misconduct issue [26,27]. Instead, institutions should redesign assessment strategies, strengthen AI literacy, clarify expectations regarding appropriate use, and promote authentic learning experiences that require critical analysis, reflection, and contextual judgement. Such approaches shift institutional attention from detecting AI use toward cultivating responsible engagement with AI technologies.

From an organizational perspective, the results suggest that emerging AI adoption should be understood as a process of institutional capability development rather than technological implementation alone. Educational leadership therefore becomes closely associated with organizational learning. Leaders are required to create environments where experimentation is encouraged but accompanied by ethical reflection, professional support, and continuous evaluation. This perspective resonates with human-centered AI principles emphasizing transparency, accountability, meaningful human oversight, and user empowerment [28,29]. Rather than maximizing technological autonomy, successful institutions may be those that successfully integrate AI within existing educational values while preserving academic integrity, human agency, and pedagogical quality.

The exploratory nature of the study also provides several directions for future research. First, larger multi-institutional studies are needed to determine whether the observed patterns remain stable across different national, disciplinary, and institutional contexts. Second, longitudinal research could investigate how AI adoption evolves as universities develop more comprehensive governance structures and professional development initiatives. Third, comparative studies examining differences between institutions characterized by low, moderate, and advanced AI maturity would contribute to a more nuanced understanding of organizational AI transformation. Finally, future research should move beyond descriptive analyses of AI use toward examining the relationships among educational leadership, AI governance, institutional readiness, digital competence, trust, and learning outcomes.

Several limitations should be considered when interpreting the findings. The relatively small convenience sample prevents statistical generalization to the broader higher education population. The cross-sectional design captures participant perceptions during a specific stage of AI adoption and cannot account for rapidly evolving technological developments. Furthermore, the study relies on self-reported behavior rather than direct observation of AI interactions, introducing the possibility of recall bias or socially desirable responses. The findings also reflect an environment where AI use remains relatively basic, focusing primarily on information retrieval, summarization, brainstorming, writing assistance, and instructional preparation. Consequently, the results should not be interpreted as representative of institutions where AI has become deeply integrated into curriculum design, assessment systems, or institutional governance.

Despite these limitations, the study offers an important contribution by examining AI adoption within an educational context that has received comparatively limited scholarly attention. Much of the existing literature concentrates on technologically advanced universities or platform-specific analyses of AI interactions. By contrast, the present research illustrates how students and educators negotiate the earliest stages of AI integration, revealing leadership challenges that emerge before formal governance structures and institutional AI strategies become fully established. Understanding these early organizational dynamics is essential because the practices, expectations, and norms formed during initial adoption are likely to influence the trajectory of future Human-AI Collaboration in higher education. The findings therefore support a broader conceptual shift in which

educational leadership is understood not simply as managing technological change but as cultivating institutional readiness for responsible, human-centered, and sustainable AI integration.

6. Conclusion

The emergence of generative artificial intelligence represents one of the most significant transformations currently influencing higher education. Unlike previous waves of educational technologies that primarily supported specific instructional or administrative functions, generative AI directly participates in activities traditionally associated with human cognition, including information synthesis, content generation, problem solving, communication, and knowledge construction. These developments have shifted the discussion from technology adoption alone toward broader questions concerning educational leadership, institutional governance, professional responsibility, and the evolving nature of Human-AI Collaboration.

This study contributes to this emerging discussion by examining AI adoption within a higher education context characterized by gradual rather than mature technological integration. Drawing upon responses from 76 university students and 38 educators from multiple higher education institutions, the findings demonstrate that AI is currently employed primarily as an augmentation technology supporting routine educational activities rather than replacing human expertise or academic judgement. Students most frequently reported using AI for information retrieval, summarization, brainstorming, language improvement, and academic writing support, whereas educators primarily applied AI to lesson preparation, instructional resource development, assessment design, and administrative communication. Across both participant groups, AI was consistently perceived as a complementary resource capable of increasing efficiency while requiring continuous human evaluation, contextual interpretation, and professional oversight.

One of the central contributions of the study lies in demonstrating that emerging AI adoption should be interpreted as an organizational learning process rather than solely as technological implementation. Although participants acknowledged the considerable practical value of generative AI, they simultaneously recognized important challenges concerning academic integrity, information reliability, cognitive dependency, digital competencies, ethical responsibility, and the absence of institutional governance mechanisms. These concerns indicate that successful AI integration depends not only on technological accessibility but also on leadership capacity to establish institutional policies, support professional development, promote responsible AI literacy, and create organizational cultures capable of balancing innovation with accountability.

The findings further reinforce recent theoretical perspectives describing Human-AI Collaboration as the dominant paradigm for AI integration within knowledge-intensive organizations. Rather than seeking full automation of educational processes, participants viewed AI as extending human capabilities while preserving professional autonomy and academic responsibility. This distinction between augmentation and automation has important implications for educational leadership. Leaders are increasingly required to guide institutions through a transition in which AI becomes embedded within teaching, learning, and academic administration without undermining critical thinking, ethical reasoning, or the human dimensions of education. Consequently, leadership priorities extend beyond acquiring technological infrastructure toward cultivating institutional readiness for sustainable Human-AI Collaboration.

