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Facilitating a paradigm shift for teaching and learning with AIs

Facilitare un cambio di paradigma per l'insegnamento e apprendimento con le intelligenze artificiali

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ABSTRACT This paper explores how the role of educators is transforming into that of facilitators of change. The main idea is prioritising human learners, enhancing their capacity to learn autonomously, and seamlessly integrating upcoming technologies into an educational framework focused on the individual. This approach uses technology to support and refine learners' metacognitive abilities, allowing them to analyse and interpret digital and real-world information critically. Artificial Intelligences (AIs) are crucial in information retrieval, content generation, proofreading, validation, deduplication, and assessment in education. Human educators must work collaboratively with AIs, redefining the boundaries of professional and personal education. One of the critical challenges for educators working with learners is to build trust in individuals' unique cognitive skills and engage in open dialogues about the ethical implications of technological advancements, including the potential risks of relinquishing our human capabilities to AI systems.

KEYWORDS Faculty Development; ChatGPT Challenges; Facilitating Human Learning; Teaching Paradigm Shifts; Learning Mindset.

SOMMARIO Questo articolo delinea ipotesi di evoluzione del ruolo degli educatori in facilitatori di cambiamento. L'ipotesi in discussione ruota attorno al dare priorità agli studenti, al miglioramento della loro capacità di apprendere autonomamente e all'integrazione delle tecnologie future in un quadro educativo centrato sull'individuo. Questo approccio sfrutta le tecnologie per supportare e affinare le capacità metacognitive degli studenti, consentendo loro di analizzare e interpretare criticamente le informazioni digitali e del mondo reale. Le Intelligenze Artificiali (IA) sono fondamentali nel recupero delle informazioni, nella generazione di contenuti, nella correzione di bozze, nella convalida, nella deduplicazione e nella valutazione in ambito formativo. Gli educatori devono collaborare con le IA, ridefinendo i confini dell'educazione professionale e personale. Una sfida per gli educatori risiede nel coltivare la fiducia nelle capacità cognitive degli individui e nell'impegnarsi in dialoghi aperti sulle ramificazioni etiche dei progressi tecnologici.

PAROLE CHIAVE Formazione dei Docenti; ChatGPT; Facilitare l'Apprendimento; Cambi di Paradigma; Cambi di Mentalità.

1. Facilitating a paradigm shift in teaching and learning with AIs

The term "digital learning" has lost some of its original meaning as almost all media and information processing have become electronic and digital. Machine Learning (ML) and Artificial Intelligence

(AI) are becoming more efficient for adaptive learning. Traditional teaching methods centred around the professor are no longer adequate for students to retain knowledge and change their behaviour. It is also becoming apparent that we must shift towards a new era of AI-augmented learning (Huang et al., 2021).

To tackle the potential threat of being entirely replaced by data-driven technologies, educators must redefine the concept of lifelong learning. The digital world is a platform for continuous learning journeys focusing on self-directed adult learners. In this transformed landscape, professors can be change facilitators, guiding learners along adaptive paths towards autonomy while navigating innovative AI contexts and prioritising a human-centric approach (Mastrogiacomi, 2020).

Educators have traditionally believed that robots cannot possess sentience due to the complexity of human emotions and unstructured consciousness. However, some educators have recently delved into exploring self-awareness in robots and reimagining artificial consciousness in the context of synthetic knowledge. This journey has led to reevaluating assumptions related to memory, adult learning, deep learning, anticipation, subjective experiences, emotional intelligence, ethics, metaphors, and semantics (Gulyamov et al., 2023).

The emergence of robust Large Language Models like ChatGPT also marks a significant turning point. Professors have realised that AI is here to stay, and academia has a choice: resist and restrict technologies like ChatGPT or embrace and leverage them to redefine teaching and learning methods. Adopting these technologies is the wiser path, as students in an increasingly diverse and global society must be prepared to navigate a world filled with AI possibilities (Lambert & Stevens, 2023).

