Educational and Humanities
ISSN Print: 3104-4352
ISSN Online: 3104-4360
CD ISSN: 3104-4379
https://doi.org/10.63313/EH.9067

From Technocentrism to Human-Centrism: Reimagining TVET in the Age of AI Automation

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How to cite this paper: Gu, R. (2026). From technocentrism to human-centrism: Reimagining TVET in the age of AI automation. *Educational and Humanities, 3*(2), 36–40. ISSN Print: 3104-4352; ISSN Online: 3104-4360.
https://doi.org/10.63313/EH.9067
Published: 2026-05-14

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Abstract

This paper argues that traditional technocentric TVET—focused narrowly on hard skills—is fundamentally fragile in the AI era. Drawing on recent empirical studies from Africa, Asia, and beyond, it contends that TVET must shift from "technology-centered" to "human-centered" education, integrating soft skills as career stabilizers, embedding ethics as a core pillar, and adopting holistic pedagogies to cultivate not merely competent operators but complete human beings.

Keywords

TVET; AI; Soft Skills; Ethics; Human-Centered Education

1. Introduction

The editorial of TVET@Asia Issue 26 declares that AI is not merely another technological trend for TVET; it challenges some of its foundational assumptions[1]. As AI reshapes occupational profiles, TVET systems must reconsider what constitutes vocational competence and who benefits from technological change.

The current landscape reveals a troubling paradox. In Nigeria, Chiamogu and Chiamogu (2025) found that 65% of employers identify digital illiteracy among TVET graduates as a key barrier to employment[2]. Yet this mismatch is fundamentally an adaptability deficit—not merely a technical one. Rabiu, Lee, and Lim (2025) further document severe skills mismatches where curricula remain disconnected from automation realities. Graduates may operate machinery but struggle when that machinery becomes intelligent and autonomous[3].

In the age of AI automation, relying solely on hard technical skills is inherently fragile. TVET must transform from technology-centered to human-centered—placing equal emphasis on soft skills, ethical reasoning, and holistic pedagogy as the true anchors of employability.

2. The Limitations of Technocentrism

Traditional TVET operates under a technocentric ideology: vocational competence is primarily technical mastery. The graduate is imagined as an operator who executes commands. In the AI era, this is dangerously obsolete—the very tasks defining the operator role are precisely those AI performs faster and more accurately.

Technocentrism also exacerbates inequality through the digital divide. TVET@Asia Issue 26 notes that AI integration unfolds across unequal infrastructures[1]. Mahuyu (2026) confirms this empirically in Zimbabwe: urban institutions possess high-specification hardware while rural colleges contend with obsolete equipment and no AI-specific hardware. Urban-rural location, connectivity, and device ownership explain 72% of variance in AI tool access. When policy focuses narrowly on expensive equipment without addressing structural inequities, it risks creating a two-tiered system marginalizing rural populations[4].

Moreover, simply stacking technology courses does not resolve mismatches. Rabiu, Lee, and Lim (2025) found that even with AI modules, curricula remain theoretically detached from practice. The mismatch persists because graduates lack higher-order capacities to adapt, critique, and collaborate in AI deployment. If TVET continues producing graduates defined solely by technical execution, it produces workers most vulnerable to AI displacement[3].

3. Soft Skills as Career Stabilizers

A human-centered approach cultivates career stabilizers—transferable capabilities enabling workers to navigate technological disruption. The ETS (2025) framework identifies five power skills: adaptability, collaboration, resilience, communication, and critical thinking. These must be repositioned as core professional competencies, not supplementary qualities[5].

Critical thinking in the AI era means questioning AI-generated outputs, recognizing algorithmic errors, and resisting automated authority. In CNC machining, an AI might generate cutting parameters based on historical data—but what if material properties differ? A technician with critical thinking interrogates the recommendation rather than blindly executing it.

Adaptability must be reconceptualized: from operating machinery to managing and debugging AI systems that operate machinery. The future worker orchestrates AI, interprets anomalies, and steps in when edge cases exceed training distributions[5].

Complex communication—articulating technical concepts to non-technical stakeholders and building trust in hybrid human-AI teams—is irreplaceable. Pirzada (2026) highlights how Pakistan's Art and Design TVET increasingly demands "hybrid technical-creative skill sets" where graduates explain AI-generated choices to clients and mediate between human intuition and machine optimization[6].

