

Integrated Curriculum Design across Secondary, Higher Vocational, and Undergraduate Education in China Based on Industry Qualification Level Standards

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Abstract: In response to industrial transformation and the growing demand for highly skilled workers, China is working to build a modern vocational education system that supports smooth progression across levels and lifelong learning. Yet curriculum articulation across levels still struggles with learning outcomes, content sequencing, and assessment. This study explains how integrated curriculum design can be guided by Industry Qualification Level Standards (IQLS). IQLS can link secondary, higher vocational, and vocational undergraduate education by setting shared competency expectations. Based on this framework, the paper proposes a technical pathway for cross-level integrated curriculum design. It also outlines strategies for curriculum models, industry education collaboration, curriculum review and revision, and credit recognition and transfer.

1. Introduction

Vocational education plays an important role in advancing sustainable social development and the transition to a green economy by providing skills training that supports full employment. To keep pace with labour market change, vocational education needs ongoing reform and stronger system design [1]. As more people pursue higher-level qualifications, many countries have built qualifications frameworks. Increasingly, they also use industry qualification standards to support cross-level pathways in vocational education. In France, cross-level curriculum pathways use a grouped approach that differentiates routes by programme type [2]. In Australia, competence-based vocational education curricula have been advanced on the basis of the national qualifications framework, ensuring efficient articulation of the vocational curriculum system and promoting equivalence-based alignment between vocational qualifications and diplomas [3]. In New Zealand, the development of Industry Qualification Level Standards has been used to drive vocational education reform, with the aim of creating a vocational education system that equips learners to be prepared for rapid changes in skills, learning, and work [4].

In China, vocational education includes three main levels: secondary vocational, higher vocational, and vocational undergraduate education. Vocational institutions have also carried out extensive practical exploration of pathways that connect these levels. Common pathways from secondary to

higher vocational education include five-year integrated programmes, segmented models [5], counterpart single-admission routes, independent enrolment routes, and flexible pathways outside a fixed programme structure. Common pathways from higher vocational to vocational undergraduate education include the "3+2" model and the top-up route from junior college to a bachelor's degree (upgrade from junior college student to university student). Common pathways from secondary vocational to vocational undergraduate education include integrated routes such as "3+2+2" and "5+2", as well as direct progression through the secondary vocational "3+Certificate" examination route.

To support smooth progression across levels, integrated design is needed for programme length, training plans, curriculum plans, teaching management, curriculum content, and assessment standards. The most important and most complex task is the articulation and integrated design of programme curricula. Using the systematic competency units and competency matrices in IQLS, this study develops an approach to cross-level integrated curriculum design for China. The approach helps align curricula with industry needs while keeping a clear learning progression. It also offers practical steps for curriculum development.

2. Current Status and Challenges of Integrated Curriculum Design in China's Vocational Education

2.1. Divergence in Curriculum Goals and Pedagogical Focus

A major barrier to cross-level articulation is the lack of alignment in curriculum goals across vocational tiers. Curriculum goals shape content, teaching, and assessment. When goals differ, learning becomes fragmented. In secondary vocational education, curricula typically emphasize procedural competence, preparing students with the operational skills needed for entry-level positions. Higher vocational education, by contrast, places greater weight on technical competence, strengthening relevant theoretical foundations so that students can diagnose and solve practical technical problems in the workplace. Vocational undergraduate education further extends this trajectory by aiming to develop applied professionals with systematic disciplinary knowledge and the capacity for inquiry and innovation. This shift from operational performance to technical analysis and then to applied innovation makes cross-level curriculum design difficult. Without a shared framework that shows what should build at each stage, students often face breaks when moving to the next level.

2.2. Misalignment and Fragmentation of Content

Curriculum content shows three main problems. The primary challenge lies in the absence of rigorous national standards for cross-level design. Without a unified framework, many institutions revise existing courses in small steps. Limited staffing can weaken theory teaching or place practice at the wrong stage. Compounding this issue is the superficial nature of vertical articulation. Rather than achieving a genuine integration of knowledge, many programs merely repeat content or leave critical gaps, creating abrupt shifts that disrupt the continuity of learning. Furthermore, curriculum content frequently trails behind labour-market needs. As industrial upgrading rapidly reshapes required competencies, the lack of deep industry involvement means that articulation initiatives often remain disconnected from emerging workplace demands.

