

Vocational education reform across the Taiwan Strait: A comparative analysis of governance scale and institutional ecology

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ABSTRACT

This study compares vocational education reform in Taiwan and Mainland China to explain why similar reform goals are translated into different institutional practices. Previous cross-strait studies have often examined the two systems separately or compared individual policy measures, while paying limited attention to the institutional logic linking governance scale, institutional ecology, and industrial transition pathways. Using qualitative empirical document analysis within a comparative case-study design, the study analysed 35 core policy, legal, statistical, institutional, and academic sources. Documentary evidence was coded using an integrated covering governance structure, system scale and institutional composition, curriculum and major adjustment, industry–education cooperation, teacher development, and digital transformation. The findings reveal convergence in the shared emphasis on applied talent cultivation, practical learning, and stronger industry linkages, but divergence in the institutional mechanisms through which these objectives are implemented. Taiwan’s relatively smaller and more diversified technical and vocational education system promotes flexible learning pathways, private institutional participation, and industry–academia collaboration, whereas Mainland China’s large-scale system emphasizes national coordination, strategic programme restructuring, school–enterprise cooperation, and workforce development aligned with industrial upgrading. The study contributes an integrated six-dimensional comparative framework for analysing vocational education reform in culturally connected yet institutionally distinct contexts and provides practical insights for context-sensitive policy learning and vocational education reform.

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INTRODUCTION

Vocational education has become a central policy instrument for economic transformation, employment promotion, and human capital development. International discussions of technical and vocational education and training (TVET) increasingly emphasize that vocational education should not only provide job-specific skills but also support lifelong learning, digital competence, and adaptability in changing labor markets (Subrahmanyam, 2020; UNESCO, 2016). Recent scholarship further shows that contemporary TVET reform is shaped by governance arrangements, school–enterprise linkages, digital teacher competence, and the capacity of systems to respond to changing industrial demand (Mende et al., 2025; Rahmawati et al., 2025; Zhao & Selvaratnam, 2024; Zhou & Xu, 2023). Against this background, comparing different vocational education systems can help clarify how policy design, institutional arrangements, and industry relations shape the production of applied talent.

Taiwan and Mainland China provide a meaningful comparative case. Both sides share Chinese cultural traditions and have long regarded vocational education as a means of supporting industrial development. However, they differ in governance scale, institutional ecology, and reform

priorities. Taiwan's technical and vocational education (TVE) system includes flexible pathways from secondary to higher technical education and a visible role for private institutions (Ministry of Education of the Republic of China (Taiwan), 2011, 2024). Mainland China's vocational education system is much larger. By 2023, it had more than 11,000 vocational schools, including technical schools, and nearly 35 million students (Ministry of Education of the People's Republic of China, 2024). At the same time, vocational education has become increasingly connected to strategic emerging industries and new quality productive forces, a policy concept that refers to innovation-driven, technology-intensive industrial upgrading (The State Council of the People's Republic of China, 2026).

Previous cross-strait vocational education studies have often described the two systems separately or compared isolated reform measures, such as school-enterprise cooperation, teacher development, or curriculum reform. They have paid less attention to how shared reform vocabulary is reorganized by different governance scales, institutional ecologies, and industrial transition pathways. To address this gap, this study asks three questions linked to the six analytical dimensions developed below: (1) What similarities and differences appear across governance structure, system scale, and institutional composition, curriculum and major adjustment, industry-education cooperation, teacher development, and digital transformation? (2) How do governance scale and institutional ecology shape these similarities and differences? (3) What implications can be drawn for vocational education reform and cross-strait policy learning?

This study therefore contributes by offering a traceable comparative framework for explaining how shared vocational education reform goals are reorganized by different institutional settings. Rather than presenting cross-strait reform as policy similarity or model transfer, it uses six evidence-linked dimensions to compare governance structure, system scale and institutional composition, curriculum and major adjustment, industry-education cooperation, teacher development, and digital transformation. The terms Taiwan and Mainland China are used in this paper as analytical and geographical descriptors of two vocational education systems. The purpose of the study is to compare education policy and institutional development rather than to discuss political status. The following paragraphs review the theoretical and empirical literature that informs the comparative framework.

