INTERNATIONAL JOURNAL OF ACADEMIC RESEARCH IN PROGRESSIVE EDUCATION & DEVELOPMENT

OPEN ACCESS JOURNAL

Vol 14, Issue 4, (2025) E-ISSN: 2226-6348

# Integrating Emotional Intelligence (EQ) and Adab into AI-Driven TVET: A Bibliometric Review and Human-Centred Framework

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**DOI Link:** http://dx.doi.org/10.6007/IJARPED/v14-i4/27053

***Published Online:*** 22 November 2025

**Abstract**

Artificial Intelligence (AI) is transforming Technical and Vocational Education and Training (TVET) through adaptive learning systems, VR/AR, and automation. While such applications enhance efficiency, much of the discourse remains narrowly technical, with limited engagement in socio-emotional and ethical formation. This bibliometric review analysed publications indexed in Scopus between 2015 and 2025, mapping three strands of scholarship: AI, Emotional Intelligence (EQ), and Adab. After screening, 36 AI–TVET records and 26 EQ–TVET records were identified, while a strict Adab–TVET query yielded none. A broader search on Adab and values in education and vocational contexts produced 45 records. Co-occurrence mapping using VOSviewer revealed technology-focused clusters in AI, modest socio-emotional emphasis in EQ, and fragmented cultural-ethical discussions around Adab. To address this imbalance, the paper proposes a Human-Centred TVET Framework that positions AI for technical competence, EQ for resilience and collaboration, and Adab for ethical and professional grounding. The framework highlights the need for integration of values into AI-driven learning to ensure graduates are future-ready, emotionally resilient, and ethically responsible. This contribution aligns with UNESCO's TVET agenda and the Sustainable Development Goals, offering implications for curriculum, teacher training, and industry collaboration.

**Keywords:** Technical and Vocational Education and Training (TVET), Artificial Intelligence (AI), Emotional Intelligence (EQ), Adab, Human-Centred Framework

## Introduction

Artificial Intelligence (AI) has become a transformative force in education, especially within Technical and Vocational Education and Training (TVET). Adaptive platforms, VR/AR simulations, and robotics enable personalised learning, accelerate skills acquisition, and enhance workforce readiness (Vistorte et al., 2024; Reis da Silva, 2024). At the same time, these technologies raise concerns about inclusivity, ethics, and socio-emotional development

(Zahra et al., 2025). Research shows benefits such as real-time assessment and workplace simulations (Vistorte et al., 2024; Reis da Silva, 2024), but persistent challenges include inequitable access (Cinar and Bilodeau, 2024), insufficient teacher readiness (Reis da Silva, 2024), and ethical issues of privacy, bias, and fairness (Mahesh, 2025). A bibliometric scan of 2015 to 2025 identified 36 AI–TVET documents, largely focused on technical innovation with limited attention to human-centred values.

Parallel to this, Emotional Intelligence (EQ) is increasingly recognised as vital for learning, resilience, and employability. Defined as the ability to perceive, regulate, and apply emotions, EQ strengthens teamwork, leadership, and adaptability (Palmquist et al., 2025; Hoke, 2025; Baranidharan and Dhakshayini, 2024). Yet only 26 EQ–TVET studies were found, and links between EQ and AI applications remain scarce (Zahra et al., 2025; Cinar and Bilodeau, 2024).

Adab, rooted in Islamic intellectual tradition, encompasses humility, respect, discipline, and professionalism while also integrating ethics and knowledge as emphasised by Syed Muhammad Naquib al-Attas, who regarded adab as central to shaping education that cultivates both intellect and character (Buele et al., 2025; Hidayatullah and Arif, 2022). A strict Adab–TVET search returned no records, while a broader query produced 45, mostly on ethics and professionalism, but disconnected from AI and EQ. Malaysian studies have also stressed that vocational instructors require not only technical but also ethical and professional competencies to be effective (Aripin et al., 2022). This gap represents both a challenge and an opportunity. Integrating Adab with AI and EQ offers a holistic pathway for TVET, relevant for Malaysia but also globally, as discussed further in Table 1, Table 2, and subsequent sections.

## Methodology

This study employed bibliometric analysis to systematically examine published literature, identifying keywords, influential authors, and research patterns (Ortega Alvarez et al., 2024; Lim et al., 2024; Öztürk et al., 2024). Publications were retrieved from Elsevier's Scopus database, covering 2015 to 2025. The search strategy is detailed in Table 1, which shows the AI–TVET, EQ–TVET, and Adab–TVET queries, and in Table 2, which presents the broader Adab-in-education queries.