2. Teaching and learning centres as safe learning places for supporting the faculty

Given the recent emergence of a new era marked by significant advances and widespread use of AI technologies, it is crucial for the field of lifelong education to systematically integrate a thorough examination of AI into the comprehensive curriculum of teacher preparation programs (Willis et al., 2013). This strategic initiative is essential for equipping educators at all grade levels with the necessary knowledge and skills to thoughtfully incorporate AI, such as technologies like ChatGPT, into their teaching methods. This comprehensive pedagogical transformation aims to prepare students for an era increasingly influenced by AI-driven phenomena (Trust et al., 2023).

The core hypothesis to be explored in this paper revolves around cultivating a paradigm shift among educators whose focal point should persistently centre on human learners, fostering their inherent capacity for metacognitive learning. The primary challenge is harmoniously assimilating forthcoming technologies into a robust pedagogical framework built around the learner. This framework should function as a scaffolding mechanism, engendering and catalysing students' metacognitive abilities and enabling them to analyse and interpret information critically, whether digital or empirical. AI can play a pivotal role in streamlining various aspects of education, including information retrieval, content creation, spell-checking, validation, deduplication, testing, and more (Azevedo, 2018).

However, the ultimate challenge confronting human educators is to work alongside AI collaboratively as complementary tools, effectively reshaping the boundaries delineating the domains of professional and personal education in the context of humanity's future. Concurrently, educators must wrestle with instilling trust in their students' unique cognitive capabilities while facilitating candid discussions concerning the ethical implications of technological innovations and their overarching impact on human existence (Mastrogiacomi, 2023).

Specifically in the business context of adult informal learning (Matthews, 2013) and in the continuous effort to reinvent and reimagine management education (Steyaert et al., 2016) to best anticipate the disrupting forces at work in AI technological and business landscapes, many Teaching and Learning Centres are proliferating in academia and business schools for supporting teaching excellence in the classroom and enabling innovative pedagogies for effective learning outside of it. By being highly transversal, they are designed to impact multiple stakeholders and act as resources for improving the standards of teaching by standardising teaching materials, supporting faculty training, researching innovative teaching methods, recommending assessment, grading, and feedback best practices, and facilitating engagement and interaction with the corporate world.

One common challenge for Teaching and Learning Centres is supporting faculty members' onboarding, reskilling, and upskilling towards facilitating and sustaining a profound paradigm shift, specifically in the professional contexts of adult education and business schools. Faculty orientation programs are available at different universities to onboard new faculty members. For instance, McCombs offers the new faculty symposium, Hong Kong University of Science and Technology (HKUST) offers a University teaching and learning course, and Berkeley Haas provides new faculty orientation videos.

Many universities offer teaching excellence awards like the faculty awards at UCLA Anderson. Additionally, several universities support their faculty members in integrating DEI and ERS topics as much as technology into their teaching. As recently reported by The Financial Times, teaching awards have been used by innovative business schools to push towards a brighter future; the top-tier business schools mentioned are improving their teaching on sustainability and the climate crisis by combining hands-on experience with tools such as VR headsets and AI. Another example is Georgia Tech, which offers learning and technology initiatives, and McCombs also provides a technology-enhanced learning symposium. Continuous improvement of the quality of teaching is becoming a priority at many universities. NYU Stern offers ongoing workshops, and Berkeley Haas provides continuous learning events, workshops, videos, and seminars. Lastly, universities such as Carey, ESCP and Berkeley Haas have a database of teaching cases and syllabi, teaching and learning resources, and a reference library to assist faculty members in teaching.

These and other major higher education institutions are centralising the efforts around the setup and maintenance of Teaching and Learning Centres; these global players are to be taken as a reference in the educational field also to ingrain AI solutions in the formative curriculum of tenured professors and adjunct faculty:

- The *Initiative for Learning Innovation and Teaching Excellence* (iLITE) supports teaching cases for INSEAD faculty and beyond. It facilitates the development of instructors within a *diverse community* of learners.
- The *Centre for Teaching and Learning* (CTL) at the Georgia Institute of Technology promotes a fully engaged, sharing community by providing communication networks, resources, and innovative programs for faculty, postdoctoral scholars, and graduate students.
- The *Centre for Education Innovation* (CEI) at The Hong Kong University of Science and Technology (HKUST) is an *academic support unit* that proactively advances HKUST's teaching and learning strategy.
- The *Centre for Teaching and Learning* (CTL) at McCOMBS collaborates with the University of Texas faculty, graduate-student instructors, and the University's programs and leadership to create an environment that focuses on teaching for student learning and success.

