

From Digital Provision to Quality Improvement: A Resource-to-Capability Framework for Institutional Digital Ecosystems in Vocational Education and Training.

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Abstract

Purpose — This conceptual article considers how vocational education and training (VET) institutions may convert digital provision into capabilities that support pedagogical quality, rather than treating equipment or technology adoption as evidence of quality improvement.

Design/methodology/approach — An interpretive synthesis connects research on digital transformation, organizational capabilities, VET teaching and process-based evaluation. It distinguishes resource availability, orchestration, capability enactment and quality evidence.

Findings — A four-stage framework specifies digital provision, institutional resource orchestration, quality-enabling capabilities and pedagogical process quality, with external occupational interfaces and feedback cycles as boundary conditions. The propositions are theoretical and have not been empirically estimated. **Originality** — The contribution concerns the quality-oriented conversion of resources within VET institutions, not a generic claim that digitalization creates organizational capabilities.

Keywords: Vocational education and training; quality assurance; digital ecosystem; resource orchestration; organizational capabilities; pedagogical process quality.

Introduction

VET providers invest in platforms, connectivity, digital content and administrative systems while being asked to demonstrate educational quality. These two developments are related but they should not be conflated. A functioning learning management system makes some practices possible; it does not establish that learning tasks are well designed, that teachers can adapt instruction during workshop sessions, or that assessment information leads to timely remediation. The managerial challenge is consequently not to list digital assets but to explain how institutions convert them into repeatable pedagogical capabilities and generate credible evidence of quality.

Research on digital transformation has already moved beyond a narrow account of technology deployment (Vial, 2019). Jia, Khaw and Zhou (2026), for example, organize the digitalization–capability relationship around enabling, cognitive, collaborative and adaptive mechanisms. A contribution to quality-assurance scholarship cannot ignore this advance and claim that resource conversion remains wholly untheorized. The unresolved issue for our purposes is more specific: the translation of heterogeneous institutional resources into capabilities tied to the assurance and improvement of pedagogical processes in VET, whose delivery depends on classrooms, workshops, placements and sectoral partners.

The institutional problem is especially visible in VET systems where infrastructure, occupational relevance and staff development must be coordinated. Evidence from TVET colleges in Ethiopia, for example, documents continuing variation in technology integration and institutional conditions (Regassa and Desissa, 2025), while Swiss VET research shows that school context and teacher-level beliefs jointly shape actual technology use (Cattaneo et al., 2025). These findings motivate a quality-assurance question that is narrower than digitalization itself: what organizational conversion processes make digital provision visible in the quality of pedagogical processes and in evidence that can support improvement?

This question matters because quality assurance can become detached from teaching. A provider may audit inventories, count platform accounts or report professional development hours without examining whether an instructor can retrieve an occupationally appropriate simulation, adapt a practical exercise when a tool fails, or use feedback data to redesign learning. The argument developed here treats quality as a property of enacted and reviewed pedagogical processes. The aim is to offer an explanatory model whose assumptions can subsequently be tested across vocational sectors, institutions and national contexts.

Research objective and article organization. The article develops a resource-to-capability explanation of how institutional digital ecosystems may contribute to pedagogical process

quality in vocational education and training (VET). More specifically, it separates digital provision, resource orchestration, collective capabilities and observable quality evidence; it then derives four theoretical propositions and identifies their observable implications and rival explanations. Following this introduction, Section 1 explains the integrative review approach and its boundaries; Section 2 defines the constructs; Section 3 develops the conversion framework; Section 4 states the propositions; Section 5 identifies process-sensitive evidence; Section 6 examines competing explanations, validation, equity and sustainability; Sections 7 and 8 compare recent scholarship and formulate theory-to-evidence questions; the conclusion summarizes the conceptual contribution.

1. Integrative review approach and boundaries

The article is a theory-building, interpretive synthesis of selected foundational and recent literature, not a registered systematic review or a new meta-analysis. Its documentary point of departure comprises work on organizational digital transformation, mechanism-based capability formation, VET teachers' digital practices, professional development and the support of course processes by information systems. The selected publications are read comparatively to identify constructs, plausible links, evidence limitations and alternative explanations. There is no claim that every indexed record was retrieved or that effect sizes can be pooled.