Table 1
*Search strategy overview — AI–TVET, EQ–TVET, Adab–TVET*

| | |
|---|---|
| AI in TVET | TITLE-ABS-KEY ( "artificial intelligence" AND ( "technical and vocational education" OR TVET OR "vocational training" ) ) AND PUBYEAR > 2014 AND PUBYEAR < 2026 |
| EQ in TVET | TITLE-ABS-KEY ( "emotional intelligence" AND ( "technical and vocational education" OR TVET OR "vocational training" ) ) AND PUBYEAR > 2014 AND PUBYEAR < 2026 |
| Adab in TVET (strict) | TITLE-ABS-KEY ( adab AND ( "technical and vocational education" OR TVET OR "vocational training" ) ) AND PUBYEAR > 2014 AND PUBYEAR < 2026 |

Table 2
*Broader Search strategy for Adab–TVET/ Education*

| | |
|---|---|
| Adab + TVET/Education (tight search) | TITLE-ABS-KEY ( adab AND ( "technical and vocational education" OR TVET OR "vocational training" OR polytechnic OR "skills training" OR education ) ) AND PUBYEAR > 2014 AND PUBYEAR < 2026 |

All records were screened for relevance to TVET, and duplicates were removed using OpenRefine. VOSviewer was employed for co-occurrence mapping. One record identified as conference proceedings front matter without authors or keywords was excluded. The final dataset comprised 36 AI–TVET records, 26 EQ–TVET records, 0 Adab–TVET records, and 45 broader Adab-related records. Limitations include reliance on Scopus and English-only publications, which may undercount literature that employs alternative terms such as akhlaq. At the national level, Malaysian scholars have also developed holistic TVET training modules that explicitly integrate spiritual and cultural dimensions, including adab and moral values (Aripin et al., 2018), showing that such integration is both feasible and necessary in vocational education.

**Results and Analysis**

The bibliometric analysis shows uneven engagement across the three domains. Between 2015 and 2025, 36 publications addressed AI in TVET, 26 examined EQ in TVET, while no indexed records linked Adab directly to TVET. A broader Adab search yielded 45 records, centred on ethics, professionalism, and moral education. These findings are summarised in Table 3.

Table 3
*Summary of Publications, Focus Areas, and Gaps in AI, EQ, and Adab within TVET (2015–2025)*

| Theme / Domain | Publications (2015–2025) | Key Focus Areas | Gap Identified |
|---|---|---|---|
| **AI in TVET** | 36 | Personalised learning, VR/AR, automation, workforce prep, workplace skills | Ethics, teacher readiness, and digital divide |
| **EQ in TVET** | 26 | Teacher performance, leadership, teamwork, learning, and achievement | Limited integration with AI-driven pedagogy |
| **Adab in TVET (strict)** | 0 | – | Completely absent in indexed TVET research |
| **Adab in Education/Values** | 45 | Ethics, professionalism, responsibility, and moral education | Fragmented, not linked with AI/EQ in TVET |

Keyword clusters further illustrate these patterns. AI–TVET studies group into four themes: technology adoption and employability, institutional strategies, pedagogical innovations, and governance (see Figure 1 and Table 4).