- The *Centre for Excellence in Teaching and Learning* (CTL) at ESADE promotes excellence and innovation for teaching and student learning. The CTL encompasses all areas of the educational experience and teaching innovations, particularly on learning models. It is structured in four key areas: 1) faculty office for innovation; 2) excellence, learning and impact measurement; 3) learning factory; 4) learning innovation, technology and spaces.
- The *Future of Learning Advisory Group* enables Melbourne Business School to gain new insights and address business problems by testing ideas, stimulating robust conversations about the future of learning, and exploring new offerings and services that can help tackle those business challenges.
- The *Centre for Learning and Management Practice* (CLMP) at ISB - Indian School of Business - focuses on 1) encouraging and supporting the writing and publication of high-quality India-specific cases; 2) implementing the AOL (*Assurance of Learning*) programme for all degrees and programmes at ISB; 3) assisting the measurement of the impact of executive training programmes conducted at ISB; 4) enabling teaching excellence in the classroom at ISB and in business schools across India; 5) Encouraging the practice of innovative pedagogies in the classroom, in the form of technology and simulations.
- The *Learning Science Lab* at NYU STERN collaborates with faculty to build meaningful learning environments, uses research in the learning sciences to inform *design practice*, and partners with instructors to create engaging and interactive courses for business school education.

In the spring of 2022, LUISS Business School initiated the *Teaching and Learning Lab*, inspired by other esteemed higher education institutions. This establishment is designed to support professors in their continuous transformation journey, building on the foundation of the pilot *Faculty Transformation Program*. The lab aims to reinvent and relaunch an ongoing *Digital Teaching for Learning Program*, inviting newly appointed core and adjunct faculty members and senior fellows to participate. The program refreshes tenured professors, adopting a *hybrid* train-the-trainer curriculum with synchronous and asynchronous components, personalised sessions, peer collaboration, and individualised exercises. The *curriculum*, deeply rooted in pedagogical principles, includes *Universal Design for Learning* (UDL) and *Backwards Design* in teaching planning (Laurillard, 2012). This approach *reshapes instructional objectives* and improves *assessment* practices by integrating educational technology. The lab promotes *soft skills* among educators, emphasising constructive *feedback* as a crucial competency. A key focus is training educators as *facilitators* and fostering *psychological safety* in learning environments (Henriksen et al., 2022). This approach develops a strong sense of community, reciprocal care, empathy, and collaborative problem-solving across various educational settings, including virtual, AI-augmented, in-person, or hybrid environments (Gleason & Mehta, 2022).

2.1. Scaffolding the paradigm shift while sensing the sentiment amongst the faculty

Teaching and Learning Centres, as observed across the cited examples, share a common *trend* of creating a secure environment that encourages applied research, open discussions and exchanging ideas. One of their primary focus is consistently assessing *faculty perspectives* on the advantages and challenges of EdTech, AI, and ChatGPT solutions. Often, their goal is to keep faculty members engaged, monitored, and reflective in using AI tools while fostering opportunities for training, discussions, and collaboration with industry partners (Khaddage & Flintoff, 2023). Regular *surveys* are recommended to assess faculty understanding and willingness to use technological tools efficiently in teaching and learning practices. Such surveys can focus on critical dimensions such as efficiency, cus-

tomisation, scalability, accessibility, and interactivity. For instance, LUISS Business School involved faculty rating their agreement on ChatGPT's added value in terms of these dimensions in a *pilot survey*. Indeed, if reiterated systematically, such surveys can gather opinions on disadvantages, including time consumption, ecosystem integration, error generation, trial periods, and the potential for cheating. Expanding these surveys to many education institutions can explore the *faculty readiness* and the perceived value of ChatGPT for specific activities like creating teaching materials, live interaction with students, crafting assessment tests, and grading. Qualitative interviews can then follow surveys to provide deeper insights and an opportunity to stimulate reflection as much as further adoption. Qualitative and quantitative investigations can trigger educators' curiosity about AI tools, including potential applications in exams and research. Concerns about AI's societal and educational impacts, skill obsolescence, and the need for human validation of AI-generated results may be expressed anonymously. Faculty consensus may emerge regarding areas susceptible to AI disintermediation, emphasising the importance of critical thinking, discernment, and higher-order cognitive skills. These insights can *foster reflective conversations* and knowledge-sharing among faculty members, highlighting the need for shared *discourse* on effective education in a rapidly evolving technological landscape beyond technical training (Mastrogiacomi, 2023).

