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Epistemological Beliefs and Informal Learning in Industry-Based Curriculum Transformation among TVET Educators: A Systematic Literature Review

Nur Syahazanani Zulkifli[a]* and Nurul Aini Mohd Ahyan[b] and Nornazira Suhairom[c]

Faculty of Educational Sciences and Technology, Universiti Teknologi Malaysia, Johor, Malaysia

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Abstract

The transformation of competency-based, industry-oriented curricula in Technical and Vocational Education and Training (TVET) has intensified expectations placed upon educators to continuously adapt their pedagogical knowledge and professional practices. While policy discourses frequently emphasise structural reform and industry alignment, comparatively limited attention has been given to the epistemological foundations underpinning teachers' responses to curriculum change. This systematic literature review synthesises empirical and conceptual studies examining the interrelationship between epistemological beliefs, informal learning, and industry-based curriculum transformation in TVET contexts. Guided by PRISMA procedures, peer-reviewed studies published between 2010 and 2024 were analysed thematically. The review reveals that educators who conceptualise knowledge as dynamic, contextual, and practice-based are more likely to engage in informal professional learning and successfully enact curriculum reform. Conversely, traditional epistemological orientations constrain adaptive pedagogies and weaken reform implementation. An integrative conceptual framework—the Epistemology–Informal Learning–Curriculum Responsiveness (EICR) Model—is proposed to explain the cognitive and professional mechanisms underpinning curriculum responsiveness in TVET systems. The review highlights critical research gaps and policy implications for strengthening sustainable curriculum transformation.

Keywords: Epistemological Beliefs, Informal Learning, TVET Educators, Curriculum Transformation, Industry-Based Education

Introduction

Global shifts towards Industry 4.0, digitalisation, and automation have significantly reshaped expectations of Technical and Vocational Education and Training (TVET) (Mulder, Competence-based education and training, 2012) (Rauner & Maclean, 2008). In response, policymakers increasingly advocate competency-based, industry-oriented curriculum reforms aimed at enhancing employability and workforce responsiveness (Mulder, Conceptions of

professional competence, 2014). However, despite these structural efforts, curriculum transformation cannot be understood solely as a reconfiguration of learning outcomes or assessment standards. Rather, it is fundamentally epistemic, as it involves underlying assumptions about how knowledge is defined, legitimised, and enacted within vocational classrooms (Young M. , 2008) (Young & Muller, 2014).

Within this evolving landscape, the role of educators is undergoing a significant shift. TVET educators are no longer positioned merely as transmitters of established technical knowledge; instead, they are expected to function as mediators who bridge institutional curricula with rapidly changing industrial practices. This transition brings to the forefront the importance of educators' epistemological beliefs specifically, their conceptions of the nature, source, and development of knowledge (Hofer & Pintrich, The development of epistemological theories: Beliefs about knowledge and knowing and their relation to learning, 1997) (Schommer, 1990). These beliefs are critical, as they shape how educators interpret curriculum changes and influence their readiness to adopt adaptive and context-responsive pedagogical practices (Fives & Buehl, 2012) (Richardson, 1996).

In parallel, informal learning has emerged as a key mechanism through which TVET educators continuously update their professional knowledge and skills. Beyond formal training programmes, educators engage in various forms of self-directed and workplace-based learning, including peer collaboration, industry immersion, digital learning, and mentoring (Marsick & Watkins, Informal and incidental learning in the workplace, 1990) (Eraut, Informal learning in the workplace, 2004) (Billett, Learning in the workplace: Strategies for effective practice, 2001). These practices enable educators to remain responsive to evolving industry demands. However, while both epistemological beliefs and informal learning have been widely acknowledged in the literature, they are often examined as separate constructs. Consequently, limited attention has been given to how these elements interact in shaping educators' capacity to enact industry-based curriculum transformation.

This lack of integration represents a significant theoretical and practical gap. Without a coherent understanding of how belief systems and professional learning processes interact, efforts to reform TVET curricula risk remaining fragmented and insufficiently grounded in the realities of teaching practice.

Therefore, this systematic literature review aims to synthesise existing scholarship to examine how epistemological beliefs and informal learning interact in shaping industry-based curriculum transformation among TVET educators. This study contributes to the field of TVET and the broader social sciences in several important ways. First, it offers a theoretically integrated perspective by systematically linking epistemological beliefs and informal learning, two constructs that have largely been examined in isolation within existing literature. Second, it introduces the Epistemology–Informal Learning–Curriculum Responsiveness (EICR) Model as a novel conceptual framework that explains the underlying cognitive and professional mechanisms influencing curriculum enactment in industry-driven contexts. Third, it extends current understandings of curriculum transformation by positioning epistemology as a foundational and active determinant of pedagogical change, rather than a passive or peripheral factor. In doing so, this study provides new theoretical insights into how internal

belief systems interact with professional learning processes to shape sustainable curriculum reform in TVET.