TVET is widely understood as an educational field that connects learning, work, and social development. Billett (2011) argues that vocational education should integrate occupational competence with broader capabilities for adaptation, lifelong learning, and citizenship. Research on TVET also emphasizes that vocational learning is shaped by institutional traditions, occupational standards, and the relationship between schools and workplaces (Rauner & Maclean, 2008). Work-based learning studies further show that vocational competence is formed not only through classroom instruction but also through participation in authentic tasks, workplace communities, and feedback-rich environments (Fuller & Unwin, 2003; Lave & Wenger, 1991). Recent studies on technology use and digital competence in vocational education also suggest that digital transformation depends not only on infrastructure, but also on teachers' pedagogical capacity, perceived usefulness of digital tools and institutional support for professional learning (Antonietti et al., 2022; Cattaneo et al., 2022; Reich et al., 2021).

Comparative education provides the methodological basis for this study. Rather than treating policy models as transferable solutions, comparative education stresses that educational practices are embedded in national and regional contexts (Bray et al., 2014). Policy borrowing and policy learning should therefore examine why an arrangement works in one context, what changes when it is transferred to another context, and what institutional conditions are required for it to work elsewhere (Phillips & Ochs, 2004). Typological studies of vocational education further remind us that systems differ in their balance between state regulation, market participation, school-based learning, and workplace-based learning (Greinert, 2005; Pilz, 2016). International indicators also show that vocational education is increasingly expected to serve both employment and lifelong learning functions in knowledge-based economies (OECD, 2023).

Taiwan's TVE has been closely connected with industrial development. Official documents state that TVE is provided at both secondary and higher levels. At the secondary level, vocational senior high schools and vocational courses in general and comprehensive senior high schools are

included; at the higher level, junior colleges, technology colleges, and universities of science and technology are central institutions (Ministry of Education of the Republic of China (Taiwan), 2024). Earlier official materials also emphasize TVE's historical contribution to economic development and the practical orientation of technical education (Ministry of Education of the Republic of China (Taiwan), 2011).

A notable feature of Taiwan's TVE is its flexibility. Secondary vocational education is characterized by a comprehensive structure, adaptive school systems, subject courses, and job-oriented courses with hands-on training (Ministry of Education of the Republic of China (Taiwan), 2024). At a higher level, private schools play an important role in bringing technical and vocational education closer to business needs (Ministry of Education of the Republic of China (Taiwan), 2024). Taiwan also promotes industry-academia collaboration and practical learning. The Industry-Academia Collaboration Program 2.0 is designed to connect technical colleges, vocational high schools, and enterprises through incentives, scholarships, and co-cultivation of talent (Ministry of Education of the Republic of China (Taiwan), 2024). Existing comparative research has therefore regarded Taiwan as a useful case for studying diversified pathways, private institutional participation, and the link between TVE and regional industry (Hu et al., 2018).

At the same time, Taiwan faces new pressures for reform. Demographic decline, enrolment competition, digital teaching demands, and the need to strengthen local industry links all require TVE institutions to improve quality and institutional adaptability. These pressures make Taiwan a useful case for analyzing how a relatively small but diversified system responds to labor-market change and institutional sustainability challenges.

Mainland China's vocational education has expanded under strong policy guidance. The revised Vocational Education Law confirms vocational education as an important component of the national education system and emphasizes cooperation among vocational schools, training institutions, and enterprises (National People's Congress of the People's Republic of China, 2022). International analyses describe the Chinese TVET model as demand-driven: the government sets the overall policy direction, while vocational institutions adjust programs according to labor-market needs, local industries, and employment outcomes (World Bank, 2018). Recent reviews of China's vocational education reform and school-enterprise cooperation further show that policy reform has increasingly emphasized institutionalized cooperation, curriculum renewal, and stronger alignment between education provision and labor-market demand (Zhao & Selvaratnam, 2024; Zhou & Xu, 2023). Results-based skills training research also highlights the importance of demand signals, employer participation, and outcome accountability in improving the relevance of vocational education (Weltbank, 2020).