2.3. Deficiencies in Assessment Frameworks

Current assessment systems are poorly matched to the needs of an integrated vocational pathway. Assessment is still dominated by summative written exams and single scores, which rarely capture

key competencies such as problem-solving, the ability to apply knowledge in authentic settings, and professional ethics. As a result, assessment provides limited evidence of cumulative development across the secondary-to-undergraduate trajectory. Moreover, evaluation is largely institution centred, with decisions made primarily by faculty and minimal participation from external stakeholders. This insularity widens the gap between educational outcomes and labour-market expectations. Because employers are the primary users of vocational graduates, industry partners can provide essential benchmarks for workplace performance and emerging skill requirements. An integrated curriculum therefore requires a multidimensional assessment framework that goes beyond internal academic criteria and incorporates industry-informed indicators of professional competence.

3. Conceptual Framework and Value of Integrated Curriculum Design Based on Industry Qualification Level Standards (IQLS)

3.1. Conceptual Framework

Industry Qualification Level Standards (IQLS) set out the functional scope of an industry and, through a qualifications framework, specify a competency matrix made up of discrete units. By clarifying the knowledge, skills, and abilities required at different occupational levels, IQLS provides a continuous and widely recognised hierarchy of industry qualifications [6]. Integrated curriculum design based on IQLS uses these level descriptors as an overarching reference for reconstructing curriculum structure, content, pedagogy, and assessment. Its core aim is to align learning outcomes in secondary, higher, and undergraduate vocational education with the graded competency requirements specified by IQLS. In doing so, it supports a structured, hierarchical, competency-oriented, standardized, and open approach to talent development that enables smooth cross-level progression.

This approach changes how curricula are organised. Structurally, it moves away from discipline-based subject arrangements toward modular curricula derived directly from IQLS learning units. This structural shift is underpinned by a hierarchical alignment, where standards at each educational level are anchored to specific indicators, thereby reducing duplication and discontinuities. Beyond structure, the model prioritises skill development by embedding authentic industry project scenarios that integrate knowledge application with professional literacy. Crucially, it standardizes assessment criteria involving industry partners to ensure transparent evaluation, while simultaneously maintaining openness to support credit transfer and the recognition of prior learning.

3.2. Value Proposition

An integrated curriculum anchored in IQLS can address persistent structural weaknesses in vocational education, including misaligned training goals, fragmented content, and underdeveloped assessment systems. By reorganizing curriculum design around shared competency standards, this approach shifts vocational education from input-oriented teaching to outcome-based education.

For learners, IQLS makes progression expectations explicit and pathways transparent, helping students identify competency gaps and plan upward mobility as part of lifelong learning. Its modular structure also allows learners to select course combinations that match their interests, prior experience, and career needs. For educational institutions, IQLS strengthens the rigor and coherence of curriculum design, supports smoother cross-level articulation, and enables resource sharing through standardized modules. For industry and enterprises, IQLS-based curricula align more closely with occupational competency requirements, thereby strengthening school and enterprise collaboration and supporting joint innovation in training. At the societal level, industry qualification standards can underpin a lifelong learning system by improving coordination across education sectors, advancing

the institutionalization of lifelong education, and contributing to the development of a learning society.

4. Technical Pathways for Integrated Curriculum Design Based on IQLS

Developing an IQLS-based integrated curriculum requires a structured, multi-phase approach. The process begins not in the classroom, but with a rigorous elicitation of industry requirements, followed by the calibration of competency units. These units are then translated into curricular terms, culminating in the design of the overall architecture, as show in Figure 1.