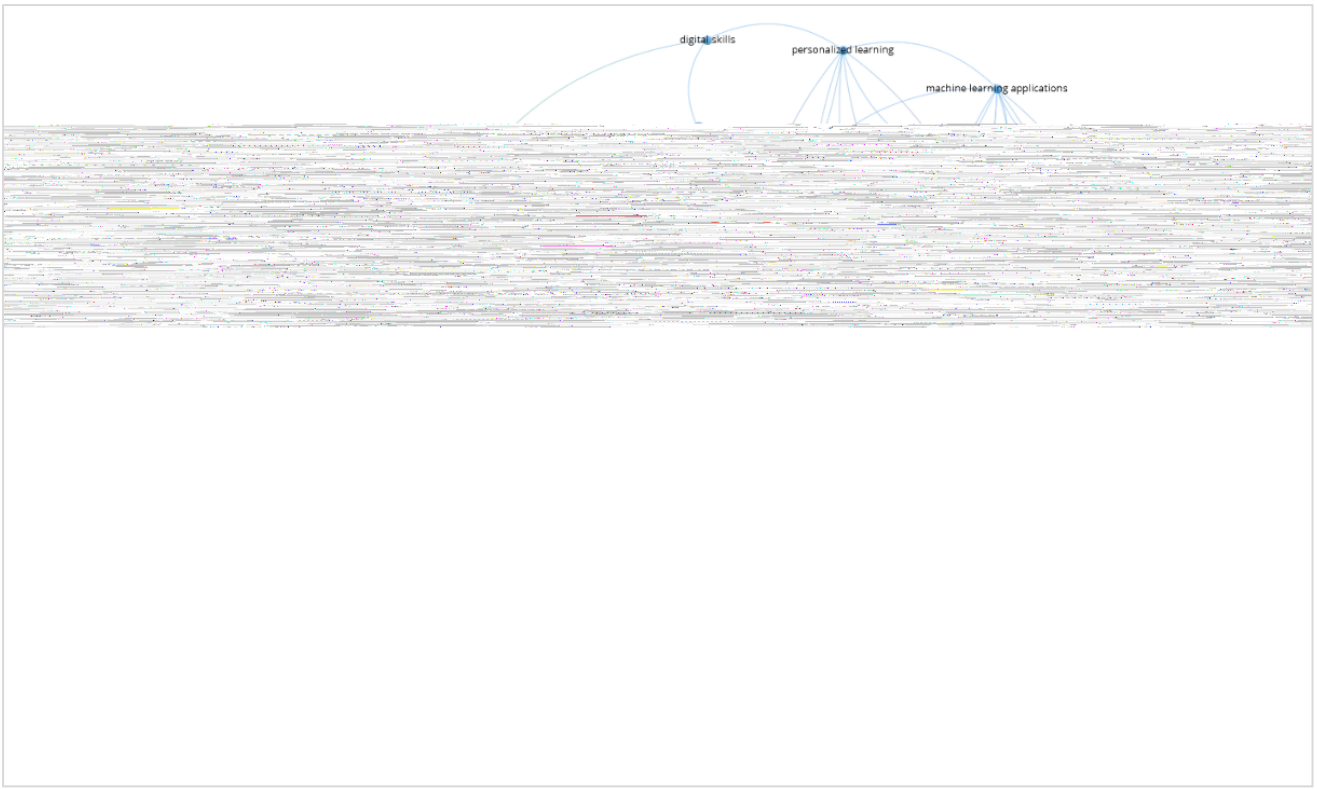


Figure 1 VOSviewer map for AI in TVET (clusters).

Table 4
*Keyword Clusters in AI–TVET Research (2015–2025)*

| Cluster | Key Terms | Focus Area |
|---|---|---|
| **Cluster 1 (Red)** | AI, Industry 4.0, employability, Malaysia, policy | Technology adoption & workforce readiness |
| **Cluster 2 (Green)** | Engineering education, personnel training, and curricula | Institutional strategies & training design |
| **Cluster 3 (Blue)** | ICT, digital skills, personalised learning, pedagogy | Teaching innovations & learning processes |
| **Cluster 4 (Yellow)** | Curriculum design, decision making, and training institutions | Governance & management of TVET |

EQ–TVET studies cluster into socio-emotional skills, teacher training, entrepreneurship, and demographic comparisons (see Figure 2 and Table 5).