From a theoretical perspective, the study contributes to the literature by integrating educational leadership, technology adoption, Human-AI Collaboration, cognitive offloading, AI governance, and responsible AI within a single exploratory framework. Existing research has frequently examined these domains independently, often focusing on technologically advanced universities or platform-specific analyses of AI use. By contrast, the present study highlights how these dimensions interact during the early stages of organizational AI adoption, where institutional strategies remain under development and AI is primarily used for relatively basic educational tasks. This perspective extends current discussions by suggesting that leadership preparedness should precede large-scale AI implementation rather than emerge as a reactive response to technological change.

The study also has several practical implications for higher education institutions. First, universities should recognize that early AI adoption represents an opportunity to establish governance structures before AI becomes deeply embedded in institutional processes. Developing clear policies regarding acceptable AI use, assessment practices, data governance, transparency, and academic integrity can reduce uncertainty among both educators and students. Second, institutional leaders should invest in continuous professional development that strengthens AI literacy, pedagogical innovation, and critical evaluation skills rather than focusing exclusively on technical competencies. Third, curriculum design should increasingly emphasize authentic learning experiences that encourage students to critically engage with AI-generated outputs instead of relying upon them uncritically. Finally, institutional strategies should promote Human-AI Collaboration as a model in which AI supports educational activities while preserving human judgement, creativity, ethical responsibility, and professional accountability.

Several limitations should be acknowledged. The exploratory design, relatively small convenience sample, and cross-sectional nature of the study prevent statistical generalization beyond the investigated participants. The findings reflect self-reported perceptions rather than observed AI interactions and represent a specific moment within a rapidly evolving technological landscape. Furthermore, AI adoption within the investigated context remains comparatively limited and focuses predominantly on basic educational applications rather than advanced institutional integration. These limitations should not be viewed solely as methodological constraints but also as characteristics of an emerging adoption environment that remains insufficiently represented in the existing literature.

Future research should expand upon these findings through larger comparative studies involving multiple countries, institutional types, and disciplinary contexts. Longitudinal investigations would be particularly valuable for examining how AI practices evolve as organizational AI maturity increases and governance structures become more sophisticated. Future studies may also investigate the relationships among educational leadership, AI literacy, organizational readiness, trust in AI, institutional governance, and learning outcomes using more advanced analytical approaches such as structural equation modeling or multilevel analysis. Comparative research examining differences between institutions with varying levels of AI maturity may further clarify how leadership priorities evolve throughout the AI adoption lifecycle.

Ultimately, the study argues that the future of higher education will not be determined by the capabilities of artificial intelligence alone but by the capacity of educational institutions to integrate these technologies responsibly within their academic missions. Human-AI Collaboration should therefore be understood not as a technological destination but as an evolving organizational capability requiring visionary leadership, ethical governance, continuous professional learning, and sustained institutional adaptation. Universities that successfully cultivate these capabilities are likely to be better positioned to harness the opportunities offered by generative AI while preserving the intellectual, ethical, and human values that define higher education.

References

1. Zawacki-Richter O, Marín VI, Bond M, Gouverneur F. Systematic review of research on artificial intelligence applications in higher education—where are the educators? *Int J Educ Technol High Educ*. 2019;16(1):39. <https://doi.org/10.1186/s41239-019-0171-0>
2. Crompton H, Burke D. Artificial intelligence in higher education: The state of the field. *Int J Educ Technol High Educ*. 2023;20(1):22. <https://doi.org/10.1186/s41239-023-00392-8>
3. Kasneci E, Seßler K, Küchemann S, Bannert M, Dementieva D, Fischer F, Gasser U, Groh G, Günnemann S, Hüllermeier E, Krusche S. ChatGPT for good? On opportunities and challenges of large language models for education. *Learning and individual differences*. 2023 Apr 1;103:102274. <https://doi.org/10.1016/j.lindif.2023.102274>
4. Tlili A, Shehata B, Adarkwah MA, Bozkurt A, Hickey DT, Huang R, et al. What if the devil is my guardian angel: ChatGPT as a case study of using chatbots in education. *Smart Learn Environ*. 2023;10:15. <https://doi.org/10.1186/s40561-023-00237-x>