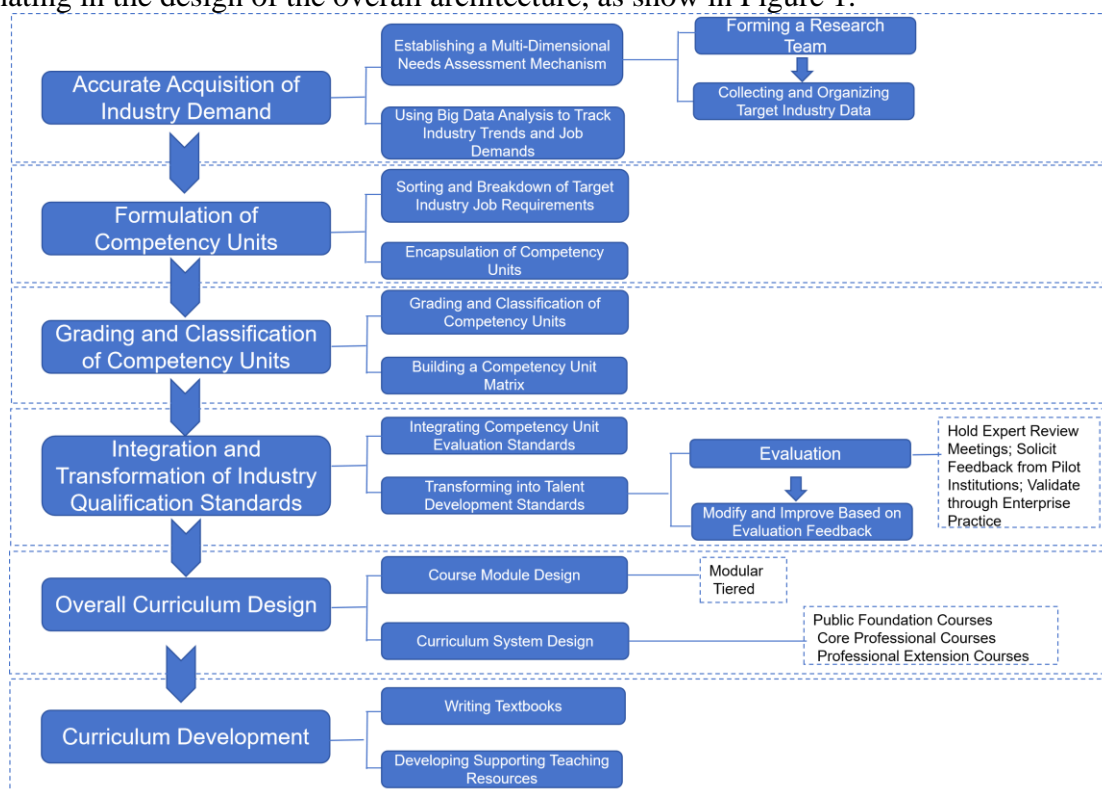


Figure 1: Core Technical Pathway Flowchart for Integrated Curriculum Design

4.1. Accurate Elicitation of Industry Needs

Because the central aim of vocational education is to develop skilled professionals who can perform specific occupational roles, curriculum design should begin with an accurate assessment of industry needs. This requires a multidimensional research approach. A dedicated task force—comprising technical experts from industry, subject specialists, and frontline practitioners—should systematically map job specifications, functional areas, typical work tasks, and technical standards. Data should be collected through job shadowing, site visits, and semi-structured interviews. In parallel, analytics can be applied to recruitment postings, job descriptions, and vocational skills assessment data. Together, these methods capture shifting industry trends and emerging competency requirements, thereby ensuring that the curriculum remains current and aligned with practice.

4.2. Development of competency units

The construction of an IQLS depends on the development of discrete competency units. The expert team should decompose industry requirements using a hierarchical framework that moves from industry sector to functional domain, specific function, and typical work task. For each task, the team

should analyse the associated work processes, tools, knowledge base, and performance requirements, and then translate these elements into standardized, teachable competency units. Each unit should be specified across four dimensions: knowledge, skills, professional attitudes, and workplace behaviours.

As shown in Table 1, each competency unit should include core metadata such as its name, code, scope, qualification level, credit or contact-hour value, learning outcomes, assessment criteria, and the responsible development and auditing body. Each unit should target a single core competency while remaining sufficiently modular to be combined flexibly with other units [7].