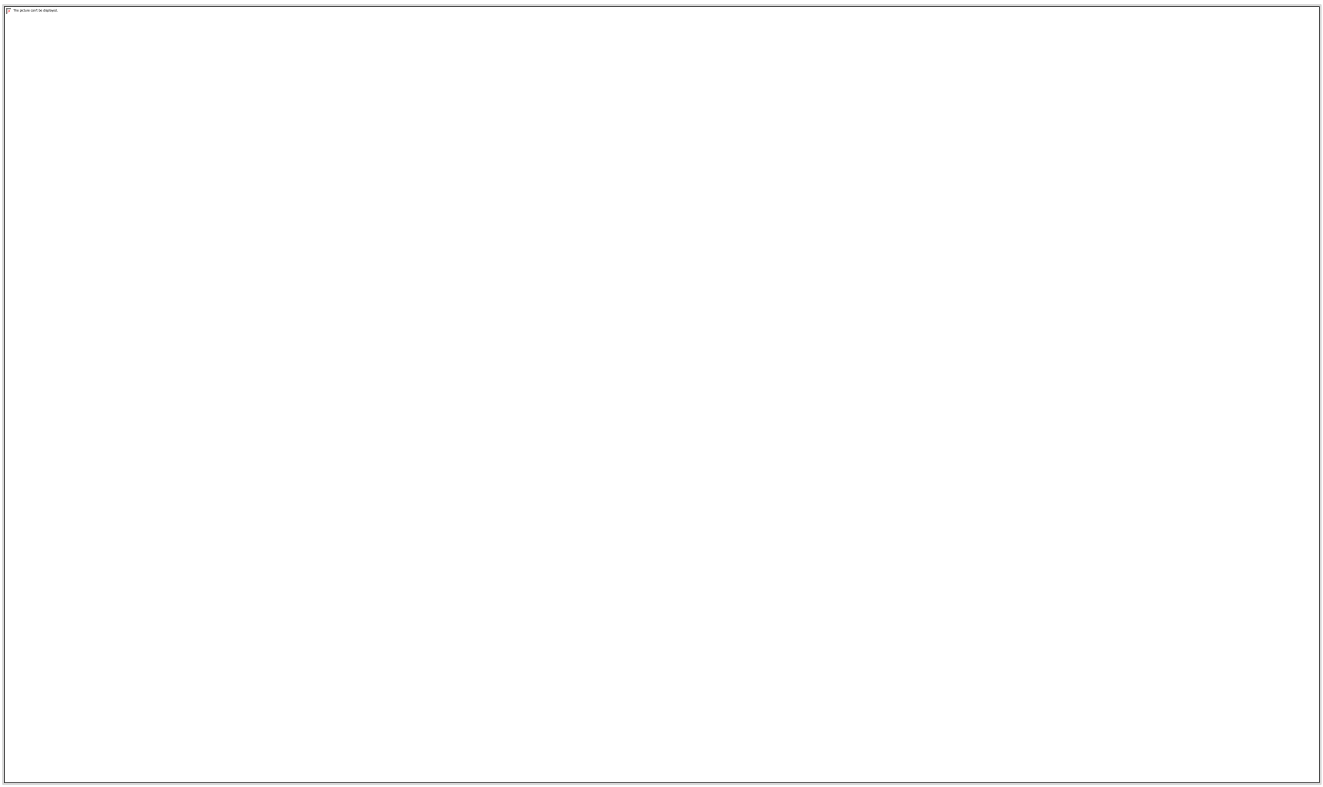

*Figure 2 VOSviewer map – EQ in TVET (clusters).*

Table 5
*Keyword Clusters in EQ–TVET Research (2015–2025)*

| Cluster | Key Terms | Focus Area |
|---|---|---|
| **Cluster 1 (Red)** | Emotional intelligence, social skills, and adolescents | Socio-emotional skills & youth development |
| **Cluster 2 (Green)** | Teacher training, vocational teachers, and challenges | Teacher EI, competence & professional adaptation |
| **Cluster 3 (Blue)** | Entrepreneurship, holistic graduates, and employability | EI in entrepreneurship & career readiness |
| **Cluster 4 (Yellow)** | Gender, perceived EI, student differences | Demographics & comparative EI studies |

Adab-related clusters highlight cultural transformation, comparative pedagogy, seminary traditions, and higher education adaptation (see Figure 3 and Table 6).

