

A Capability-Oriented AI-Enabled Teaching Framework: Evidence from Public Administration Education

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Abstract

Artificial intelligence (AI) in higher education has intensified debates on how teaching can foster capability development beyond technical skill acquisition. This study examines AI-enabled teaching in public administration education from a capability-oriented perspective. Drawing on reflective analysis of teaching practice, it develops a generative framework that conceptualizes capability development as a staged process involving capability emergence through curricular and pedagogical design with AI embedded as a cognitive scaffold, capability transformation through situated action and judgment in AI-mediated governance scenarios, and capability stabilization through reflection and contextual transfer across interconnected learning environments. The framework is enacted in teaching practice to illustrate how pedagogical reconfiguration, restructured teacher-student-AI relationships, and integrated learning ecologies jointly support sustained capability development. The study highlights AI's role as a pedagogically mediated support mechanism rather than a substitute for human judgment.

Keywords: *Generative AI; capability-oriented teaching; higher education; learning ecology.*

1. Introduction

The rapid integration of artificial intelligence (AI) into higher education has sparked widespread concern over how teaching and learning practices can be redesigned to meet emerging competency demands. Existing studies indicate that AI is increasingly explored as a supportive tool in higher education, particularly for personalized learning, adaptive feedback, and instructional design under guidance. However, a critical challenge remains unaddressed: how AI can be meaningfully embedded into the process of students' capability development, rather than merely used to train skills or improve short-term learning outcomes.

In much of the current literature, capability development is conceptualized in instrumental terms, either as a collection of discrete skills or as measurable learning outcomes evaluated through performance indicators (Chan et al. 2024; Francis et al. 2025; Deroncele-Acosta et al., 2025). Within this approach, AI is primarily positioned as an instructional tool for efficiency enhancement, content delivery, or assessment automation. While providing empirical value, they often leave the theoretical exploration of the underlying process of capability formation insufficient (Daniel et al. 2025). As a consequence, students may acquire technical skills without developing the ability to apply them flexibly across complex and evolving real-world contexts.

This limitation is particularly salient in public administration education. As governance becomes increasingly entangled with complex policy environments, data-driven decision-making, and uncertainty, students are required not only to master technical tools but also to develop integrative capabilities that combine conceptual understanding, situational judgment, and adaptive decision-making. Teaching focusing solely on skill acquisition or outcome measurement risk overlooking how such capabilities are gradually generated, transformed, and stabilized through sustained learning experiences (Holmes, Bialik, & Fadel, 2019).

Addressing this gap requires shifting from viewing capability development as a static instructional outcome to a generative learning process, unfolding through multiple stages, including the formation of cognitive structures, the transformation of understanding into guided action, and the stabilization of capabilities through reflection and contextual transfer. Importantly, this perspective reconceptualizes AI as a mediating mechanism supporting each stage of the capability generation process, rather than an isolated tool.

2. Literature review

Existing studies predominantly examine AI tool adoption in higher education, highlighting that perceived ease of use, usefulness, and intelligence are positively associated with AI adoption (Zhang et al., 2025; Shahzad et al., 2024). International policy frameworks further underscore a human-centred approach to AI in education, prioritizing pedagogical design and ethical considerations over technological determinism (OECD, 2023). However, existing studies insufficiently theorize the pedagogical positioning of AI within the broader learning process, particularly regarding its interaction with students' capability development across different learning stages.

Capability development constitutes a central theme in research on higher education. Recent frameworks emphasize learners' ability to use AI tools effectively, ethically, and responsibly in specific task contexts (Nussbaum, 2011; Gligorea, 2023). Although existing studies and frameworks have advanced the understanding of AI-supported teaching and capability development (Haroud & Saqri, 2025), they tend to treat capability development as a static or instrumental outcome of instructional interventions. By focusing on what skills can be trained

or what outcomes can be achieved, these approaches tend to overlook how capabilities are gradually generated through the interaction of understanding, action, and reflection over time. AI capabilities in higher education involve sense-making, judgment, and contextual adaptation, as these cannot be fully captured through outcome-based measures alone .

The OECD (2026) have warned that overreliance on AI without pedagogical mediation may cause “false mastery”. This leaves the generative process through which capabilities emerge, transform, and stabilize over time under theorized. Addressing this gap requires a process-oriented perspective on pedagogically structured learning experiences.