Table 1: Core Elements of Standardized Competency Units

| Element Category | Core Element Name | Element Description |
|----------------------------------|--|---|
| Basic Identification Elements | Name | A concise naming of the competency unit |
| Coding | Compiled according to the rule of industry-direction-level-numbering | Achieves the systematic management of competency units, providing a unified identifier for integrated curriculum design across secondary, higher vocational, and undergraduate education. |
| Application Scope | Clearly define the applicable jobs, educational stages, and industry scenarios for the competency unit | Define the boundaries for the articulation of competency units, ensuring their adaptability across different educational stages. |
| Level-Related Elements | Qualification Level | Corresponding to the level defined in the industry qualification standards |
| Credits and Hours | Clearly define the credit value and corresponding hours for each competency unit | Provide a quantitative standard for credit recognition and transfer, and the alignment of hours across secondary, higher vocational, and undergraduate education. |
| Teaching Implementation Elements | Learning Outcomes | Teaching goals described across four dimensions: knowledge, skills, abilities, and attitudes |
| Evaluation Criteria | Assessment methods and evaluation criteria corresponding to the learning outcomes | Provide a unified basis for the integrated evaluation system across secondary, higher vocational, and undergraduate education, supporting cross-stage competency certification |
| Management Support Elements | Developing Organization | The institution responsible for developing the competency unit (e.g., industry associations, educational institutions, enterprises) |
| Development Date | The time of the competency unit's creation | Facilitates future dynamic updates and maintenance |
| Reviewing Organization | The institution responsible for reviewing the competency unit | Ensures the authority and standardization of the competency unit, providing quality support for integrated curriculum design across secondary, higher vocational, and undergraduate education |

4.3. Levelling and Classification of competency units

To ensure alignment with IQLS-based training objectives across educational stages, competency units should be levelled and classified. Units can be grouped into levels according to knowledge difficulty, skill complexity, and the performance requirements associated with each competency. For example, under the Guangdong Lifelong Education Qualifications Framework Standard [8], secondary vocational education aligns with Level 3 units, which emphasize basic operational skills

for entry-level positions, including the execution of routine tasks and the use of basic tools. Higher vocational education aligns with Level 4 units, focusing on integrated application abilities and requiring learners to plan and complete relatively complex tasks independently and to address common practical problems. Vocational undergraduate education aligns with Level 5 units, which stress innovation, extension, and cross-domain integration, with an emphasis on technical R&D, project management, and resolving complex problems.

Building on this levelling, a progression matrix should be developed to make the relationships among units explicit. Using functional domains as the horizontal axis and qualification levels as the vertical axis, the matrix can display the competency composition associated with different job functions and task segments, as well as the vertical progression between units across levels. This approach supports curricular continuity and coherence while reducing gaps and unnecessary repetition.

4.4. Standard Integration and Translation

Although the IQLS specifies industry-driven competency requirements, educational standards provide pedagogical guidance for talent development. This phase therefore focuses on translating the Level 3–5 IQLS indicators into integrated training standards that are educationally appropriate and operationally feasible. The translation should be conducted through expert consultation, pilot implementation, and industry validation.

The resulting standards should be reviewed for alignment with industry demand, vertical articulation across levels, and instructional applicability. Findings from these reviews should inform iterative revisions, such as recalibrating the required depth of theoretical content or strengthening cross-level competency linkages. Through this iterative process, the standards can evolve into a rigorous and coherent framework for talent development.

4.5. Overall Curriculum Design

This stage establishes a modular, tiered curriculum system grounded in the integrated talent development standards. The curriculum should comprise three course clusters—public foundation courses, professional core courses, and professional extension courses—distributed across secondary vocational, higher vocational, and vocational undergraduate education. Public foundation courses develop cross-industry general knowledge and transferable skills. Professional core courses align with the major’s key functional domains and are built from the corresponding core competency units. Professional extension courses respond to industry trends, regional industrial needs, and learners’ individualized development pathways.

Based on the integrated standards, competency units at each level should be assembled into curriculum modules according to functional domains and their internal logic. Module design should follow a bottom-up progression that specifies prerequisites and subsequent courses, making cross-stage linkages explicit across the secondary, higher, and undergraduate phases. This structure reduces redundancy and supports spiral development of knowledge and skills.

For each module, dedicated curriculum standards should be developed to specify learning objectives, content scope, instructional requirements, assessment criteria, and training conditions. These standards should also define appropriate teaching approaches, contact hours, and faculty requirements in accordance with the module’s characteristics.

4.6. Curriculum Development

The final phase converts the curriculum architecture into deliverable teaching and learning

resources. Expert teams should develop module based teaching materials, often in loose leaf formats, with each curriculum module as the basic design unit. These materials should integrate theory, practice, and professional literacy within task-based learning activities and should align explicitly with IQLS requirements. This resource development completes the transition from standards to teachable content.