Methodology

Review Design

This study adopted a Systematic Literature Review (SLR) design guided by the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) framework to ensure methodological transparency, replicability, and rigour. The SLR approach was selected due to its capacity to synthesise fragmented empirical and conceptual evidence while identifying research gaps and theoretical integration opportunities.

Search Strategy

A comprehensive search was conducted across Scopus, Web of Science, ERIC, and Google Scholar. These databases were selected due to their extensive coverage of educational and vocational research. The search was limited to publications between 2010 and 2024 to capture developments associated with Industry 4.0 and contemporary curriculum reform discourse.

The Boolean search string combined three keyword clusters:
("epistemological beliefs" OR "teacher epistemology" OR "nature of knowledge")
AND
("informal learning" OR "workplace learning" OR "self-directed learning" OR "industry attachment")
AND
("technical education" OR "vocational education" OR "TVET educators" OR "competency-based curriculum")

Eligibility Criteria

Studies were included if they were peer-reviewed journal articles, empirical or conceptual in nature, focused on TVET educators, and examined epistemological beliefs, informal learning, or curriculum reform. Studies focusing solely on students, non-peer-reviewed publications, or articles lacking relevance to TVET contexts were excluded.

Screening and Selection

Following duplicate removal, titles and abstracts were screened for relevance. Full-text articles were subsequently assessed against eligibility criteria. A total of 55 studies met the inclusion criteria and were included in the final thematic synthesis.

Data Extraction and Analysis

Data were extracted using a structured coding framework capturing context, methodological design, theoretical orientation, and key findings. A thematic synthesis approach was employed to identify recurring patterns and conceptual relationships. Rather than summarising studies individually, findings were integrated across themes to construct higher-order interpretations and identify theoretical gaps.

Findings

The synthesis generated three interconnected themes:

Epistemological orientations in TVET
Informal learning as professional adaptation
Interdependence between epistemology and curriculum responsiveness

Epistemological Orientations

Two broad orientations emerged:

Traditional orientation: Knowledge perceived as fixed and authoritative (Schommer, 1990) (Hofer & Pintrich, Personal epistemology: The psychology of beliefs about knowledge and knowing, 2002). Educators holding such beliefs often demonstrate resistance or difficulty in adapting to industry-based curriculum changes (Kember & Kwan, 2000).

Dynamic orientation: Knowledge viewed as evolving and contextual (Pintrich, 2002) (Young 2008). Studies consistently indicate that educators with more sophisticated epistemological beliefs are better positioned to engage in reflective practice and curriculum adaptation (Richardson, 1996).

Educators with dynamic epistemological beliefs demonstrated greater openness to integrating technological innovation and workplace realities into teaching practice.

Informal Learning Practices among TVET Educators

Informal learning appears as a central professional development mechanism in TVET contexts. Common practices include peer discussion, mentoring, industry attachment, online courses, and participation in professional communities (Marsick & Watkins, Informal and incidental learning, 2001) (Eraut, Learning from other people in the workplace, 2007) (Wenger, 1998).

These learning practices are typically self-initiated and context-responsive, enabling educators to access up-to-date industrial knowledge (Billett, 2001) (Tynjälä, 2008).

Epistemology–Practice Interdependence

A consistent pattern indicated that epistemological beliefs shape engagement in informal learning. Educators with progressive epistemological orientations were more proactive in seeking industry knowledge and reflective practice, thereby enhancing curriculum responsiveness.

Discussion

Epistemology and Curriculum Reform

The findings suggest that curriculum transformation in TVET is fundamentally epistemic rather than merely procedural (Young & Muller, 2014). Structural reforms alone are insufficient if educators maintain transmissive conceptions of knowledge (Wheelahan, 2010). When knowledge is viewed as fixed, curriculum reform risks becoming compliance-driven rather than transformative (Young M. , 2008). Conversely, when educators adopt dynamic epistemological orientations, reform becomes an opportunity for pedagogical innovation and contextual adaptation.

This highlights a critical tension within TVET reform: policy narratives assume knowledge dynamism, yet institutional cultures may continue to reinforce static epistemologies.