Epistemological positioning and mode of reasoning. This study adopts a critical-realist, mechanism-oriented conceptual stance: digital resources, institutional decisions and teaching practices are treated as analytically distinct, while their proposed relations remain fallible explanations rather than established causal effects. It uses abductive reasoning to connect observed problems identified in prior research—especially the gap between technology deployment and demonstrable pedagogical quality—with organizational resource-orchestration and capability concepts. A subsequent deductive step articulates explicit propositions and potentially disconfirming observations. An interpretive integrative review is appropriate because the objective is to clarify constructs and formulate mechanisms across heterogeneous empirical and theoretical studies, not to estimate a pooled effect or claim exhaustive coverage (Snyder, 2019). The review therefore prioritizes conceptual relevance and the transparency of its selection questions over the comprehensiveness requirements of a systematic review. This positioning does not convert the manuscript into an empirical test; no interview, observation or intervention data were collected for the present article.

Three selection questions guided the conceptual reading: Does a source distinguish resources from organizational action? Does it address vocational education or a transferable educational process? Does it identify evidence relevant to quality rather than merely adoption? Vial (2019)

and Jia et al. (2026) inform the institutional mechanism; Cattaneo, Antonietti and Rausedo (2022), Noguera et al. (2024) and Wagner and Gerholz (2026) situate digital capacity within vocational teaching and school development. Tsupari, Lagstedt and Kauppinen (2024) provide a necessary warning that the educational core process may remain invisible even in process-aware digitalization work.

This reading deliberately combines studies with different units of analysis. Evidence on individual competence is not re-labelled as evidence of institutional capability; evidence from universities or enterprises is not assumed to transfer without qualification to VET. A further limitation is that the present framework is intended for empirical refinement. Its mechanisms and indicators are propositions to be tested, not outcomes of a completed field study.

2. Construct boundaries: resources, orchestration, capability and quality

Digital provision denotes the availability and accessibility of infrastructure, interoperable platforms, digital learning resources, technical services and relevant data. Provision describes potential, not the institution's ability to use that potential well. A technically available simulator may be unreliable, poorly matched to an occupational standard or unsupported when instructors require help. Conversely, modest provision can sometimes support useful teaching if the resources are dependable, shared and pedagogically appropriate. These differences justify treating provision and quality as separate constructs.

Resource orchestration refers to the organizational arrangements through which provision becomes usable in teaching. It includes prioritization of investments, interoperability decisions, allocation of technical and pedagogical support, opportunities for collaborative development, and routines for evaluating whether a tool still serves its intended purpose. This is a recurring management process. The orchestration concept should not be turned into an all-purpose explanation: decisions may be coherent on paper but blocked by staffing, procurement rules, workload or the misalignment of external occupational requirements.

Quality-enabling capabilities are repeatable collective abilities to design, coordinate, enact and improve teaching with the support of digital resources. They differ from the personal digital competence of an instructor, though that competence is one ingredient. A capability exists at the institutional level when staff, procedures, knowledge, systems and support arrangements together make practice reliable beyond an isolated enthusiastic teacher. A training course that is never applied is provision for development; an organization able to coach instructors, adjust schedules and evaluate transfer into workshops demonstrates a more developed capability (Siliņa-Jasjukeviča et al., 2025).

Pedagogical process quality is the extent to which preparation, teaching enactment and evaluative regulation meet stated educational and occupational purposes, are appropriately adapted to learners and generate usable feedback. It should not be equated with satisfaction, time on a platform or a learner's final examination score. These may provide contextual or complementary evidence, but they do not reveal on their own how a pedagogical process was organized or improved.

Table N°1 : Conceptual boundaries and possible evidence

Construct	Boundary in the framework	Illustrative evidence
Digital provision	Availability and accessibility of infrastructure, interoperable platforms, learning resources, technical services and relevant data; it denotes potential, not quality.	Uptime, accessibility, compatibility, availability of occupationally relevant material.
Institutional resource orchestration	Organizational arrangements that prioritize, connect and support resources for teaching through recurring management decisions.	Decision records, interoperability choices, service response, protected collaboration time.
Quality-enabling capabilities	Repeatable collective abilities to design, coordinate, enact and improve teaching beyond isolated individual competence.	Observed routines, transfer between instructors, coaching and support arrangements.
Pedagogical process quality	Quality of preparation, teaching enactment and evaluative regulation relative to educational and occupational purposes.	Instructional artifacts, structured observations, assessment-follow-up and usable feedback.