In parallel, a comprehensive digital resource repository should be established to support blended instruction. Key components include instructional videos, virtual simulation modules, online item banks for assessment, and curated case libraries, which together provide the infrastructure for integrated online–offline teaching and learning [9].

5. Implementation Strategies for an IQLS-Based Integrated Curriculum Across Secondary, Higher Vocational, and vocational undergraduate education

5.1. Building a Task Based Curriculum Model

To align competency development precisely with industry qualification requirements, a dual-driven curriculum model that combines contextualized learning with task-based instruction should be established. Grounded in the IQLS, authentic occupational scenarios, and core work tasks, this model should also reflect learners' cognitive development across stages. This approach provides a consistent basis for integrating training objectives, learning experiences, and assessment standards.

First, instructional contexts should mirror the key work domains and representative scenarios specified in the level standards. Through industry–education joint training bases, digital learning platforms, and virtual simulation technologies, learners can develop knowledge and skills in simulated or real vocational environments. These environments should incorporate current technical specifications, safety requirements, and organizational norms, thereby strengthening professional identity alongside technical competence.

Second, curriculum content should be organized into a coherent sequence of implementable and interconnected teaching tasks. Task design should match the developmental focus of each stage: secondary vocational education should emphasize foundational skills and standardized execution; higher vocational education should strengthen specialized skills and integrated application; and vocational undergraduate education should cultivate systems thinking and innovation. By anchoring task design in IQLS requirements and stage-specific training goals, this model can reduce the theory–practice divide and mitigate competency discontinuities across educational levels.

5.2. Deepening Industry-Education Partnerships for Curriculum Implementation

Collaborative governance between vocational colleges and enterprises is essential for effective implementation of an integrated curriculum. To ensure that delivery remains aligned with the IQLS and evolving labour-market needs, partnerships should be institutionalised through long-term arrangements based on shared responsibilities and mutual benefits. In particular, enterprises should participate throughout the teaching cycle, including curriculum design, delivery, and assessment.

First, joint teaching and research groups should be established by professional field, bringing together college instructors and enterprise mentors. These groups can meet regularly to conduct co-planning, develop shared teaching resources, and address instructional challenges through collaborative inquiry. Second, curriculum delivery should be co-led by college instructors and enterprise mentors. Enterprise production projects and technical R&D tasks can be converted into instructional projects and implemented across both campus-based simulated training sites and authentic workplace settings, scheduled according to curriculum requirements and the focus of each semester. In this model, students participate in enterprise work as apprentices and engage with real

tasks under joint supervision.

Finally, learning assessment should be explicitly benchmarked to the IQLS, with greater emphasis on integrated competencies rather than isolated knowledge points. Evaluation should prioritise students' ability to apply what they have learned to solve practical problems and should also assess teamwork and innovation, thereby reinforcing the intended outcomes of the industry–education partnership.

5.3. Establishing a Dynamic Mechanism for Curriculum Review and Revision

The relevance of an integrated curriculum depends on its capacity to respond to rapid industrial change; therefore, a dynamic mechanism for curriculum review and revision is essential [10]. Curriculum adaptability and currency can be maintained by systematically tracking technological trends, shifts in occupational competency requirements, and changes in labour demand. Such intelligence can be gathered through industry associations, partner enterprises, and data platforms.

In addition, curriculum performance should be reviewed on a regular basis using a comprehensive evaluation framework. Key indicators may include curriculum content, teaching approaches, resource allocation, faculty capacity, completion of learning tasks, and graduates' job readiness. The evaluation findings should then inform timely updates to course content, refinements to pedagogy, upgrades to teaching resources, and targeted improvements in delivery quality.

Finally, an employment-outcome-oriented monitoring and iterative improvement system should be established. By following graduates' career trajectories and collecting employer feedback, institutions can assess curriculum outcomes in authentic employment contexts. The resulting evidence should guide targeted adjustments to curriculum content, teaching methods, and school–enterprise articulation pathways. Through continuous monitoring and iterative refinement, the quality of curriculum implementation and adaptability can be steadily enhanced, thereby supporting the development of high-quality technical and skilled talent aligned with industry needs [11].