Yet a critical paradox exists: educators themselves often lack these competencies. Nwakile et al. (2026) surveyed 416 TVET educators, finding that，moderate AI

readiness but limited engagement with advanced AI-enabled practices.If teachers have not mastered critical thinking about AI outputs or adaptability to new technologies, how can they cultivate these in students? This readiness gap is the most urgent bottleneck in TVET transformation[7].

4. The Criticality of Ethics in Complex Sociotechnical Systems

As systems grow more sophisticated, ethical reasoning grows proportionally—not inversely. The more we delegate decisions to algorithms, the more we need humans capable of scrutinizing embedded values and identifying biases.

Consider algorithmic bias: when an AI recommends against certifying a female welding student because historical data shows lower female completion rates, is it being "objective" or perpetuating discrimination? A technically trained technician may lack the ethical vocabulary to recognize this; one trained in ethical reasoning can identify the bias and advocate for fairer criteria.

Mahuyu (2026) illustrates how AI adoption in resource-constrained contexts amplifies injustice. In Zimbabwe, female participation in AI-enabling fields remains significantly lower,with girls steered towards traditional feminine trades while AI courses are implicitly marketed to boys.AI tools reflect biases from their Western, male-dominated development contexts,making it difficult for female students to connect with them. Ethical education is not a luxury here—it is a practical necessity against exclusion[4].

5. Towards a Holistic Pedagogy

(1) Curriculum Integration

Curriculum must adopt a dual-track approach pairing technical content with humanistic and ethical dimensions. Pirzada (2026) offers a model: when teaching AI graphic design in Pakistan, instructors should simultaneously discuss copyright, originality, and generative AI ethics. Is an AI-generated image original? Who owns copyright when work is 90% algorithmically produced[6] ?

Similarly, technical fields should integrate "ethics checkpoints" where students evaluate AI-generated parameters against safety and fairness criteria.

(2) Problem-Based Learning

Traditional pedagogy—demonstration, imitation, repetition—is ill-suited for the AI era. TVET should embrace Problem-Based Learning placing students in complex scenarios requiring technical and humanistic reasoning.

Consider an automotive PBL scenario： an AI diagnostic system flags an engine fault, but the technician suspects misinterpreted sensor data from a firmware update. Students must (1) verify the AI diagnosis manually; (2) communicate findings to a manager who trusts the AI; (3) adapt when new data contradicts hypotheses; and (4) ethically justify overriding the AI, considering warranty and safety. This exercises critical thinking, communication, adaptability, and ethics simultaneously.

Do (2025), in a Vietnam case study demonstrates that embedded soft skills training—rather than bolted-on modules—significantly enhances workplace readiness[8].

(3) Cultivating Critical Practitioners

Goh and Hamid (2026) studied Bruneian adult educators, finding positive AI orientation but gaps in confidence, ethical awareness, and structured professional development.They propose embedding AI literacy within broader digital competence, repositioning educators as critical practitioners who mediate between AI, pedagogy, equity, and learner agency[9].

6. Conclusion

The AI revolution in vocational education is not primarily technological—it is philosophical. The question is not how do we integrate AI into TVET? but what kind of human beings do we want TVET to cultivate?

Technology and humanity are complementary, but only when TVET deliberately cultivates human dimensions—critical thinking that questions, adaptability that embraces change, communication that bridges divides, and ethical reasoning that humanizes.

TVET's mission must expand beyond producing qualified workers to cultivating complete human beings—those with technical competence to engage AI, soft skills to transcend it, and ethical commitment to govern it. The response to AI must not be defensive technocentrism. It must be confident humanism: a curriculum trusting in the irreplaceable value of human judgment, creativity, and conscience.

For policymakers, this means attending to curriculum's invisible dimensions—ethics, culture, social-emotional development—with the same urgency as visible infrastructure. For educators, it means modeling the soft skills and ethical reasoning they seek to instill. For students, it means recognizing that their greatest asset is not mimicking machines, but being profoundly, irreducibly human.

The future belongs not to those who compete with AI, but to those who collaborate with it—while never surrendering the judgment, values, and dignity that make collaboration meaningful. TVET must choose its center: technology, or the human being. The evidence suggests only one choice leads to a future worth working toward.

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