Recent reforms have further connected vocational education with strategic emerging industries and the policy agenda for new, high-quality productive forces. In 2023, higher vocational schools opened more than 1,200 new campuses offering majors related to strategic emerging industries such as next-generation information technology, high-end equipment manufacturing, new materials, and biotechnology (The State Council of the People's Republic of China, 2026). This reflects a policy logic in which vocational education is expected to support industrial upgrading, digital transformation, and the cultivation of skilled workers for innovation-oriented economic development. However, the large scale of the system also creates challenges, including regional inequality, uneven enterprise participation, and the need to balance short-term labor-market demand with students' long-term development.

The literature suggests that both Taiwan and Mainland China emphasize practical skills, industry cooperation, and teacher development. However, existing studies do not sufficiently integrate these issues into a single comparative framework. In particular, cross-strait comparison should move beyond listing similarities and differences. It should explain how governance scale, institutional ecology and industrial transition pathways shape vocational education reform.

This study therefore develops an analytical framework with six dimensions: governance structure, system scale and institutional composition, curriculum and major adjustment, industry-education cooperation, teacher development, and digital transformation. These dimensions represent the core institutional elements through which vocational education systems organize learning, coordinate actors, and respond to economic change.

The six analytical dimensions operationalize three broader analytical lenses: governance scale, institutional ecology, and industrial transition pathway. Governance structure and system scale capture who coordinates reform and at what level. Institutional composition, industry-education cooperation, and teacher development show how actors and resources are organized. The curriculum-and-major-adjustment dimension and the digital-transformation dimension show how vocational education systems respond to industrial transition.

METHOD

This study adopts qualitative empirical document analysis within a comparative case-study design. This approach is appropriate because the research aim is to explain the logic of system-level reform through documentary evidence rather than to measure individual learning outcomes or institutional performance. Publicly available policy documents, legal texts, statistical reports, and international reports were treated as the primary documentary data because they record formal policy priorities, institutional arrangements, system indicators, reform instruments, and implementation pressures. Academic literature was used to define concepts, situate the comparison, and interpret the documentary evidence, rather than as primary evidence for current policy implementation.

Document search and selection. The corpus was constructed through a purposive and criterion-based search strategy. Official and institutional documents were identified on ministry websites, official statistical portals, legal information platforms, and international organization repositories, including sources from Taiwan, Mainland China, UNESCO, UNESCO-UNEVOC, OECD, and the World Bank. Academic literature was identified through targeted searches of publisher websites; DOI-bearing academic references were verified using Crossref metadata, with combinations of terms such as vocational education, TVET, technical and vocational education, Taiwan, Mainland China, cross-strait comparison, industry-education integration, industry-academia collaboration, school-enterprise cooperation, teacher development, and digital transformation.

Documents were included when they met three criteria: (1) direct relevance to vocational education policy, system development, governance, curriculum, industry cooperation, teacher development, or digital transformation; (2) official, peer-reviewed, or internationally recognized source status; and (3) analytical relevance to at least one of the six dimensions used in the study. Documents were excluded when they were duplicate records, news summaries without policy or empirical content, sources without identifiable authorship or institutional provenance, or materials that discussed general education without a clear vocational education component. The core official and institutional documents were mainly published between 2015 and 2026, while several classic theoretical works were retained for conceptual framing.

The final reference base consisted of 35 core sources. Official, legal, statistical, and international organization documents formed the primary corpus, while books, reports, and peer-reviewed academic studies supported conceptual framing, methodological justification, and comparative interpretation. The main search was conducted in May 2026 and updated in June 2026 before revision. A broader pool of candidate materials was screened, and duplicate policy pages, short news summaries without documentary content, sources without clear institutional provenance, and documents on general education without a vocational education component were excluded before the final corpus was retained. Supplementary File 1 provides a source-by-source evidence matrix that lists each core source by type, case, analytical dimension, and its use in the manuscript.