Informal Learning as an Adaptive Mechanism

Informal learning emerges as a central mechanism enabling educators to respond to industrial volatility (Eraut, Informal learning in the workplace, 2004) (Marsick & Watkins, Informal and incidental learning, 2001). Unlike formal training, informal learning is situated, responsive, and problem-driven (Hager & Hodkinson, 2009). Reflective practice further strengthens adaptive expertise (Schön, 1983) (Mezirow, 1997).

However, informal learning remains unevenly supported. Without institutional recognition or structured industry collaboration, its impact may be fragmented. Thus, reform sustainability depends not only on teacher initiative but also on systemic reinforcement.

The EICR Model: An Integrative Framework

Based on the synthesis, this review proposes the Epistemology–Informal Learning–Curriculum Responsiveness (EICR) Model. The EICR Model builds upon established conceptualisations of epistemological development (Hofer & Pintrich, Personal epistemology: The psychology of beliefs about knowledge and knowing, 2002) and workplace-based informal learning (Billett, Integrating practice-based experiences into higher education, 2014) (Marsick & Watkins, Informal and incidental learning, 2001). The model conceptualises curriculum transformation as an epistemically grounded process mediated by informal professional learning.

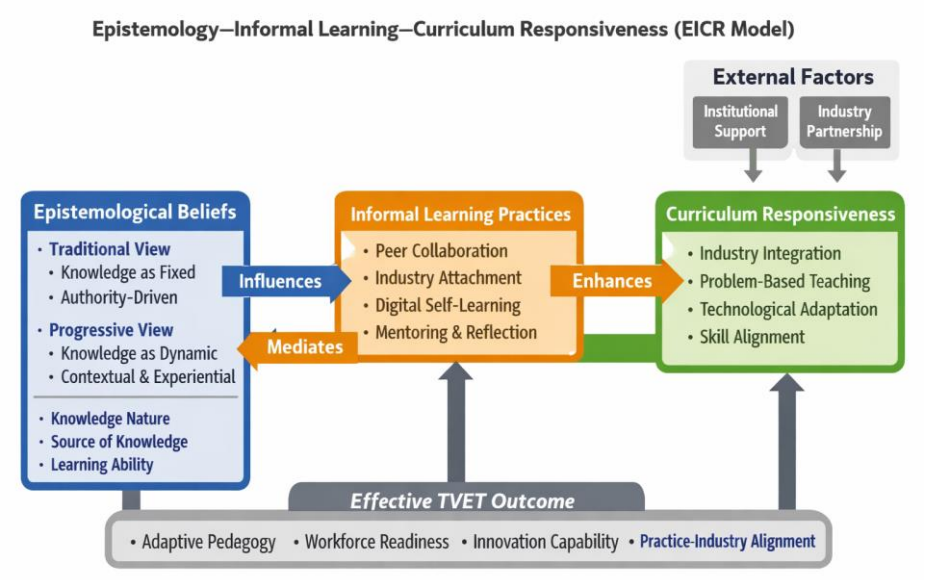

Figure 1 Epistemology – Informal Learning – Curriculum Responsiveness (EICR Model)

Core Components

Epistemological Beliefs (Foundational Variable)

Teachers' beliefs about the nature and development of knowledge shape their openness to change and professional engagement.

Informal Learning (Mediating Mechanism)
Self-directed and workplace-based learning practices translate epistemological orientation into professional action.

Curriculum Responsiveness (Outcome)
The extent to which educators integrate industry standards, emerging technologies, and contextual problem-solving into teaching practice.

Pathways
Indirect pathway: Epistemology → Informal Learning → Curriculum Responsiveness
Direct pathway: Epistemology → Curriculum Responsiveness
The model posits that epistemological orientation not only influences engagement in informal learning but also directly shapes curriculum enactment practices.

By integrating cognitive (belief), behavioural (learning), and systemic (curriculum) dimensions, the EICR Model reframes TVET reform as a dynamic interaction between internal belief systems and external professional practice.

Implications
Theoretically, the review advances a more integrated understanding of TVET reform by positioning epistemology as foundational rather than peripheral.

Practically, policy efforts should:
Incorporate epistemological awareness into teacher development programmes.
Institutionalise recognition of informal learning.
Strengthen industry–institution collaboration mechanisms.

Reform sustainability requires aligning structural curriculum change with epistemic and professional learning transformation.

Conclusion

This systematic review demonstrates that epistemological beliefs and informal learning are deeply interconnected determinants of industry-based curriculum transformation in TVET. Structural reform without epistemic alignment risks superficial compliance. Sustainable transformation requires cultivating dynamic epistemological orientations and institutional cultures that legitimise continuous informal professional learning.

The EICR Model provides a theoretical foundation for future empirical testing and policy refinement in vocational education systems navigating industrial change.

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