2.2. Contemplating risks and drawbacks of current and future AI in education

Such reflective conversations amongst faculty should tackle the risks and drawbacks of AI solutions for education, even though experts identified *personalised learning* as the most prominent advantage in examining the advantages and disadvantages of AIs and Large Language Models (LLM) in education. Numerous specialists highlighted how tools like ChatGPT can be harnessed to deliver subject matter tailored to each learner's unique needs and learning environment. It is worth noting that the most frequently cited *disadvantage* by far is *plagiarism* (Jahic et al., 2023). Beyond plagiarism, inherent limitations in ChatGPT can be identified in generating wrong information and *biases* in data training, which may augment existing biases and *privacy* issues (Baï doo-Anu et al., 2023). Specifically in K-12 education, the most significant risks of integrating such AI algorithms were identified as 1) perpetuating existing systemic bias and discrimination, 2) perpetuating unfairness for students from mostly disadvantaged and marginalised groups, and 3) amplifying racism, sexism, xenophobia, and other forms of injustice and inequity (Akgun & Greenhow, 2022). More generally, in lifelong education, the prospective ethical and societal risks associated with AI applications were perfectly outlined:

- *Privacy Concerns*: This involves compromising students' privacy by exploiting data via biometrics recognition and recommender systems.
- *Bias and Discrimination*: These risks pertain to perpetuating gender, racial bias and social discrimination through automated scoring systems.
- *Autonomy*: The potential ethical concern jeopardises students' autonomy and *agency* in governing their lives by implementing *predictive* systems.
- *Surveillance*: Another area of concern involves monitoring student activities through personalised learning systems and social networking sites (SNSs) (Akgun et al., 2022).

In light of the risks associated with Artificial Intelligence in Education (AIED), there is a widely recognised need for educators' *skilling*, *reskilling*, and *upskilling* in the areas mentioned above. While at the same time, keep having open and candid conversations among experts. This process should integrate new technologies within a robust *pedagogical framework* centred on learners. Furthermore, adhering to

the *ethical principles* outlined for AIED is advisable. These *ethical principles* encompass diverse dimensions, including governance and stewardship, transparency in data and algorithms, accountability, sustainability and proportionality, privacy, security, safety, inclusiveness in accessibility, inclusiveness in data and algorithms, and a human-centred approach to AIED. Adhering to these principles can guide technology integration into education responsibly and learner-centric (Nguyen et al., 2023).

2.3. Facing fears and challenges for facilitating teaching and learning with AIs

Historically, apprehensions regarding humans' interactions with robots, AI, and Machine Learning have deep-seated roots. During the onset of discontinuous technological evolution in our lives, the benefits of these innovations often became entangled with emotional reactions (Kennedy et al., 2022). The *social discourse* surrounding new *adaptive* technologies has struggled with balancing perspectives from humanists, futurists, and technologists. Successfully nurturing and *scaffolding* a *paradigm shift* in how humans approach lifelong learning involves having honest conversations while comprehending the technical intricacies, broader implications and future applications.

Emotionally, creating safe spaces that engage tech professionals, educators, *facilitators*, students, and learners in an open *social discourse* is crucial, and *Teaching and Learning Centres* can offer such spaces. This discourse aims to *normalise* the integration of new technological developments within a human-centred pedagogical *framework*. By fostering such conversations and collaboration, we can navigate the ever-evolving terrain of educational technology while prioritising *human values* and academic efficacy (D'Mello et al., 2014).

In the pre-ChatGPT era, teachers commonly employed collaborative projects and gamified elements to engage students in *problem-solving* and experimentation with intelligent agents and robots. Among these activities, interacting with robotics, engaging in software development, and interacting with intelligent agents emerged as the most prevalent learning tools for fostering students' understanding of Artificial Intelligence (AI). Despite their effectiveness, educators faced *challenges* teaching AI in classrooms, including providing cognitive *scaffolding* and syntax comprehension for novice programmers and enhancing teachers' *confidence* and digital competence in AI (Ng et al., 2023).