Coding and analysis. The analysis followed four steps. First, the selected sources were grouped into four categories: official policy and legal documents, statistical and system reports, international organization reports, and academic studies. Second, an evidence matrix was developed. For primary documentary sources, it recorded policy statements, institutional descriptions, statistical indicators, reform instruments, and implementation pressures; for academic sources, it recorded conceptual, methodological, or interpretive uses. Third, the evidence was coded against six analytical dimensions: governance structure, system scale and institutional composition, curriculum and major adjustment, industry-education cooperation, teacher development, and digital transformation. Fourth, the coded evidence was compared across the two cases to identify patterns of convergence and divergence.

To enhance trustworthiness, the coding process combined source triangulation, iterative checking, and an audit trail. Coding was conducted manually through a source-by-source evidence matrix rather than through automated text-mining software. Initial coding was conducted by the first author. The second and third authors then reviewed the evidence matrix and checked whether each source had been assigned to the appropriate analytical dimension. Ambiguous cases were discussed among the authors and checked against the original documents before final classification. Consistency was addressed through author review and consensus discussion rather than a statistical inter-coder reliability coefficient. This process created an audit trail linking each source to the comparative claims in the tables and discussion.

Because all materials were drawn from publicly available documents and no human participants were involved, ethics approval and informed consent were not required. As a document-based empirical study, the findings should be understood as an interpretation of documentary evidence rather than a direct assessment of school-level implementation.

Table 1. Document Sources and Analytical Use

Document category	Examples of sources	Analytical use
Official policy and legal documents	Education in Taiwan report: Vocational Education Law of the People's Republic of China	Primary documentary data for identifying governance arrangements, policy priorities, and institutional responsibilities
Statistical and system reports	Official education statistics: reports on vocational education development	Primary documentary data for understanding system scale, institutional composition, and reform pressures
International organization reports	UNESCO, UNESCO-UNEVOC, OECD, and World Bank reports	Comparative documentary evidence for situating cross-strait reform within wider TVET debates
Academic studies	Comparative education, TVET governance, and work-based learning literature	Supporting literature for conceptual framing, methodological justification, and interpretation

Table 2. Analytical Dimensions and Coding Focus

Analytical dimension	Coding focus	Examples of evidence examined
Governance structure	Administrative agencies, central-local relations, institutional autonomy, and policy coordination	MOE supervision, local education authorities, national strategies, and legal frameworks
System scale and institutional composition	Institutional types, public/private roles, relative system scale, and statistical comparability	Vocational senior high schools, junior colleges, universities of science and technology, vocational schools, and colleges
Curriculum and major adjustment	Curriculum flexibility, major revision, links with labor-market and industrial needs	Adaptive school systems, emerging majors, job-oriented courses, and occupational standards
Industry-education cooperation	Enterprise participation, internships, apprenticeship, co-cultivation, and program evaluation	Industry-academia collaboration, school-enterprise cooperation, and order-based training
Teacher development	Dual competence, enterprise practice, digital pedagogy, and professional learning	Double-qualified teachers, teacher workshops, enterprise practice, and industry experts
Digital transformation	Digital infrastructure, online resources, simulation platforms, and digital teaching capacity	Digital Learning Enhancement Plan, online platforms, and digital skills training

RESULTS AND DISCUSSION

Comparative Framework and System Overview

Table 3 presents a systematic comparison of the vocational education systems in Taiwan and Mainland China based on the coded documentary evidence. The analysis generated two broad empirical patterns: convergence in reform goals and divergence in institutional mechanisms. Although both sides emphasize the cultivation of applied talent and practical training, they differ in governance arrangements, institutional composition, and reform priorities. Taiwan's system is characterized by relatively flexible pathways and a strong presence of private institutions, whereas Mainland China's system is larger in scale and more closely guided by national strategies for industrial upgrading and the development of a skilled workforce. This table provides the analytical basis for the following sections, which further develop the comparison from structural, operational, and developmental perspectives.