Source : Authors' conceptual synthesis from the cited literature; indicators are proposals.

3. The conversion framework

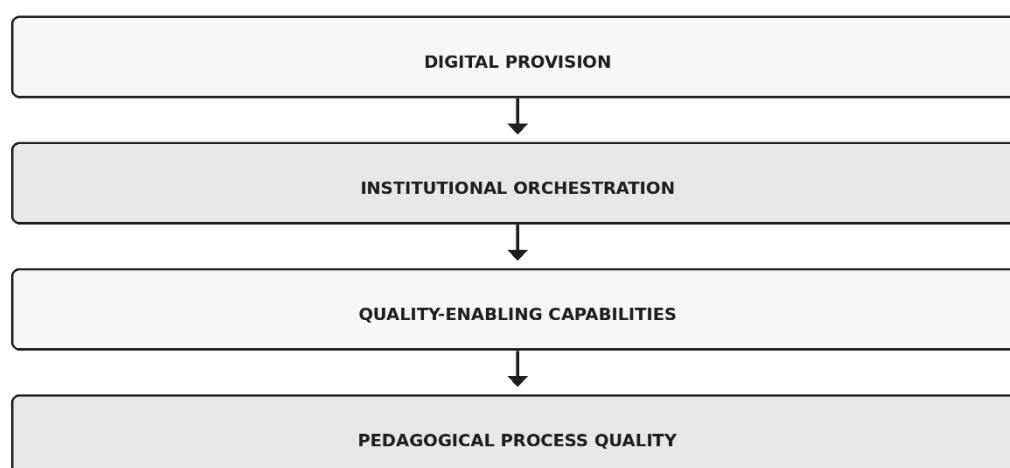
The proposed sequence is digital provision → institutional orchestration → quality-enabling capabilities → pedagogical process quality. The arrows denote theoretically plausible mechanisms, not statistically verified effects. First, provision gives an institution resources with differing technical and pedagogical affordances. Second, orchestration selects and connects these resources to curriculum requirements, staff support and the timing of instruction. Third, repeated enactment supported by feedback can turn those arrangements into institutional capabilities. Fourth, these capabilities may improve the consistency and adaptability of pedagogical processes when quality criteria are explicit.

The school–industry interface is a distinctive boundary condition. A VET provider that updates digital content only in response to its own procurement calendar may accumulate tools whose

occupational relevance fades. Where companies, sectoral bodies and placement supervisors contribute to the review of tasks, demonstrations and assessment rubrics, digital resources are more likely to be aligned with changing practices outside the institution. Yet stronger external links can also create contradictory demands and uneven access among trades. Their presence should therefore be examined empirically rather than assumed to confer quality automatically. A feedback loop is required to prevent orchestration from becoming a one-time implementation event. Teaching problems, technical incidents, learner difficulties and assessment records can reveal where a capability is fragile. The institution then has to decide whether the problem lies in provision, governance, staff development or the instructional design itself. Wagner and Gerholz (2026) document the importance of personnel and technological development in German vocational schools; their findings make it difficult to justify a framework in which maintenance and professional learning are marginal rather than recurrent.

Figure N°1 : Proposed conceptual framework

THEORETICAL SEQUENCE — NOT AN EMPIRICALLY ESTIMATED MODEL



Conceptual synthesis by the present article. Arrows denote hypotheses, not established effects.

Source : Authors' conceptual synthesis. Arrows denote hypotheses, not established effects. Resource orchestration clarifies why provision cannot be treated as capability. Sirmon et al. (2011) distinguish resource possession from managerial actions that structure, bundle and leverage resources, while Zahra and George (2002) distinguish potential from realized absorptive capacity. Applied to vocational education, these distinctions imply that digital provision becomes quality-relevant only when institutions repeatedly convert resources into usable pedagogical routines and evidence for review. This interpretation complements the dynamic-capabilities perspective (Teece, 2007) and is consistent with evidence that school-level digital transformation depends on interacting organizational, human and technological

conditions rather than equipment alone (Timotheou et al., 2023). Recent VET evidence further shows that perceived digital competence and perceived usefulness relate to actual technology use within nested school contexts, reinforcing the need to keep institutional conditions, teacher capability and enacted use analytically separate (Cattaneo et al., 2025).