A long-haul literature review conducted by Celik et al. (2022), dating to before the emergence of ChatGPT, had already highlighted the numerous *advantages* of integrating AI into education across different teaching dimensions. In the *planning phase*, AI was already considered a valuable tool for providing student information, aiding decision-making on learning content, and assisting in planning activities. During *implementation*, AI could transform teaching practices by enabling timely monitoring, reducing teacher workload, providing immediate feedback, selecting/adapting learning activities, facilitating timely intervention, tracking student progress, enhancing the teaching process, and increasing interaction between teachers and students. AI would also transform the *assessment* phase by offering better prediction/assessment of *teacher performance*, automating *assessment* and *evaluation* processes, providing *feedback* on instructional practices, and assisting in *decisions* (Earl, 2012).

Despite these benefits, this pre-ChatGPT literature review already identified several *challenges* in AI adoption in education, which in some cases have been overcome by the rapid evolution of AIs and LLMs; some reported limited reliability of AI algorithms, technical capacity issues, infrastructure limitations in schools, inapplicability to multiple settings, inefficiency in assessment and evaluation, lack of technological knowledge among teachers, limited interest in AI, slow AI feedback, and little *adaptive feedback*. Overall, the need for collaborative efforts was also emphasised at the time as required across

disciplines, involving AI developers, pedagogical experts, teachers, and students to develop AI systems that would contribute significantly to quality education (Ng et al., 2023).

After the storm of LLMs across multiple languages, experts and educators have expressed concerns about detecting text generated by ChatGPT, which poses a significant hurdle to current *assessment* methods (Jahic et al., 2023). Indeed, *assessment* plays a foundational role in formal education, and both *formative* and *summative* assessments should align with the current state of technology. The role of AI and digital tools in the evaluation process can either be perceived as a threat or a *facilitator*, contingent on the awareness and preparedness of educators (Willis et al., 2013). As *facilitators* of educational change, educators must actively incorporate new tools into their *pedagogical toolbox*. They should serve as exemplars in providing and receiving *feedback*, engaging in open discussions about disruptive solutions, and adapting to the evolving landscape driven by technology.

The application of AI in education holds *promise* in supporting both teachers and students through various means, such as 1) delivering effective instruction in mixed-ability classrooms; 2) providing students with thorough and timely feedback on their *written assignments* (Kim et al., 2019); 3) relieving teachers from the obligation of possessing exhaustive knowledge. Educators would have more opportunities to assist students in collaborative knowledge-building through observation, discussion, and information gathering (Akgun et al., 2022).

Many *instructional strategies* could offer *guidelines* for leveraging AI to develop educational materials efficiently, supporting the implementation of these strategies by aiding students in comprehending *challenging* and abstract concepts through the provision of numerous examples, offering diverse explanations and analogies to address common misconceptions, administering low-stakes tests for information retrieval and knowledge assessment, conducting assessments to identify knowledge gaps and gain insights into student learning, and employing distributed practice to reinforce learning (Mollick et al., 2023).

Generating many examples for a single concept is a time-intensive endeavour that can be delegated to AI for expeditious execution. The AI can rapidly produce numerous examples, serving as a valuable resource for instructors. In supporting instructors, the AI can generate multiple explanations from various perspectives, employ a step-by-step approach, and enhance existing explanations with additional details. It is essential to note that all AI-generated explanations serve as starting points and necessitate validation by instructors before dissemination to students (Henriksen et al., 2022).

Furthermore, AI can assist instructors in creating practice tests, quizzes, and short answer assessments related to specific topics or readings, and it can contribute questions designed to assess student knowledge during lectures. The AI's ability to identify patterns and common themes in student responses will likely expedite this process. Incorporating AI into distributed practice, instructors can task the AI with generating questions that assess student knowledge across a series of course topics throughout the course duration. This approach ensures the integration and assessment of newly introduced and previously learned concepts, thereby optimising the effectiveness of distributed practice. Recently, STEM subjects also benefitted from *adaptive learning* systems such as Squirrel AI Learning (Shuai et al., 2023).