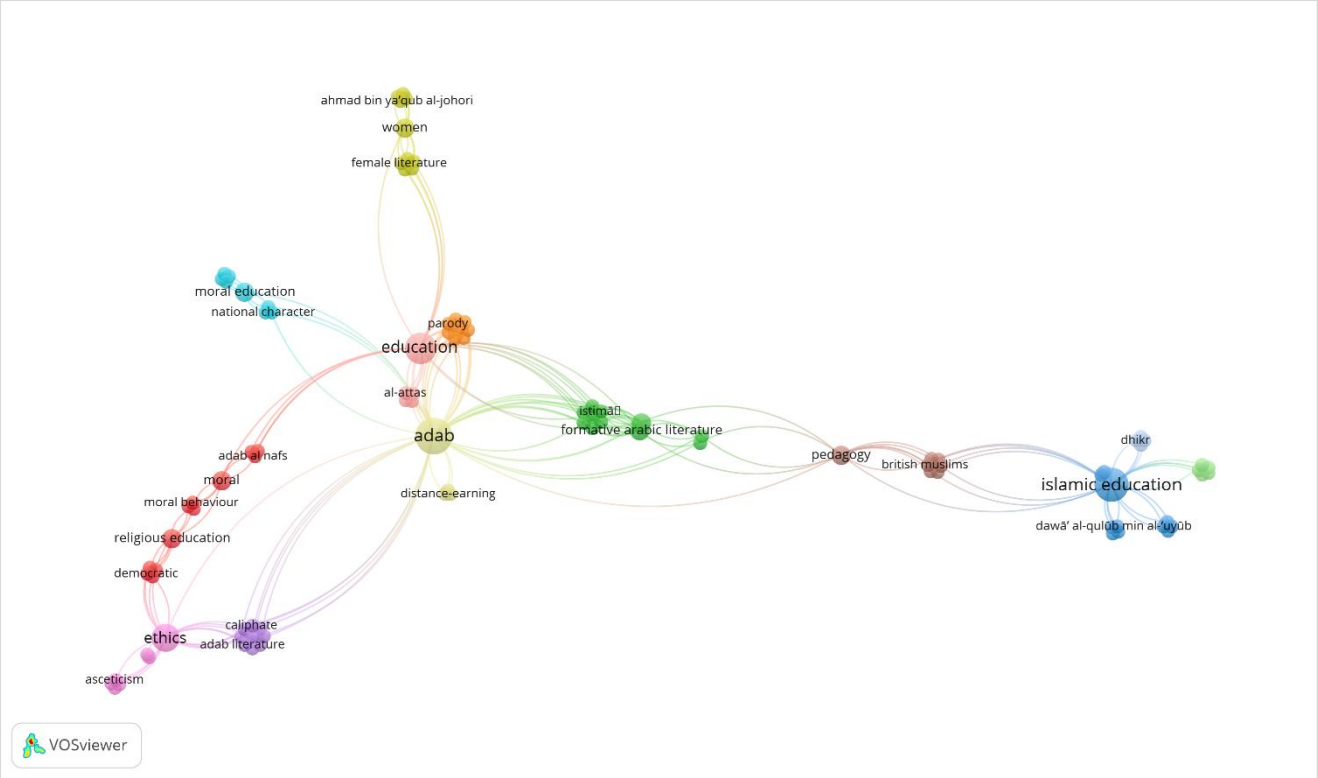


Figure 3 VOSviewer map – Adab-related education/vocational literature.

Table 6
*Keyword Clusters in Adab-Related Education Research (2015–2025).*

| Cluster | Key Terms | Focus Area |
|---|---|---|
| **Cluster 1 (Red)** | Pesantren, piety, Arabic literature, Kyai | Character formation & cultural transformation |
| **Cluster 2 (Green)** | Adab education, comparative study, character | Cross-national values & comparative pedagogy |
| **Cluster 3 (Blue)** | Dar al-Uloom, tradition, pedagogy, humility | Islamic seminary traditions & leadership training |
| **Cluster 4 (Yellow)** | Quality assurance, digital literacy, humanities | Adab in higher education & digital adaptation |

Together, these results confirm that AI dominates with technical themes, EQ is modestly represented, and Adab remains peripheral. This imbalance suggests that while graduates may acquire digital competence, they risk lacking resilience, ethical reasoning, and cultural grounding.

The analysis of top-cited works reinforces this picture. As shown in Table 7, the most cited AI–TVET papers emphasise ICT and AI integration (Hassan et al., 2021; Lim and Lee, 2024), employability and skills readiness (Kenayathulla, 2021; Adnan et al., 2021), and governance innovations (Rawat et al., 2022). EQ–TVET citations highlight adolescent socio-emotional skills (Carmona and López, 2015), Malaysian teacher challenges (Ismail et al., 2018), and entrepreneurship attributes (Mohamad et al., 2021). Adab citations reflect seminary traditions (Sidat, 2018), pesantren pedagogy (Manshur, 2020), and comparative values education (Huda et al., 2023). These confirm both the richness and the fragmentation of the field.