4. Theoretical propositions

Proposition 1 (P1). In VET institutions, the contribution of digital provision to pedagogical process quality depends on the institution's ability to convert resources into usable and repeatable pedagogical capabilities. This proposition rejects both technological determinism and the stronger claim that every successful teaching process must be digitally mediated. Its empirical test should separate resource availability from the reliability of teaching routines.

Proposition 2 (P2). Institutional resource orchestration is expected to strengthen conversion when it aligns technological interoperability, curricular objectives, teacher learning and timely support. The mechanism concerns coordinated decisions, not merely favorable perceptions of management. A competing explanation is that already high-performing institutions invest more coherently; longitudinal and comparative designs are therefore needed to establish direction.

Proposition 3 (P3). Quality-enabling organizational capabilities form a central theoretical link between digital provision and pedagogical process quality. Unlike an undifferentiated mediation claim, the proposition invites scholars to specify which capability is activated at which stage of teaching. A planning capability may be strong while formative feedback remains weak; the relationship should consequently be examined by process rather than inferred from a single composite rating.

Proposition 4 (P4). The relevance of resource conversion to VET pedagogical quality is conditioned by the institution's ability to connect its digital ecosystem to workplace tasks, sectoral knowledge and learning undertaken beyond the classroom. This relationship may differ across occupations, partnership density and modes of work-based learning. Its proposed direction cannot be presumed constant across countries or provider types.

5. Making quality observable

A credible quality-assurance application requires evidence at several points in the sequence. Provision can be documented through uptime, accessibility, compatibility and availability of occupationally relevant material; orchestration through decision records, service response and protected collaboration time; capability through observed routines and their transfer between instructors; and process quality through instructional artifacts, structured observations and assessment-follow-up records. None of these measures is sufficient by itself. The usefulness of

the framework lies in tracing where an apparently favorable infrastructure profile ceases to produce educational value.

The distinction between performance and quality also matters. Faster lesson preparation is not necessarily better preparation if essential workshop safeguards are omitted. Automated feedback is not an improvement merely because it is rapid if its criteria are inaccurate or students cannot interpret the result. External reviews should therefore require evidence that efficiency gains remain compatible with curricular alignment, accessible learning and responsible professional judgment. Noguera et al. (2024) reinforce the value of bringing both teacher and learner perspectives to analyses of digital and pedagogical practice.

Table II specifies candidate indicators as an audit design rather than a validated scale. Future research should test their content validity with vocational teachers, quality managers and sectoral partners, then examine reliability and comparability across programmes. A single standardized dashboard will likely miss differences between a machining workshop, a health simulation and a digital-services classroom. Indicators should therefore have an invariant core and carefully documented occupational extensions.

Table N°2 : Process-sensitive observational indicators

Stage	Candidate indicators	Primary evidence source
Provision	Reliability/uptime; accessibility; compatibility; occupational relevance of digital material.	Resource audit; system records; curriculum-resource mapping.
Orchestration	Documented allocation decisions; response time; interoperability; cross-functional coordination; protected collaboration time.	Decision records; service logs; meeting records; interviews.
Capability	Repeatability beyond one instructor; transfer across staff; adaptation when conditions change; sustained revision.	Teaching observation; staff interviews; routine documentation; evidence of transfer.
Process quality	Alignment with vocational tasks; accessibility; appropriate adaptation; interpretable feedback; feedback-to-revision cycle.	Instructional artifacts; structured observations; assessment feedback; successive lesson versions.
Equity diffusion	Who accesses resources and support; whether reliable routines extend across campuses, departments and employment statuses.	Distributional audit; staff/access records; comparative observations.

Source : Authors' synthesis of the observation strategy specified in the manuscript; indicators require empirical validation.

