OECD Session: Effective Uses of Generative AI in Education

From School AI Readiness to Student AI Literacy

A National Multilevel Analysis in Vocational Education

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The Challenge: AI in Education

The integration of Artificial Intelligence in education represents a **systemic organisational transformation**, not merely a technological upgrade.

Particularly in vocational education, students must apply AI tools within authentic occupational workflows to meet the rapidly evolving demands of the labour market.

- How do we move beyond simply procuring AI tools?
- How does institutional infrastructure translate into measurable student outcomes?

The missing empirical link between Institutional Readiness & Student Outcomes

Assessing the Outcome: AI Literacy

To understand the impact of institutional readiness, we must first be able to reliably measure student competency at scale.

Introducing GLAT: Generative AI Literacy Assessment Test

GLAT is a rigorously validated instrument designed to capture students' multidimensional competencies in generative AI environments. It moves beyond self-reported confidence to assess actual cognitive and applied skills.

1. Conceptual Knowledge

Understanding underlying mechanisms of GenAI systems.

2. Applied Tool Use

Effective prompting and problem-solving in specific contexts.

3. Ethical Evaluation

Critical assessment of biases, hallucinations, and ethical boundaries.

GLAT: The Generative AI Literacy Assessment Test

GLAT: Global Adoption

The Core Unresolved Question

"How does institutional AI readiness translate into tangible student learning outcomes, and through which organisational mechanisms does this translation occur?"

Moving beyond the dichotomy of "infrastructure exists" vs "infrastructure is absent".

A Multilevel Ecological Framework

Drawing on ecological systems theory, educational environments are nested structures. AI integration requires alignment across all levels.

Macro-Level

Regional/Policy Context

Regional digitalisation, labour-market transformation, and national AI strategies.

Meso-Level

Institutional Readiness

Schools as configurators of instructional opportunity structures. Governance, resources, and shared professional environment.

Micro-Level

Student Literacy (GLAT)

Classroom interactions where teachers, students, and AI tools converge to form competencies.

A National-Scale Empirical Study

To robustly test these cross-level pathways, we conducted a massive linked survey across the nationwide population of vocational institutions in China (March-April 2025).

2.38M+

Students

Level 1 (Outcome via GLAT)

156K+

Teachers

Level 2 (Aggregated Mechanisms)

1,007

Institutions

Level 2 (Institutional Readiness)

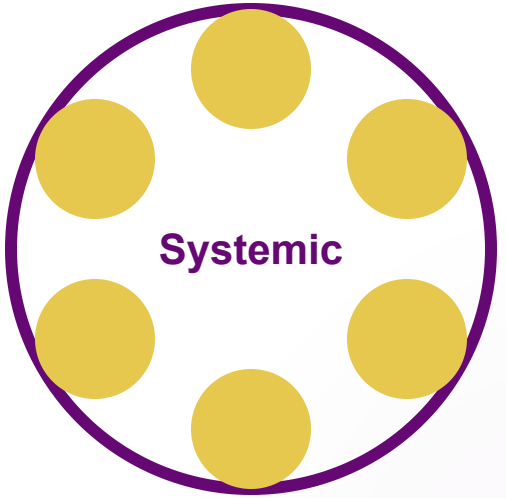
Methodology: 2-2-1 cross-level mediation framework using multilevel linear mixed-effects models.

Finding 1: Readiness is a Systemic Configuration

Institutional AI readiness is positively associated with students' AI literacy. But it is not a single checklist item; it is an integrated organisational configuration.

- **Strategic Readiness:** Policy alignment and vision.
- **Organisational Readiness:** Structural support for change.
- **Process Readiness:** Curricular integration workflows.
- **Technical Readiness:** Hardware and platform availability.
- **Data Readiness:** Infrastructure for safe, effective AI use.
- **Ethical Governance:** Safeguards and responsible use policies.

**When modeled simultaneously, these capacities reinforce each other. Isolated technical upgrades without governance yield limited impact.*



Finding 2: The Missing Link – Teachers as the Engine

How does macro-level institutional infrastructure actually reach the student? Our data shows that institutional readiness is translated through a specific professional intermediary.

It's about Capability, not just Attitude.

While readiness influences teachers' perceived effort expectancy, social support, and satisfaction, only **Aggregated Teacher-Perceived AI Capability** demonstrated a statistically significant cross-level transmission pathway to student AI literacy.

💡 **Insight:** General attitudinal acceptance of AI is insufficient. Systemic capacity must foster the collective instructional competence to design and enact AI-supported pedagogy in the classroom.

The Readiness-Capability-Literacy Pathway

Formal mediation testing confirmed a statistically significant indirect pathway. The direct association remains significant, indicating partial mediation. **Institutional investments shape professional capability, which in turn structures students' opportunities to develop AI literacy.**

Finding 3: Robustness Across Regional Divides

Does this hold true across different economic contexts?

We tested whether regional AI development (e.g., proximity to tech hubs) altered the readiness-literacy association.

- **Macro Advantage:** Students in high AI-development regions naturally demonstrated higher overall baseline AI literacy.
- **Structural Stability:** However, the interaction between school readiness and regional development was **not** statistically significant.

⚖ An Equity Perspective

This means the internal school-level transmission mechanism operates consistently. Even in resource-constrained or low-AI regions, strengthening institutional readiness and teacher capability remains a highly viable, scalable strategy for closing the digital divide.

Implications for Policy Makers

For OECD policy makers seeking equitable AI transformation, infrastructure procurement is only the first step.

Evaluate Readiness Holistically

National frameworks must incorporate explicit indicators of governance, ethics, and collective instructional competence alongside hardware metrics.

Shift PD Focus

Professional development should pivot from general AI awareness campaigns to building domain-specific, job-embedded instructional capability.

Assess Meaningfully

Implement standardized, multidimensional assessments like GLAT to track genuine competency development rather than just tool usage frequency.

Implications for Institutional Leaders

"AI integration is a team sport, not an individual hobby."

- ✓ **Build Shared Capacity:** Cultivate aggregated teacher capability through collaborative planning and communities of practice.
- ✓ **Align Processes:** Ensure that curricular structures and assessment policies explicitly permit and encourage safe AI use.
- ✓ **Bridge the Gap:** Map how data readiness and ethical guidelines actively support the teacher in the classroom.

Key Takeaways & Discussion (Summary)

- **Institutional Capacity** AI readiness requires systemic alignment, not just tool procurement.
- **Teacher Capability** The crucial transmission mechanism translating readiness into literacy.
- **Student Literacy** Assessing real-world AI competencies using validated tools like GLAT.
- **Policy Action** Invest in human capital alongside technological infrastructure.

Thank you for your attention! Let's discuss.