5. Jarrahi MH. Artificial intelligence and the future of work: Human-AI symbiosis in organizational decision making. *Bus Horiz*. 2018;61(4):577–586. <https://doi.org/10.1016/j.bushor.2018.03.007>
6. Dellermann D, Ebel P, Söllner M, Leimeister JM. Hybrid intelligence. *Bus Inf Syst Eng*. 2019;61(5):637–643. <https://doi.org/10.1007/s12599-019-00595-2>
7. Brynjolfsson E, McAfee A. *The Second Machine Age: Work, Progress, and Prosperity in a Time of Brilliant Technologies*. New York: W.W. Norton; 2014.
8. Brynjolfsson E, McAfee A. *Machine, Platform, Crowd: Harnessing Our Digital Future*. New York: W.W. Norton; 2017.
9. Davenport TH, Kirby J. *Only Humans Need Apply: Winners and Losers in the Age of Smart Machines*. New York: Harper Business; 2016.
10. Malone TW. *Superminds: The Surprising Power of People and Computers Thinking Together*. New York: Little, Brown and Company; 2018.
11. Wilson HJ, Daugherty PR. Collaborative intelligence: Humans and AI are joining forces. *Harv Bus Rev*. 2018;96(4):114–123.
12. Hallinger P. Bringing context out of the shadows of leadership. *Educ Manag Adm Leadersh*. 2018;46(1):5–24.
13. Leithwood K, Harris A, Hopkins D. Seven strong claims about successful school leadership revisited. *Sch Leadersh Manag*. 2020;40(1):5–22.
14. Papa R, Jackson C. *Educational Leadership and the Digital Revolution*. Cham: Springer; 2018.
15. Davis FD. Perceived usefulness, perceived ease of use, and user acceptance of information technology. *MIS Q*. 1989;13(3):319–340.
16. Venkatesh V, Morris MG, Davis GB, Davis FD. User acceptance of information technology: Toward a unified view. *MIS Q*. 2003;27(3):425–478.
17. Rogers EM. *Diffusion of Innovations*. 5th ed. New York: Free Press; 2003.
18. Tornatzky LG, Fleischer M. *The Processes of Technological Innovation*. Lexington, MA: Lexington Books; 1990.
19. Risko EF, Gilbert SJ. Cognitive offloading. *Trends Cogn Sci*. 2016;20(9):676–688.
20. Sparrow B, Liu J, Wegner DM. Google effects on memory: Cognitive consequences of having information at our fingertips. *Science*. 2011;333(6043):776–778.
21. Anderson LW, Krathwohl DR, editors. *A Taxonomy for Learning, Teaching, and Assessing: A Revision of Bloom's Taxonomy of Educational Objectives*. New York: Longman; 2001.
22. Floridi L, Cowls J. A unified framework of five principles for AI in society. *Harv Data Sci Rev*. 2019;1(1). <https://doi.org/10.1162/99608f92.8cd550d1>
23. UNESCO. *Recommendation on the Ethics of Artificial Intelligence*. Paris: UNESCO; 2021.
24. OECD. *OECD AI Principles*. Paris: Organisation for Economic Co-operation and Development; 2019.
25. European Union. Regulation (EU) 2024/1689 of the European Parliament and of the Council laying down harmonised rules on artificial intelligence (Artificial Intelligence Act). *Off J Eur Union*. 2024.
26. Cotton DRE, Cotton PA, Shipway JR. Chatting and cheating: Ensuring academic integrity in the era of ChatGPT. *Innov Educ Teach Int*. 2024;61(2):228–239.
27. Perkins M. Academic integrity considerations of AI large language models in higher education. *J Univ Teach Learn Pract*. 2023;20(2):1–17.
28. Shneiderman B. Human-centered artificial intelligence: Reliable, safe & trustworthy. *Int J Hum Comput Interact*. 2022;38(6):495–504.
29. Amershi S, Weld D, Vorvoreanu M, et al. Guidelines for human-AI interaction. In: *Proceedings of the 2019 CHI Conference on Human Factors in Computing Systems*. New York: ACM; 2019. p. 1–13.
30. Lo CK. What is the impact of ChatGPT on education? A rapid review of the literature. *Educ Sci*. 2023;13(4):410. <https://doi.org/10.3390/educsci13040410>
31. Sallam M. ChatGPT utility in healthcare education, research, and practice: Systematic review. *Healthcare*. 2023;11(6):887.
32. Bond M, Khosravi H, De Laat M, Bergdahl N, Negrea V. Artificial intelligence in higher education: A systematic literature review. *Comput Educ Artif Intell*. 2024;6:100197.
33. Dwivedi YK, Hughes L, Baabdullah AM, et al. So what if ChatGPT wrote it? Multidisciplinary perspectives on opportunities, challenges and implications of generative conversational AI for research, practice and policy. *Int J Inf Manage*. 2023;71:102642.

34. Fullan M. *The New Meaning of Educational Change*. 5th ed. New York: Teachers College Press; 2016.
35. Snyder H. Literature review as a research methodology: An overview and guidelines. *J Bus Res*. 2019;104:333–339.
36. Webster J, Watson RT. Analyzing the past to prepare for the future: Writing a literature review. *MIS Q*. 2002;26(2):xiii–xxiii.
37. Tranfield D, Denyer D, Smart P. Towards a methodology for developing evidence-informed management knowledge by means of systematic review. *Br J Manag*. 2003;14(3):207–222.
38. Anthropic. *Claude for Education Report: How University Students and Educators Use Claude*. San Francisco: Anthropic; 2025. Available from: <https://www.anthropic.com/news/education-report>
39. European Commission. *Ethics Guidelines for Trustworthy AI*. Brussels: European Commission; 2019.
40. World Economic Forum. *Shaping the Future of Learning: The Role of AI in Education*. Geneva: World Economic Forum; 2024.