3. A Capability-Oriented AI-Enabled Teaching Framework

This study shifts the understanding of capability development from an instrumental outcome to a generative learning process unfolding across stages and contexts. Capability development is conceptualized as involving three interrelated processes: capability emergence through capability-oriented curricular and pedagogical design, in which AI is embedded as a cognitive scaffold to structure learners’ understanding of complex governance domains; capability transformation through situated action and judgment under uncertainty, supported by AI-mediated governance scenarios; and capability stabilization through reflection and contextual transfer across AI-supported learning environments. This perspective shifts attention from isolated learning activities to the pedagogical sequencing and integration of learning experiences over time. On this basis, a generative capability development framework for AI-enhanced public administration education is summarized in Table 1.

3.1. Capability Emergence: Structuring Governance Problems through Capability-Oriented Learning Design

In public administration education, capability development does not begin with AI tool use, but with students’ ability to conceptualize governance problems. Public governance issues —such as digital government reform, public crisis management, or policy coordination across agencies—are characterized by multiple stakeholders, competing values, institutional constraints, and information asymmetry. Without adequate cognitive structures, students may acquire technical skills yet lack an understanding of when and why they should be applied in governance contexts.

At the stage of capability emergence, capability-oriented design focuses on framing public problems through governance structures and actor relationships. Here, specific Generative AI tools (e.g., ChatGPT, policy text analyzers) serve as cognitive scaffolds rather than decision-makers, enabling students to parse complex regulations and visualize institutional relationships, thereby transforming opaque policy environments into structured learning tasks.

These practices align with core public administration curricula, such as public policy analysis, administrative systems, and governance theory. By embedding AI into conceptual learning activities, this stage establishes cognitive foundations for subsequent decision-oriented learning.

Table 1. A Generative Framework for Capability Development in AI-Enhanced Public Administration Education

Capability Stage	Pedagogical Mechanisms	AI Mediation	Systemic and Ecological Conditions
Capability Emergence	• Capability-oriented curricular and pedagogical design • Conceptual learning to frame governance issues • Integration of public administration knowledge	• AI as cognitive scaffold • Policy text analysis • Data visualization • exploratory analysis	• Simulated governance data • Visualization tools • Interdisciplinary learning resources supporting conceptual understanding
Capability Transformation	• Scenario-based pedagogical design • Simulating administrative judgment under time pressure and incomplete information • Balancing policy trade-offs and coordination demands • Developing action-oriented reasoning through governance scenarios	• AI as decision mediator • Dynamic governance scenario generation • Policy consequence simulation • Real-time feedback	• AI-mediated simulations • Role-playing environments • Virtual labs enabling repeated engagement with governance scenarios and decision processes
Capability Stabilization	• Reflective and longitudinal learning design • Reflection on decision processes and judgment patterns • Consolidation of professional reasoning • Development of adaptive and responsible governance capability	• AI as reflective and analytic support • Learning trajectory tracking • Cross-scenario comparison • Personalized feedback	• Integration of learning data across contexts • Support for student-teacher-AI interaction • Personalized learning pathways • Sustaining capability transfer

3.2. Capability Transformation: Acting and Coordinating in AI-Mediated Public Governance Scenarios

Capability transformation addresses a long-standing gap in public administration education: the difficulty of converting theoretical understanding into situated administrative action and coordination. At this stage, learning design centers on AI-mediated governance scenarios that

require students to act as public administrators, policy analysts, or government decision-makers while interacting with other actors under institutional and situational constraints. These scenarios are grounded in typical public administration contexts, such as emergency response coordination, policy implementation trade-offs, or digital service delivery reform.

Within these contexts, the pedagogical focus shifts from identifying optimal solutions to engaging students in processes of action and adaptation. Students are required to navigate AI-simulated crisis scenarios (e.g., pandemic response) or budget debates, justifying decisions and negotiating trade-offs against real-time AI-generated constraints. Through such situated interactions within smart governance laboratories, abstract concepts are translated into practical administrative capability. Importantly, this transformation is attributed not to the AI systems themselves, but to the structured pedagogical design that mediates the interaction among learners, tasks, and peers.

3.3. Capability Stabilization: Systemic Conditions for Sustaining AI-Supported Learning Ecologies

In public administration education, students' decision-making abilities are often context-specific and may not automatically transfer across different governance contexts. This limitation underscores the importance of capability stabilization.

Within this multi-platform learning ecology, AI supports the stabilization of capabilities by providing integration across various learning environments. These environments, such as policy labs, capstone projects, smart classrooms, and online learning platforms, collectively form a cohesive ecosystem where learning experiences are interconnected and extended over time. AI tracks students' learning trajectories, enabling reflection on decision-making patterns and facilitating the transfer of administrative capabilities across different contexts.

Additionally, AI acts as an analytic and reflective support mechanism. By aggregating learning artifacts and feedback across contexts, AI helps students reflect on their action patterns, coordination strategies, and decision-making rationales. Through longitudinal and integrative learning processes, students' administrative capabilities become more stable, adaptive, and transferable across diverse governance challenges.