6. Alternative accounts, limitations and research agenda

The framework is vulnerable to at least three plausible alternative accounts. First, leadership and institutional culture may influence both orchestration and reported quality, making the proposed sequence appear stronger than it is. Second, better-resourced providers may attract experienced teachers or cooperative industry partners, creating selection effects. Third, advances in particular digital tools may improve a narrow teaching task without producing an organization-wide capability. Research should test these alternatives and resist interpreting cross-sectional mediation as a causal process.

A comparative design could follow vocational departments across successive curriculum cycles, collecting inventories, decision records, examples of teaching, observations and evidence of feedback-driven revision. Contrasting high-provision/low-quality with lower-provision/high-quality settings would be particularly informative. Sectoral partners should be involved in judging occupational relevance, but should not alone define educational quality. Process tracing may reveal whether an intervention actually travels through the four proposed stages or skips some of them.

The present synthesis is deliberately bounded. It does not establish the superiority of one platform architecture, estimate effects, validate a quality scale or prove that resource orchestration necessarily produces better results. It offers a structure for asking more discriminating quality-assurance questions. A further line of inquiry concerns equity: a capability may be reliable for staff based at a central campus while remaining unavailable to part-time teachers, smaller satellite centers or learners in remote placements.

6.1. Quality assurance as a feedback system

Quality assurance is often described as a set of procedures surrounding education: standards, documentary checks, external evaluations, periodic reports and improvement plans. Yet the educational importance of these instruments depends on what they make visible and what the institution does with the information they collect. A report on equipment availability is useful for diagnosing material constraints, but it cannot show whether a teacher revised a practical task after observing recurrent learner errors. Nor does the existence of a digital quality dashboard establish that academic departments interpret its information or share it with instructors. The proposed resource-to-capability model places this difference at the center of the analysis. Assurance becomes pedagogically consequential when institutional routines connect evidence on teaching to feasible support and subsequent changes in practice.

This perspective also distinguishes compliance from improvement. Compliance requires evidence that a procedure has been followed, whereas improvement requires a defensible

account of why an observed weakness occurred and whether an intervention changed the educational process. The same digital tool may serve both functions, but institutional use will differ. When data are collected principally for reporting, teachers may optimize visible metrics without changing the underlying design of learning. When data are reviewed with instructors and sector representatives, they can instead support a dialogue about occupational alignment, the quality of guidance during practical work and the timing of remediation. These are mechanisms to investigate, not guaranteed consequences of dashboard adoption. Tsupari et al. (2024) make this concern concrete by showing that educational information systems may support separate tasks while leaving complete teaching processes underrecognized.

6.2. Failure modes in the conversion process

The four-stage framework is also useful because it predicts different patterns of failure. The first is a provision deficit: essential resources are absent, inaccessible or unreliable. The second is an orchestration deficit: resources exist but cannot be combined because platforms are incompatible, decisions are fragmented or support arrives after the teaching episode. The third is a capability deficit: a promising pilot depends on a small number of highly motivated staff and cannot be reproduced after those individuals leave. The fourth is an outcome deficit: routine implementation is stable, yet the practice does not improve the preparation, conduct or evaluation of vocational learning. Treating these failures as interchangeable would encourage recurrent purchases where the actual problem lies elsewhere.

These patterns can be explored through contrasting cases rather than assumed from global digital-maturity scores. A department with high provision but weak coordination is not equivalent to one with modest provision and strong pedagogical routines. A third department may have both provision and organizational capability but rely on teaching tasks whose occupational relevance has become outdated. Quality-audit interviews should ask for examples of decisions before and after a difficulty was detected; observations should establish whether the described routine exists in practice. The design should also collect disconfirming evidence, including cases in which resource investment improved a narrow instructional task without creating a wider institutional capability. Such exceptions can clarify the boundary of the orchestration mechanism.

6.3. Institutional coordination across occupational boundaries

The external interface of a vocational institution does not simply add another stakeholder to a conventional educational ecosystem. Workplace placements, professional standards, equipment vendors and sectoral partnerships can shape what counts as an authentic teaching task and what information can be observed about performance. The institution must translate these diverse

demands into curriculum, timetabling, access rights, digital resources and assessment procedures. Where each unit manages its own platform or industry contacts, technically successful local arrangements may become institutionally fragmented. Resource orchestration then concerns the reconciliation of occupational relevance with institutional coherence.