Table 3. Comparison of the Vocational Education Systems in Taiwan and Mainland China

Dimension	Taiwan	Mainland China	Source IDs
Governance structure	Managed mainly by the Ministry of Education, with the Department of Technical and Vocational Education responsible for higher technical and vocational education, while local authorities supervise secondary vocational education.	Jointly promoted by central and local authorities, with the Ministry of Education playing a leading role in coordinating the modern vocational education system and local governments supporting implementation.	T1, T2; M1, M2, M3
Educational levels	Covers both secondary and higher vocational education, including vocational senior high schools, junior colleges, technology colleges, and universities of science and technology.	Covers secondary vocational schools, higher vocational colleges, vocational undergraduate institutions, technical schools, and continuing vocational education.	T1, T2; M2, I1
Institutional composition	A relatively complete and flexible system, with strong participation of private institutions, especially at the secondary and higher vocational levels.	A large-scale public-oriented system, with a broad network of secondary and higher vocational institutions across regions.	T1, T2; M2, I1
Training orientation	Emphasizes practical competence, adaptive learning pathways, and close links with regional industrial development.	Emphasizes cultivating skilled talent, employability, and alignment with industrial upgrading and national development strategies.	T1, T3, A1; M1, M3, I1
Curriculum features	Pays attention to flexible curricula, practical training, and diversified pathways for further education and employment.	Stresses demand-driven curriculum design, integration of theory and practice, and adjustment of majors to labor market demand.	T1, T3; M3, I1, A12, A13
Industry-education relations	Focuses on industry-academia collaboration, practical training, and cooperation between schools and enterprises.	Highlights industry-education integration, school-enterprise cooperation, apprenticeship-style training, and order-based talent cultivation.	T3, A10; M1, A11, A14, I1
Teacher development	Values practical teaching ability, digital teaching capacity, and coordination between academic knowledge and technical skills.	Promotes the development of double-qualified teachers with both academic and practical qualifications, often through enterprise practice and part-time industry experts.	T3, A15, A20; I1, A15
Current reform priorities	Strengthening digital learning, improving teaching quality, promoting industry collaboration, and responding to demographic and labor-market changes.	Expanding new majors in emerging industries, deepening industry-education integration, improving vocational education quality, and supporting new quality productive forces.	T1, T3, A17-A23; M3, M4, I4

Governance Structure and Institutional Logic

The first major difference lies in governance logic. Taiwan's vocational education is characterized by a multi-level administrative structure. The Ministry of Education supervises higher TVE through the Department of Technical and Vocational Education, while municipal and county authorities supervise secondary vocational education (Ministry of Education of the Republic of China (Taiwan), 2024). This arrangement supports institutional flexibility and regional responsiveness. It also allows private institutions and local actors to play a visible role in shaping program development and industry links. Mainland China's governance structure is more strongly policy-driven. National strategies define the direction of vocational education reform, while local governments and institutions translate these strategies into programs, majors, and school-enterprise partnerships (Ministry of Education of the People's Republic of China, 2022, 2024; World Bank, 2018). This model enables rapid scaling and coordinated reform, especially in strategic sectors. However, it also increases the need for quality assurance because policy implementation may vary significantly across regions and institutions.

Scale and Institutional Composition

Scale is a key differentiator. Mainland China has the world's largest vocational education system in absolute size. By 2023, it had more than 11,000 vocational schools, including technical schools, and nearly 35 million students (Ministry of Education of the People's Republic of China, 2024). This large scale enables vocational education to support modern manufacturing, strategic emerging industries, and the service sector. It also means that reforms must operate through national coordination, regional implementation, and differentiated institutional capacity.