This framework reconfigures existing public administration teaching practices into a coherent capability generation process: Curriculum modules on governance theory and policy analysis support capability emergence; AI-mediated simulations and decision-making tasks enable capability transformation; and reflective, cross-context learning environments facilitate capability stabilization. AI is not introduced as a standalone innovation, but as an enabling mechanism embedded within each stage of the public administration learning process.

4. Enacting AI-Enabled Capability-Oriented Teaching in Public Administration

Building on the generative perspective of capability development, this section illustrates how a capability-oriented, AI-enabled teaching framework has been enacted in public administration education through teaching practice.

4.1. Pedagogical Transformation: Implementing Capability-Oriented Teaching Practices

In teaching practice, pedagogical transformation is enacted by reorganizing classroom instruction around capability-oriented learning tasks rather than content coverage. Instead of sequencing teaching according to disciplinary topics, instructional activities are designed around complex governance problems, requiring students to engage in problem articulation, analysis of institutional and actor relationships, and justification of administrative decisions.

Teaching practices emphasize problem framing, analytical reasoning, and decision justification. Students are required to explicate how governance problems are defined and why particular courses of action are chosen. To operationalize this, AI is integrated as a pedagogical support for draft policy analysis and real-time feedback. Through structured activities, such as debating AI-generated policy drafts or delivering group presentations after simulations, students systematically link conceptual understanding with analytical engagement, ensuring AI supports rather than replaces human judgment.

4.2. Transformation of the Teacher-Student-AI Relationship: Reconfiguring Educational Subject Relations

Teaching practices are organized around a triadic teacher-student-AI relationship that reshapes roles and responsibilities in the learning process. Within this configuration, teachers primarily assume the role of pedagogical designers and facilitators, responsible for framing learning objectives, setting normative boundaries, and guiding reflection. Students are positioned as active agents of judgment, taking responsibility for interpreting governance situations, coordinating information, and justifying administrative decisions. AI systems function as supportive cognitive and analytic agents, assisting with information processing, pattern recognition, and feedback generation, without assuming decision-making authority.

This reconfiguration shifts educational subject relations from a hierarchical transmission model to a coordinated structure of human judgment and AI-supported analysis. Instructional authority is neither fully centralized in the teacher nor delegated to automated systems. Instead, capability development is enacted through the alignment of teachers' pedagogical guidance, students' decision responsibility, and AI-enabled analytic support.

4.3. Resource and Learning Ecology Transformation: Sustaining Capability Development

In teaching practice, the transformation of resource organization and learning ecology provides the systemic conditions for sustaining capability development over time. Smart classrooms, virtual laboratories, digital platforms, and practice-based learning environments are connected to form a multi-platform learning ecology. Rather than functioning as separate instructional spaces, these environments are organized to support continuity and integration across courses, learning contexts, and stages of study.

Within this ecology, learning resources and activities are dynamically coordinated, enabling students' learning experiences to extend beyond individual courses or scenarios. Opportunities for reflection and comparison across contexts are embedded into the learning environment, supporting the stabilization and transfer of administrative capabilities.

5. Conclusion

This paper proposes a staged framework for AI-enhanced teaching in public administration education, comprising three interconnected phases: capability emergence, transformation, and stabilization. At the curriculum level, the framework emphasizes cognitive structuring to support students' understanding of complex governance issues. At the pedagogical level, it emphasizes scenario-based learning with AI tools to turn conceptual understanding into practical decision-making. At the ecosystem level, this framework conceptualizes an AI-supported learning environment that facilitates reflection, transfer, and the stabilization of capabilities across diverse contexts.

The analysis reveals a recognizable way of organizing education. Across curriculum design, classroom interaction, and learning environments, pedagogical practices are reconfigured to engage with complexity, educational relationships are reshaped into triadic teacher-student-AI collaboration, and learning resources are organized to support continuity rather than episodic innovation. These elements form a capability-oriented AI-enabled teaching framework aligning educational practice with the evolving demands of contemporary governance.

This understanding clarifies a broader issue in higher education. In fields like public administration, where professional judgment, responsibility, and public values are central, educational transformation cannot be reduced to technological adoption. It requires attention to how learning unfolds over time and across contexts. By making the organizing logic of capability development explicit, this study offers a perspective for thinking about AI in higher education that is both cautious and constructive—one that foregrounds human judgment while acknowledging the structural influence of emerging technologies.

Beyond public administration education, this perspective has broader implications for higher education. As universities increasingly experiment with AI, the challenge is not whether it can

be used in teaching, but how educational practices are reshaped in response to it. Understanding AI-enabled teaching as a capability-oriented perspective helps address this challenge.

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