Two opposing risks should remain visible. Excessive standardization may impose common tools that are poorly suited to specialized occupations. Excessive local autonomy may create incompatible systems, unequal staff support and inconsistent evaluation. The relevant question is not which governance model is superior in the abstract, but how an institution differentiates technical services that benefit from common standards from pedagogical decisions requiring occupational adaptation. The answer could be a shared infrastructure with sector-specific resource libraries and jointly reviewed assessment criteria. This is an illustrative design option, not an observed best practice. Comparative research should test which arrangements preserve local relevance while allowing reliable institutional quality assurance.

6.4. A multi-source validation strategy

Quality assurance based entirely on self-reports is vulnerable to social desirability, differences in digital terminology and confusion between individual competence and institutional capability. A stronger design would combine resource audits, documents of institutional decision making, observation of teaching practices, samples of assessment feedback and interviews with staff who operate at different points in the process. Evidence should be temporally ordered where possible. For example, a reported improvement in a digital assessment routine is more persuasive when researchers can identify the prior problem, the decision to revise the practice, the organizational support actually provided and subsequent changes in feedback available to students.

Measurement should distinguish the quality of an intervention from its diffusion. One instructor may demonstrate excellent practice while colleagues remain unable to reproduce it; another provider may diffuse a procedure that is consistent but pedagogically weak. Rubrics could therefore include alignment with vocational tasks, accessibility, appropriate adaptation, interpretability of feedback and capacity for sustained revision. Agreement among independent observers and evidence of comparable interpretation across occupational sectors would need to be established empirically. The result should be treated as a family of measures rather than compressed prematurely into a single institutional quality score.

6.5. Equity, sustainability and practical relevance

An institution may present a favorable mean level of digital provision while distributing resources unevenly among departments, campuses or employment statuses. Part-time teachers

may have limited access to induction and support; small vocational specialisms may have fewer suitable digital resources; learners in placements may experience access conditions beyond the institution's direct control. If these differences are hidden by aggregate metrics, quality assurance can inadvertently reward technical expansion without detecting unequal pedagogical opportunities. The proposed framework therefore calls for distributional audits at each conversion stage: who can access resources, who receives support, whose routines become reproducible and whose learning difficulties are made visible in assessment records.

Sustainability is not equivalent to maintaining a platform subscription. A capability is sustainable when routines can be renewed as occupations, technologies and staff change, without making every improvement dependent on a temporary project. This requires periodic revision of occupational content, usable documentation and opportunities for new instructors to participate in a shared practice. Longitudinal evidence would be needed to show whether this occurs. The managerial implication is conditional: institutions should judge new digital spending against the resources required to enact, maintain and review teaching processes, not against acquisition cost or usage targets alone.

Table N°3 : Proposition-to-mechanism matrix

Proposition	Mechanism	Observable implication / boundary
P1	Digital provision contributes to pedagogical quality only through conversion into usable, repeatable pedagogical capabilities.	Separate resource availability from reliability of teaching routines; reject technological determinism.
P2	Resource orchestration strengthens conversion by aligning interoperability, curriculum, teacher learning and timely support.	Document coordinated decisions; address reverse causality through longitudinal/comparative designs.
P3	Quality-enabling organizational capabilities link provision to pedagogical process quality.	Specify which capability operates at which teaching stage rather than relying on one composite score.
P4	School-industry connectivity conditions the relevance of resource conversion for VET quality.	Effects may differ by occupation, partnership density, work-based learning mode, country and provider type.

Source : Authors' synthesis of Propositions P1–P4 and their stated empirical boundaries.