Table 4. Selected Indicators and Reform Pressures of Vocational Education in Taiwan and Mainland China

Indicator	Taiwan	Mainland China	Analytical implication	Source IDs
Relative scale	A smaller but diversified TVE system operating across secondary and higher levels; 194 vocational senior high schools received targeted enhancement subsidies in SY2023.	More than 11,000 vocational schools, including technical schools, and nearly 35 million students in 2023 (Ministry of Education of the People's Republic of China, 2024).	Scale differences shape governance: Taiwan emphasizes flexibility and institutional diversity; Mainland China emphasizes national coordination and large-scale implementation.	T1, T2, M2
Institutional composition	Vocational senior high schools, junior colleges, technology colleges, universities of science and technology, and a significant private-sector role.	Secondary vocational schools, higher vocational colleges, vocational undergraduate institutions, technical schools, and continuing vocational education.	Both systems are multi-layered, but Taiwan has stronger private institutional participation, while Mainland China has a larger public-oriented policy system.	T1, T2, M2, I1
Reform pressure	Demographic decline, enrolment competition, digital teaching capacity, and regional industry linkage.	Industrial upgrading, strategic emerging industries, new quality productive forces, and regional inequality.	Taiwan faces stronger sustainability and adaptability pressures; Mainland China faces stronger pressures related to scale, quality assurance, and industrial alignment.	T1, T3, M3, I1, I2, A14
Data comparability	Statistics are organized across secondary, higher, and program-based categories.	Aggregate national data often includes vocational schools and technical schools.	Direct numerical comparison should be approached with caution; a qualitative comparison of institutional logic is more appropriate.	T1, M2, I5

Taiwan's TVE system is smaller but more diversified. It includes vocational senior high schools, technical and vocational courses in general and comprehensive senior high schools, junior colleges, technology colleges, and universities of science and technology (Ministry of Education of the Republic of China (Taiwan), 2024). The 2024-2025 Education in Taiwan report shows that

vocational senior high schools are supported through targeted programs; for example, 194 schools received subsidies under the Vocational High School Enhancement Guidance Program in SY2023 (Ministry of Education of the Republic of China (Taiwan), 2024). Private institutions play a particularly important role in connecting TVE with business and industry (Ministry of Education of the Republic of China (Taiwan), 2024). Table 4 summarises selected indicators and reform pressures. Because the two systems' official statistical categories differ, the table compares system features and reform pressures rather than treating raw numbers as directly comparable.

Curriculum and Major Adjustment

Taiwan's curriculum logic emphasizes adaptability and diverse progression. Official documents describe secondary vocational education as having adaptive school systems and job-oriented courses with hands-on training (Ministry of Education of the Republic of China (Taiwan), 2024). Higher TVE also stresses practical spirit, multiple admission pathways, and learning by doing (Ministry of Education of the Republic of China (Taiwan), 2024). This suggests a student-centered, institutionally flexible approach in which vocational education is not only a channel for employment but also a pathway to further study and lifelong development.

Mainland China's curriculum logic is more explicitly demand-driven. Vocational programs are adjusted in response to labor-market needs and national industrial strategies. The addition of majors in next-generation information technology, high-end equipment, new materials, and biotechnology indicates that vocational education is expected to respond quickly to technological and industrial change (Ministry of Education of the People's Republic of China, 2024). The advantage of this model is policy responsiveness; the risk is that curriculum may become overly tied to short-term industrial demand if broader competencies and students' long-term development are not adequately protected.

Industry-Education Cooperation

Industry-education cooperation is a central area of convergence, but three related terms need to be distinguished. In this article, industry-academia collaboration primarily refers to partnerships among technical and vocational institutions, firms, and industry associations. In Taiwan, the evidence points to flexible programs, scholarships, co-cultivation arrangements and local partnerships that connect TVE institutions with regional industry rather than to a single national integration model (Hu et al., 2018; Ministry of Education of the Republic of China (Taiwan), 2024; Ministry of Education of the Republic of China, 2026). Industry-education integration is a broader system-level policy framework in which the provision of education, industrial upgrading, and talent strategy are coordinated. School-enterprise cooperation refers to the operational arrangements through which vocational schools and firms jointly organize curriculum, internships, training bases, apprenticeships, enterprise practice, or part-time teaching. Recent empirical research on industry-education integration further shows that enterprise participation is shaped by constraints, coordination mechanisms, and institutional strategies, rather than by policy endorsement alone (Yu et al., 2025). Clarifying these distinctions prevents similar vocabulary from masking different institutional mechanisms.