2.4. Meeting the opportunities of teaching and learning with AIs

The hypothesis for facilitating a *paradigm shift* in teaching and learning to make it future-proof in a world dominated by AI originates from a fundamental conviction. This conviction centres on the necessity of collaborating with AIs rather than opposing them to redefine the boundaries and essence of pro-

fessional and personal education. Within this context, educators face the challenge of fostering *trust* in learners' cognitive abilities while *facilitating* open dialogues concerning the *ethical* ramifications of technological advancements. Simultaneously, they must confront the inherent risks of relinquishing essential human skills and outsourcing them to increasingly powerful AI systems (Nguyen et al., 2023).

This awareness of a unique set of *challenges* presents an array of untapped opportunities that merit collective exploration. Among these opportunities are the following:

- *Confronting complex conversations:* The advent of AI-powered writing tools, exemplified by ChatGPT, necessitates comprehensive and thoughtful *dialogues* among students, educators, and professionals. These discussions should revolve around the intricate domain of academic integrity, encompassing an examination of what constitutes *plagiarism* when employing AI writing tools, a clear distinction between permissible and non-plagiaristic utilisation of these tools, and discernment of scenarios wherein AI writing tools can augment critical thinking, communication, and learning (Baï doo-Anu et al., 2023). These *conversations* bear significance not solely for students and educators but also for individuals pursuing careers in writing disciplines. They serve as a mechanism to tackle the multifaceted *legal* and *ethical* aspects entailing AI writing tools, which have assumed roles previously carried out exclusively by human writers (Trust et al., 2023). After a comprehensive exploration of potentialities and implications, it becomes urgent to establish *standardised guidelines* and *achieve consensus* regarding explicit and ethical applications that maximise the advantages afforded by AI writing tools (Nguyen et al., 2023).
- *Exploring pedagogical strategies:* Educators can serve as exemplars of effective practices by integrating AI tools into their instructional methods and *curriculum*. This proactive approach allows students to gain a more profound understanding of and leverage the potential of this transformative technology, ultimately enhancing their productivity, comprehension, and creative capabilities (Trust et al., 2023). Furthermore, it is reasonable to contemplate the adoption of *adaptive learning* as a substitute for traditional *personalised learning* paradigms (Shuai et al., 2023). *Adaptive learning* considers variables such as the diversity in learners' preferred learning styles and the nature of proposed activities, ensuring the creation of effective adaptive and generative learning pathways customised to individual needs. In this context, the role of the *facilitator* assumes a pivotal position in bridging the gap between *adaptive* systems and *novice learners*. While AI-driven dynamic knowledge management systems aim to automate strategies at an *expert level*, it is vital to instil *metacognitive* awareness among motivated learners (Azevedo, 2018). This *metacognitive* perspective enables learners to gain insight into their *learning strategies* and skills, fostering adaptability and enhancing their overall learning proficiency. Furthermore, training learners and educators to reflect on expert theories and practices within dynamic and fluid contexts, enriched by data-driven insights, becomes critical. Given the unpredictable pace and extent of change in didactic technologies, future educators must cultivate the ability to engage in continuous learning and remain attuned to the ongoing development of digital resources. Embracing an awareness of emerging methodological and technological possibilities equips educators with the flexibility to effectively place the learner at the core of the teaching and learning process across various disciplines.
- *Augmenting metacognitive skills via problem-solving dynamics:* Educational exercises and *assessments* can pivot toward cultivating problem identification skills and resolving pre-defined problems, as presented by instructors and reinforced through AI systems. Introducing *metacognitive* elements in *problem-solving* exercises and subsequent debriefing sessions can significantly enhance the intellectual value of these educational efforts (Oravec, 2023). Within this framework, the *faci-*