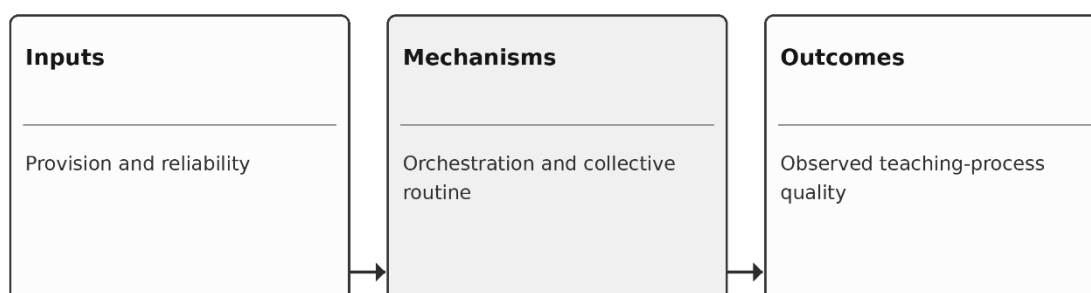
Table N°4 : Synthesis of conceptual contribution, evidence and limitations

Analytical contribution	What would count as evidence	What the present paper establishes
Distinguishes provision from orchestration	Audits of access and reliability compared with documented governance decisions	Definitions and mechanism; no observed institutional comparison
Distinguishes collective capability from individual competence	Transfer of routines across instructors, sites and cohorts	Proposition and candidate observable indicators only
Links quality to enacted teaching and feedback	Structured observations, learning artifacts and feedback-to-revision trails	Process-sensitive quality criteria; no validated instrument
Specifies occupational and equity boundaries	Industry-alignment evidence and distribution of access/support	Boundary conditions for future falsification, not confirmed effects

Source: Authors' synthesis of Sections 2–8; all indicators are illustrative and require empirical validation.

Figure N°2 : Suggested observation architecture

EVIDENCE ARCHITECTURE



Suggested observation strategy — subject to validation.

Source : Authors' suggested observation strategy; subject to empirical validation.

7. Critical comparison with recent quality-assurance scholarship

The quality-assurance framing has to be tested against recent work in quality-assurance scholarship. Warren, Vogt, Tincher and Yang (2026) examine strategic AI integration in higher-education quality assurance, linking analytical capabilities to evidence collection, risk management and institutional oversight. That framework is concerned chiefly with AI-supported quality-management arrangements. It does not by itself specify how a heterogeneous institutional digital ecosystem is orchestrated into the capacity to design, enact and revise occupation-specific pedagogy. The distinction is analytical rather than hierarchical: automated evidence collection can contribute to assurance while leaving the quality of a practical learning task largely unexamined.

Rafique, Mohsin, Abid and Anwar (2026) connect quality management, digital capabilities and Industry 4.0 readiness to sustainable competitive performance in higher education. Their reported structural associations sharpen the boundary of the present argument. Competitive or institutional performance cannot be substituted for pedagogical-process quality, and evidence from universities does not automatically transfer to VET workshops or placements. The proposed VET framework therefore needs a different unit of analysis and observable criteria: the appropriateness of occupational tasks, continuity of instruction when equipment fails, alignment between school- and workplace-based learning, and the use of assessment evidence to improve subsequent teaching.

These adjacent contributions limit a novelty claim framed simply as the relationship between digital capability and quality assurance. A more defensible claim concerns the mechanisms that allow a provider to produce, scrutinise and revise evidence of pedagogical quality from resources distributed across departments and occupational settings. In a future study, an institution with advanced analytics but weak teacher access to usable feedback should be distinguishable from a provider with modest infrastructure but strong routines for reviewing workshop performance. A model unable to account for this contrast would add little to existing institutional quality-management accounts.

For assurance to function as a recurring managerial practice rather than a certification exercise, its information must travel back to teaching. A proposed test would follow a documented sequence from a resource or service decision, through staff preparation and classroom or workshop adaptation, to assessed evidence and an explicit revision decision. Such sequences would provide more discriminating evidence of the conversion mechanism than counts of software licences, dashboards or completed training sessions. The quality claim is therefore

intentionally narrower than claims about learner achievement, employability or sustained institutional impact: those outcomes require separate longitudinal evidence.

8. Theory-to-evidence adjudication: five questions for quality assurance

A capability must be distinguished from the resources enabling it and from the practices that reveal its exercise. Teece (2007) explains dynamic capabilities in terms of activities that sense, seize and reconfigure opportunities and resources. This is useful for VET only if the translation is made explicit. Identifying an emerging occupational need is a sensing activity; selecting a digital simulation and assigning time for instructors to learn it constitutes a resource-allocation decision; redesigning the workshop lesson and revising assessment criteria are forms of reconfiguration. None of these activities alone demonstrates improved pedagogical quality. Improvement requires independent scrutiny of what students are asked to do, what instructors can actually implement and whether assessment information changes subsequent decisions. The dynamic-capabilities lens thus informs the mechanisms of conversion, but quality assurance supplies the criteria used to judge their pedagogical results.