Mainland China more often institutionalizes cooperation through industry-education integration and school-enterprise cooperation. Enterprises participate in training, curriculum development, internships, and teacher practice, while the state uses policy coordination to align vocational education with industrial upgrading. This makes cooperation more explicitly connected with major restructuring, strategic sectors, and the cultivation of double-qualified teachers. However, this institutional strength also creates quality-assurance challenges: enterprise participation may vary across regions, sectors, and schools, and cooperation must be evaluated on the basis of educational quality rather than the mere existence of formal agreements.

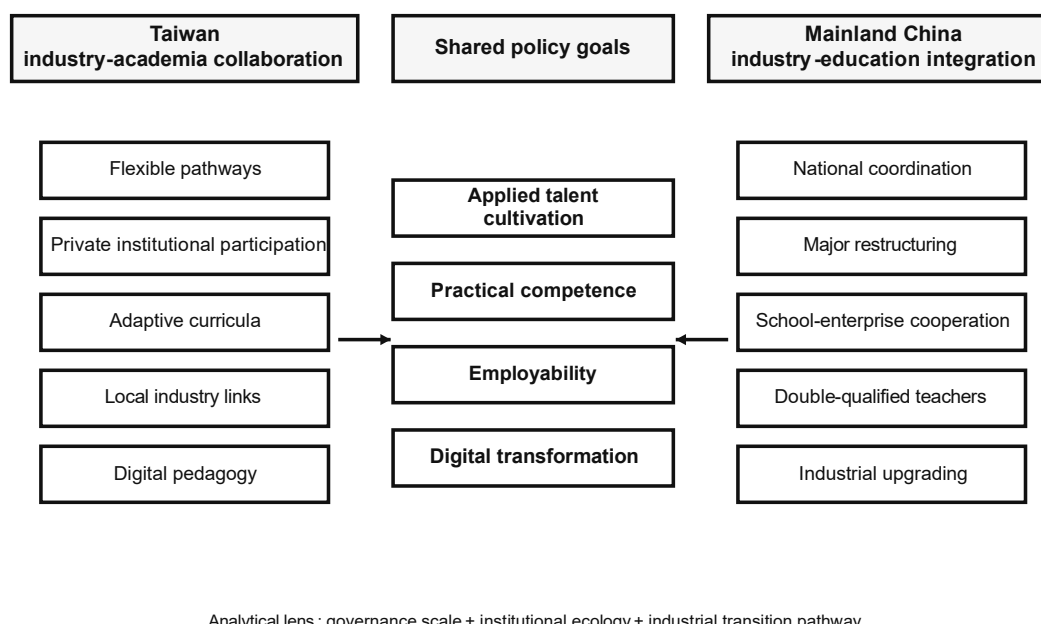


Figure 1. Comparative Framework of Industry-Academia Collaboration and Industry-Education Integration Across the Taiwan Strait

Figure 1 illustrates the comparative framework. In Taiwan, cooperation is often framed as industry-academia collaboration, with an emphasis on flexible curricula, practical training, and adaptive learning. In Mainland China, the dominant policy logic is industry-education integration, which is more explicitly connected with school-enterprise cooperation, major restructuring and the cultivation of double-qualified teachers. Despite these differences, both systems aim to improve students' practical competence, employability, and responsiveness to economic transformation.

Teacher Development and Professional Capacity

Teacher development is another key point of comparison. Both systems recognize the importance of teachers who combine academic understanding with technical and practical competence. Taiwan's approach places strong emphasis on digital pedagogy, teacher workshops, and professional communities. The MOE has issued digital teaching guidance and organized workshops to help teachers understand the pedagogical meaning of digital teaching rather than merely using digital tools (Ministry of Education of the Republic of China (Taiwan), 2024). International research on vocational teacher digital competence similarly indicates that teachers' technology use is associated with perceived usefulness, self-efficacy, institutional resources, and opportunities for professional learning (Antonietti et al., 2022; Cattaneo et al., 2022, 2025; Deschênes et al., 2024; Roll & Ifenthaler, 2021). This suggests that teacher development is closely connected with pedagogical innovation and institutional support.