Table 7
*Cross-domain comparison of Top 5 cited authors (AI–EQ–Adab)*

| Domain | Top Cited Author(s) | Year | Title | Source | Cited by | Core Contribution |
|---|---|---|---|---|---|---|
| **AI in TVET** | (Hassan et al., 2021) | 2021 | ICT Enabled TVET Education: A Systematic Literature Review | IEEE Access | 26 | Evaluates ICT integration in TVET pedagogy; highlights gaps in teacher training, curriculum, and labs. |
| | (S. C. J. Lim & Lee, 2024) | 2024 | Rethinking Education in the Era of AI | Springer (Emerging Technologies) | 14 | Links AI literacy and workforce competitiveness; calls for reskilling/upskilling via TVET. |
| | (Kenayathulla, 2021) | 2021 | Are Malaysian TVET Graduates Ready for the Future? | Higher Education Quarterly | 11 | Assesses employability skills in Malaysian TVET; aligns with IR4.0 readiness. |
| | (Adnan et al., 2021) | 2021 | Industry 4.0 Critical Skills & Career Readiness of ASEAN TVET Students | J. of Physics Conf. Series | 10 | Examines ASEAN tertiary students' readiness for Industry 4.0; qualitative "netnography" approach. |
| | (Rawat et al., 2022) | | Complaint Management in Ethiopian TVET Institutions | IEEE Conf. | 10 | Proposes decision-support systems for managing complaints in TVET institutions. |
| **EQ in TVET** | (Carmona & López, 2015) | 2015 | Self-concept, Interpersonal Difficulties & Social Skills in Teenagers | Revista Española… | 37 | Quasi-experimental design linking EI and social skills in vocational adolescents. |
| | (Ismail et al., 2018) | 2018 | Challenges Faced by Vocational Teachers in Public Skills Training Institutions | JTET | 15 | Identifies 6 EI-related challenges in Malaysian TVET teachers (motivation, workload, English use, etc.). |
| | (Vaquero-Diego et al., 2020) | 2020 | Perceived EI & Social Factors in Brazilian Adolescents | Psicologia: Reflexão e Crítica | 14 | Large-scale survey (11,370 participants); links EI with attention, clarity, and emotional repair. |

| | | | | | | |
|---|---|---|---|---|---|---|
| | (López et al., 2018) | 2018 | Emotional Intelligence of Vocational Training Students: Group, Gender & Age Differences | Educar | 13 | Compares EI levels across gender, age, and training groups in Spanish vocational students. |
| | (Mohamad et al., 2021) | 2021 | Protocol for Holistic-Entrepreneur Graduates: EI Perspectives | JTET | 11 | Identifies 6 EI attributes needed for TVET graduates to become holistic entrepreneurs. |
| **Adab in Education** | (Sidat, 2018) | 2018 | Between Tradition and Transition: Dar al-Uloom in Modern Britain | Religions | 14 | Ethnography of British Dar al-Uloom; shows evolving Adab pedagogy and humility in modern settings. |
| | (Manshur, 2020) | 2020 | Typical Literary Works of Pesantren on Righteousness Teaching | JSSER | 9 | Explores pesantren-based Arabic literature as cultural transformation & character formation. |
| | (Haddade et al., 2024) | 2024 | Quality Assurance in Higher Education in Digital Era (Anthropology of Education) | Quality Assurance in Education | 6 | Highlights Adab & humanities in digital-era curriculum innovation in Islamic HEIs. |
| | (Taleghani, 2017) | 2017 | Vulnerability & Recognition in Syrian Prison Literature | Int. J. of Middle East Studies | 5 | Uses “adab al-sujūn” to analyze ethics, human rights, and vulnerability in literature. |
| | (Huda et al., 2023) | 2023 | Character and Adab Education in Indonesia, Turkey & Japan: A Comparative Study | Islamic Guidance & Counseling Journal | 5 | Mixed-method study comparing Adab-based character education across 3 countries. |

## Discussion

The findings reveal an uneven distribution of research attention. AI–TVET publications dominate with technology-focused innovations, while EQ is modestly represented and Adab is almost absent. This imbalance suggests that current scholarship privileges technical

advancement but gives limited attention to the socio-emotional and ethical foundations of vocational education.

This concern is not only theoretical. Malaysian researchers have pointed out that vocational instructors require holistic competencies that extend beyond technical skills to include discipline, ethics, and professionalism (Ramly et al., 2022). Similarly, module development studies have shown the feasibility of embedding adab and moral values within training programmes for TVET instructors (Aripin et al., 2018). These local insights align with global debates on the risks of purely technology-driven education (Zahra et al., 2025; Mahesh, 2025).

To address this imbalance, the paper proposes a Human-Centred TVET Framework that integrates AI, EQ, and Adab as three interdependent domains. As illustrated in Figure 4, AI enhances technical competence, EQ strengthens socio-emotional resilience, and Adab grounds ethics and professionalism. The overlaps between domains reflect complementary emphases: AI–EQ promotes adaptive and collaborative learning, AI–Adab addresses governance and ethical AI, and EQ–Adab reinforces professionalism and conduct. At the centre lies the balanced graduate, equipped with technical, emotional, and ethical capacities.