A first adjudication question concerns the boundary of the digital ecosystem. It is tempting to inventory every available application and label the resulting collection an ecosystem. Yet the managerial object is not the number of components; it is whether an instructor can move between them without losing essential information, permissions or time for teaching. A curriculum platform, workshop simulation and evaluation service may all function locally while remaining mutually incompatible. The framework treats this fragmentation as a testable conversion failure. Future qualitative work could trace one occupational module from curriculum planning to assessment and document where data must be re-entered, where responsibilities are unclear and where professional judgement overrides standardised workflows. Such tracing would also reveal whether apparent interoperability is merely a technical claim or a pedagogically usable arrangement.

A second question is who has authority to orchestrate. Resource allocation frequently crosses administrative, pedagogical and technical jurisdictions. A technical team may optimise platform stability; a quality officer may prioritise auditability; a trainer may require an interface that supports rapid feedback during physical tasks. These objectives can conflict without anyone acting irrationally. The proposed model predicts that conversion is weakened when decision rights and escalation routes are obscure. Conversely, documented cross-functional routines may support meaningful adaptation even in modestly resourced institutions. Researchers should therefore record not only whether leadership support is perceived as high but also who can approve a change, which feedback is actually reviewed, how quickly decisions

are made and whether trainers can challenge technically sound but educationally unsuitable choices.

A third question concerns the occupational boundary, which separates VET from many generic accounts of educational technology. Learning activities must connect institutional digital resources to work processes that evolve unevenly across sectors. A simulation may faithfully represent a technical procedure yet reproduce an outdated sequence; workplace supervisors may favour a faster method that conflicts with the assessment standard used at school. An orchestrated ecosystem needs channels through which these discrepancies are discussed and revisions authorised. The model does not assume that industry involvement always improves quality. External partners differ in capacity, incentives, data practices and willingness to supervise learners. That heterogeneity is a boundary condition: a resource-to-capability theory that ignores it risks explaining why systems are installed while missing why some pedagogical routines become obsolete.

A fourth question is whether the institution can document a feedback-to-revision cycle. Quality assurance should generate credible evidence that an educational process performs as intended and identify revisions when it does not. Possible traces include successive versions of lesson designs, examples of assessment comments, records of adjustments after workshop incidents, and justified decisions not to change a practice. However, these materials are not interchangeable. A rapidly completed dashboard may offer poor information about the reasoning behind remediation, while a detailed teacher narrative may lack independent confirmation. The appropriate design would combine documentary evidence with observation and the perspectives of teachers and learners, separating the existence of a quality routine from evidence that the routine altered practice.

Finally, the framework should remain vulnerable to competing explanations. Better feedback may reflect reduced class size rather than new organizational capabilities; more coherent instruction may follow curriculum reform unrelated to the digital ecosystem; and an apparently successful rollout may conceal selective reporting by well-resourced departments. A comparative design could sample vocational units with similar resource availability but different orchestration arrangements, then follow them across at least two teaching cycles. If process quality improves equally in units without the proposed conversion routines, the model requires revision. In this respect the article contributes an explanatory argument for quality assurance, not a prescription that every digital investment is justified or that one form of institutional architecture is always preferable.

Conclusion

The article's contribution to quality-assurance scholarship is a disciplined distinction between having digital resources, coordinating them and demonstrating their educational value. VET adds an institutional boundary that matters: teaching quality is partly judged against changing occupational practices and must remain coherent across classrooms, workshops and external placements. In this setting, digital provision should be assessed as an input whose quality value is conditional and demonstrable, not as an achievement in its own right.

The four-stage framework and its propositions provide a basis for developing process-sensitive quality-assurance instruments and evaluating institutional investment choices. The next empirical task is to establish which orchestration routines produce repeatable capabilities under which conditions and whether those capabilities change the observed quality of teaching. Until that evidence is available, the model should be read as a contestable conceptual explanation rather than an already validated intervention.

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