litator is critical in providing a spectrum of AI-assisted *scaffolding* support encompassing conceptual, *metacognitive*, procedural, and strategic dimensions. *Conceptual* support entails guiding learners in discerning the subject matter for learning and recognising the inherent relationships within the relevant knowledge domains. AI technologies can play a central role in enhancing *conceptual* support. Conversely, *metacognitive* support entails assessing a learner's knowledge, including subtle references to *learning objectives* or ambiguously defined issues, and engaging in intricate decision-making processes. In this realm, human intervention remains indispensable. *Metacognitive scaffolding* contributes to reducing cognitive burdens and fostering critical thinking and reflection. Additionally, AI-augmented *procedural* scaffolding can expedite learners' navigation and utilisation of the educational system. In contrast, *strategic* scaffolding can provide diverse approaches to addressing a specific task, offering access to human expert guidance and available AI-enriched datasets. While AI demonstrates proficiency in delivering extensive support, it remains crucial for the *facilitator* to maintain an active role, entailing the stimulation of inquiries, cultivating investigative cognitive habits, and facilitating discussions that effectively influence learners' values and beliefs. Encouraging *metacognitive* reflection on their learning styles within technology-driven contexts and fostering direct experiences in *cooperative* learning design and *heuristic* work empower future educators and learners to cultivate dynamic and adaptable skills. These skills enable them to swiftly integrate technological platforms into their teaching and learning practices. Thus, a profound reflection on the transfer and deliberate negotiation of complex expertise remains essential, achieved through *metacognitive* analyses of expert strategies for information organisation and the management of interactive dynamics and decision-making (Caro et al., 2014).

– *Reflecting on AI interactions:* Engagement in contemplative exercises aimed at eliciting *metacognitive* insights and personal reflections can serve as a *facilitator* for students to harness the potential of generative AI systems to augment their intellectual capacities rather than circumvent them (Oravec, 2023). Creating dedicated spaces for personal and *collective introspection* concerning the human experience of interacting with AI helps facilitate this process. Such introspection should encompass a spectrum of *inquiries*, including the *emotional dimensions* of AI interaction, the quality of outcomes, the *experiential journey* leading to results, and the educational *insights* gleaned through engagements with AI and Large Language Models (LLMs). Additionally, this process should explore whether AI interactions are viewed as a *competitive* arena between humans and machines or as an avenue for synergistic *collaboration*. Deliberations on the optimal role of AI in the human context, strategies for influencing the technological agenda to align it with human problem-solving needs, and a comprehensive examination of associated *challenges* and *benefits* are essential components of this approach. It encourages *constructive discourse* and promotes the comprehensive integration of technological innovations into daily life, mitigating unwarranted apprehensions (D'Mello et al., 2014).
– *Co-design for productive failure:* Within the contemporary landscape of business education and applied research, a compelling necessity exists to nurture the capacity for *rapid failure* and expedited learning within psychologically secure environments conducive to innovation-driven problem-solving (Schein, 2016). As a result, in both personal and professional educational contexts, pedagogical approaches should increasingly pivot toward creating problem scenarios and *problem-solving* sequences that incorporate AI as an invaluable tool. Furthermore, given that *problem-based learning* is already an externally imposed structural *framework* within learning and performance, certain studies posit that there may be no need for excessive structuring of problem-solving activ-

ities in ill-structured domains. Rather, permitting students to confront challenges, including the prospect of *failure*, can be a productive pedagogical exercise (Kapur, 2008). The deliberate cultivation of such instances of *failure* - within a secure learning environment, wherein students collaborate and co-create solutions to intricate problems with the assistance of AI and under the tutelage of human experts who *facilitate*, *scaffold*, and *validate* processes and content - can accelerate the seamless integration of human capabilities with augmented realities (Gulyamov et al., 2023).

– *Measuring efficiency:* Recent investigations have demonstrated that AI technology has the potential to enhance students' learning and cognitive capacities to a certain extent, concurrently improving the *efficiency* of teaching and learning processes (Huang et al., 2021). Beyond merely utilising these technologies in daily educational practices, adopting new digital and AI tools necessitates educators to adopt a rigorous approach to delineating *Learning Objectives* (LO) for each learning endeavour. This approach prioritises achieving *Intended Learning Outcomes* (ILO) as tangible evidence of genuine and authentic learning outcomes for human participants (Mastrogiacomi, 2023). Precision in articulating and declaring *action verbs* can elevate the quality of an ILO-driven educational practice. However, it is noteworthy that recent experiments simulating the application of *high-level cognitive skills* through ChatGPT dialogue have indicated its adept performance across all *Bloom's Taxonomy* learning tiers (Bloom et al., 1956). While ChatGPT proficiently generates content that emulates various mental levels, educators are encouraged to adhere to an ILO-driven, stringent, and evidence-based instructional approach to ensure the comprehensive measurability of the overall impact of the learning experience. Digital platforms offer a wealth of *data* that necessitates integration with empirical data from human interactions and personal *learning portfolios* amassed throughout the *learning journey*. The convergence of these data streams onto measurable and observable dimensions enhances the precision of *formative* and *summative* assessments, yielding dependable evaluations of learners' competencies and skills cultivated throughout their *lifelong learning* journey (Earl, 2012).