5.4. Enhancing Credit Recognition and Transfer Systems

To support both vertical progression across educational levels and horizontal mobility across learning contexts, a robust credit recognition and transfer system is needed. This system should be coordinated through a credit bank system and embedded in a clear curriculum management framework. A well-designed credit bank can provide a consistent basis for recognising learning outcomes and enabling their accumulation, conversion, and transfer.

First, credit recognition and transfer rules spanning secondary, higher vocational, and undergraduate programmes should be developed with explicit reference to the IQLS. Because the IQLS is organised around competency units with defined content and credit values, it offers a transparent and comparable basis for credit verification and learning-outcome mapping. Using the IQLS as the common reference point can therefore improve the consistency and legitimacy of cross-level credit decisions.

Second, an accumulation and conversion mechanism for learning outcomes should be established to broaden learners' pathways. Learners can record prior learning outcomes in a lifelong learning portfolio within the credit bank and obtain credit certification or conversion through systematic alignment with IQLS competency units and integrated curriculum modules. Where gaps are identified, learners can complete targeted supplementary learning. This approach shifts progression from a rigid, programme-bound model to a more flexible and personalised pathway, thereby improving efficiency and strengthening support for lifelong learning.

Finally, the credit bank should function as an articulation channel between formal academic education and non-formal learning. Once learners accumulate a specified set of competency units and

curriculum modules and meet the requirements of a given qualification level through approved combinations, they can apply to exchange these outcomes for corresponding course credits and, where applicable, academic diplomas, vocational qualification certificates, vocational skill level certificates, or completion certificates. In this way, an IQLS-based integrated curriculum can simultaneously support academic advancement and career development, highlighting the distinctive value of vocational education as a legitimate educational pathway.

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References

- [1] UNESCO. UNESCO-UNEVOC Medium-Term Strategy for 2021-2023 [EB/OL].[2022-02-18].https://unevoc.unesco.org/pub/UNEVOC_MTS-III_EN.pdf.
- [2] Zeng Shan, Yang Xiaorong, Yan Zhili. *International Experience and China's Practice in Articulating Curriculum Systems Across Secondary, Higher Vocational, and Undergraduate Education* [J]. *Chinese Vocational and Technical Education (Special Topic Research)*, 2017(5): 62–67.
- [3] SKIBA R. *Graded Assessment Models for Competency-Based Training in Vocational Education and Training* [J]. *World Journal of Education*, 2020, 10(3):106.
- [4] New Zealand Qualifications Authority. *About changes to standards and qualifications*[EB/OL].[2025-08-03].<https://www2.nzqa.govt.nz/qualifications-and-standards/changes-to-qualifications-and-standards/about-changes-standards-qualifications/>.
- [5] Liao Yi. *Research and Practice on Effective Articulation of Vocational Competency Development Between Secondary and Higher Vocational Education* [M]. Beijing: China Social Sciences Press, 2021.
- [6] Zhang Weiyuan, Xie Qingsong. *Qualification Framework and Credit Bank System Construction: Reflections Based on the New Vocational Education Law* [J]. *Vocational Education Forum*. 2022, (6): 37-44.
- [7] Zhao Qian. *Coupling Features and Deepening Models of the Qualification Framework and the 1+X Certificate System* [J]. *Adult Education*. 2021, (10): 57-63.
- [8] DB44/T 19880-2017, *Guangdong Lifelong Education Qualification Framework Level Standards* [S]. Guangzhou: Guangdong Provincial Bureau of Quality and Technical Supervision, 2017.
- [9] Yang Shuang, Yang Meng, Dong Yuehua, et al. *Research on the Construction of a Secondary and Higher Vocational Education Curriculum System for Food Inspection and Testing Technology* [J]. *Chinese and Foreign Food Industry*. 2025, (20): 166-168.
- [10] MARTINEZ-LZQUIERDO L& SANCHEZ M T. *Dual vocational education and training and policy transfer in the European Union policy: the case of work-based learning and apprenticeships*[J].*Cogent Education*, 2022,9(1):1-25.
- [11] Hu Kewai. *Analysis of Issues and Pathways for Higher Vocational Colleges to Serve Regional Economic Development* [J]. *Journal of Liaoning Agricultural Vocational and Technical College*. 2023, (2): 20-23.