The framework is not only conceptual but practical. It provides a roadmap for curriculum review, teacher professional development, and industry collaboration. Embedding EQ and Adab into AI-driven TVET ensures that innovation does not displace humanity, but instead contributes to producing graduates who are employable, resilient, and principled. This direction is particularly relevant for Malaysia, where national aspirations emphasise both skills mastery and moral grounding, but it also has global implications as aligned with UNESCO's TVET strategy and the Sustainable Development Goals.

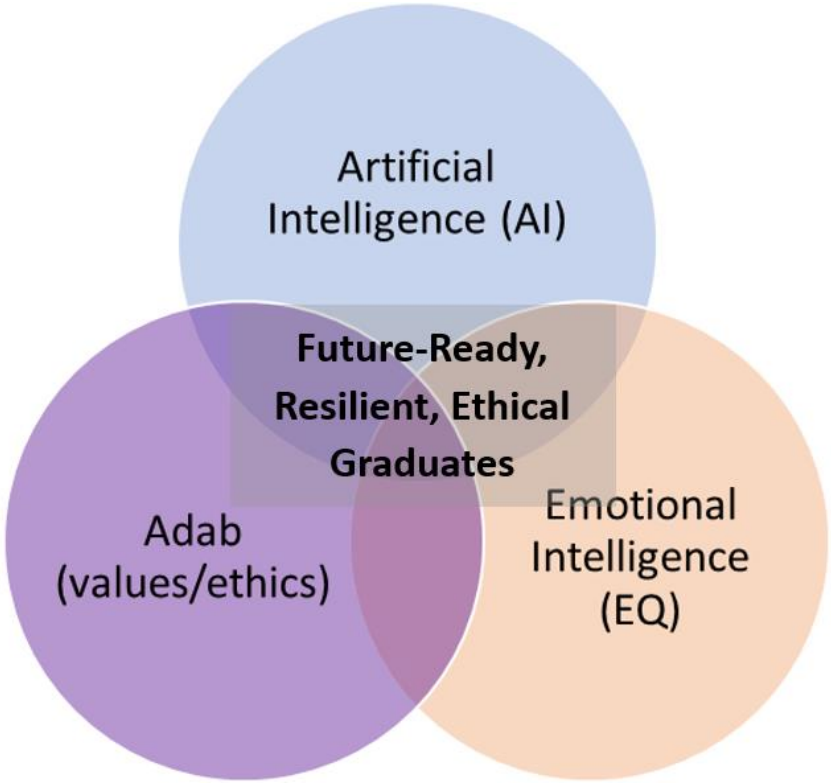

Figure 4 Integration of Artificial Intelligence (AI), Emotional Intelligence (EQ), and Adab (values/ethics). Pairwise overlaps represent intermediate emphases—AI–EQ: adaptive, collaborative learning; AI–Adab: ethical AI and governance; EQ–Adab: professionalism and conduct. The central intersection denotes balanced, future-ready TVET outcomes**.**

**Conclusion**

This study has shown that between 2015 and 2025, research on AI in TVET is abundant yet narrowly technical, EQ appears modest but promising, and Adab is absent in indexed TVET literature though present in broader values-oriented education. This imbalance risks producing graduates who are digitally skilled but insufficiently prepared in socio-emotional and ethical dimensions.

The Human-Centred TVET Framework responds to this challenge by integrating AI, EQ, and Adab as mutually reinforcing pillars. This approach highlights that sustainable workforce preparation requires not only technical competence but also emotional resilience and ethical grounding. The framework carries practical implications: embedding socio-emotional and ethical outcomes into AI-enabled teaching modules, supporting teacher professional learning that emphasises EQ and Adab, and encouraging industry partnerships that value human-centred indicators alongside productivity.

Future research can operationalise this framework through empirical interventions such as gamified EQ–Adab learning resources, digital ethics modules, and professional development programmes. By combining technical, emotional, and ethical competencies, TVET can fulfil its mandate to prepare graduates who navigate complexity with skill, heart, and integrity.

**Acknowledgement**

The authors acknowledge professional training undertaken by the first author with Six Seconds (Global Emotional Intelligence Network), whose frameworks informed the conceptual orientation of this study.

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