3. Heading towards learners' autonomy and adaptive learning with AIs

During the early stages of the pandemic, educators grappled with the rapidly advancing technological landscape, aiming to maintain a human-centric perspective amid *digital transformation*. Their focus was on integrating technology with the fundamental principles of the humanities. Many educational organisations faced the necessity to embrace digital platforms without fully understanding the profound consequences and disruptions brought by the subsequent massive advent of AI.

The initial wave of *digital transformation* significantly impacted educators, requiring them to swiftly acquire new skills and adapt to digital tools. In this challenging period, educators were primarily concerned with the practical aspects of their daily work. Many transitioned from the traditional role of a *sage on the stage* to that of a *facilitator*, driven by the need for adaptation and survival. This shift began in a renewed, entirely *hybrid* professional context, further complicated by the disruptive dynamics of the global pandemic.

Technological mediation's pervasive and all-encompassing influence accelerated the onset of a new era propelled by Artificial Intelligences (AIs). This era is now witnessing intricate connections between humans and technologically augmented entities, resulting in complex interfaces merging biological "wet-ware" with non-biological "hardware" (Bono et al., 2008). These complex interdependencies highlight the evolving landscape of human-technology interaction, indicating a profound impending shift in the very essence of human existence and societal structures.

The rapid and profound technological transformations, especially in Artificial Intelligence and Machine Learning, necessitate thoroughly reassessing a *renewed pedagogical paradigm*. This reassessment must occur with heightened awareness and a tangible sense of urgency. In the contemporary landscape, marked by numerous Artificial Intelligences, multiple Expansive Language Models, and the prevalence of Distributed Machine Learning, the approach to teaching and learning must pivot toward accommodating *adaptive learning trajectories* for human learners. These adaptive pathways are critical due to the swift pace at which human society advances towards what can aptly be termed a *posthuman* condition (Braidotti, 2013).

Traditionally, the study of humanity focused on "Man" as the primary subject of analysis. However, in the present and future context, the proper subject of examination becomes the intricate interplay between "humans" and "non-human" agents (Braidotti & Gilroy 2016). This shift underscores the necessity of understanding the complex dynamics and consequences of human interactions with non-human entities in an increasingly AI-driven world. It is essential to reevaluate traditional *ontological categories* and *boundaries* in the face of technological and cultural transformations, introducing a more *inclusive* and nuanced understanding of *identity*, *culture*, and *society* that challenges conventional notions of *human identity* and *subjectivity* in an advanced technological landscape.

4. Conclusions and further considerations

This paper explored the *paradigm shift* from educators to *facilitators* of change, focusing on strengthening human learners' ability to learn *autonomously* and incorporating future technology into an individual-centred pedagogy. It envisioned AI as a *collaborative partner* in various educational tasks, emphasising the need for educators to work with AI to redefine the boundaries of professional and personal education. Identified *challenges* for teachers included nurturing *trust* in learners' cognitive abilities and engaging in open dialogues about the *ethical* implications of technological innovations. In physical and virtual learning communities, educators have been imagined as fully transitioning into *facilitators* within authentic *apprenticeship* contexts, guiding students in *experiential* and project-driven problem-solving scenarios. The *augmented facilitator* has been encouraged to collaborate with cyber-learners, gradually receding as learners progress towards autonomy. Peer-tutoring mechanisms have been presented as crucial, creating a fluid boundary between educator and learner. The future *challenge* has risen to embrace AI as a collaborative partner, building trust, fostering open dialogues, experimenting with AI tools, enhancing *metacognitive* skills, reflecting on AI interactions, embracing *productive failure*, and *measuring* educational efficiency to navigate the evolving educational landscape effectively while maintaining *ethical integrity*.

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