Mainland China emphasizes the construction of double-qualified teachers. World Bank (2018) analyses note that vocational teachers are encouraged to obtain both academic and skills qualifications, undertake enterprise practice, and cooperate with industry experts who serve as part-time teachers. Supplementary cross-strait literature also points to differences in qualification recognition, training models and resource allocation (Luo et al., 2026). Thus, teacher development is not only a question of individual competence but also an institutional issue involving certification, mobility, and resource support.

Digital Transformation and Innovation

Digital transformation is reshaping vocational education in both systems, but the documentary evidence supports a cautious interpretation. Taiwan's Digital Learning Enhancement

Plan emphasizes digital infrastructure, teacher empowerment, and effective use of online resources (Ministry of Education of the Republic of China (Taiwan), 2024). This orientation is consistent with research showing that vocational teachers' use of technology depends on perceived usefulness, digital confidence, professional learning opportunities, and institutional support (Antonietti et al., 2022; Cattaneo et al., 2022, 2025; Deschênes et al., 2024). A concrete policy-level example is provided by Taiwan's Guidelines for Technical and Vocational Education Policies, which encourage TVE institutions to develop cloud-based digital teaching platforms, interactive digital courses, remote teaching modalities, mobile learning mechanisms and information-security workshops for faculty and students (Ministry of Education of the Republic of China, 2026). This indicates that Taiwan's digital transformation agenda is linked to teacher-supported digital pedagogy and flexible learning opportunities rather than to a simple substitution of practical training by online learning.

Mainland China's digital transformation is more closely linked with industrial upgrading and the development of emerging majors. A concrete example is the National Vocational Education Smart Education Platform, which aggregates professional resource libraries, high-quality online courses, open video courses, virtual simulation training resources, and teacher-service resources (Ministry of Education of the People's Republic of China, 2022). International evidence also indicates that digital transformation in TVET depends on systematic digital skills training for teachers and trainers rather than on infrastructure alone (Subrahmanyam, 2022). Taken together, these sources suggest that digital tools are most likely to strengthen vocational education when they are connected with curriculum redesign, teacher capacity, simulation-based practice, and workplace-oriented learning. However, the available official documents identify platform functions and implementation mechanisms more clearly than measured learning outcomes. The analysis therefore treats digitalization as a policy and implementation pathway rather than as evidence that digital tools automatically improve vocational learning.

Convergence: Applied Talent, Practical Learning and Industry Links

The first major finding is convergence. Both Taiwan and Mainland China view vocational education as a pathway for cultivating applied talent. Both stress practical learning, industry links, and teacher professionalism. This convergence is consistent with international TVET literature, which emphasizes that vocational education should connect school-based learning with work-based practice while also helping learners adapt to technological and labor-market change (Billett & Billet, 2011; Fuller & Unwin, 2003; Lave & Wenger, 1991; Rauner & Maclean, 2008; Reich et al., 2021). It is also consistent with recent China-focused studies that identify industry-education integration, school-enterprise cooperation and curriculum reform as central policy concerns in vocational education reform (Bailey et al., 2024; Zhao & Selvaratnam, 2024; Zhou & Xu, 2023).

However, convergence in reform vocabulary does not imply institutional equivalence. Terms such as practical learning, digital transformation, and industry cooperation may appear similar, but their policy instruments and implementation conditions differ. This is why comparative analysis should not only identify common goals but also explain how those goals are mediated by governance arrangements and institutional ecology.

Divergence: Governance Scale and Institutional Ecology

The second major finding is divergence across the six analytical dimensions. Taiwan's smaller and more diversified system provides space for institutional flexibility, private participation, and links to local industry, but this flexibility is accompanied by demographic decline, enrolment competition, and sustainability pressures on private providers. Mainland China's larger system enables national coordination, strategic major adjustment, and rapid scaling of reform priorities, but it also increases the difficulty of ensuring consistent implementation, balanced regional development, and quality assurance across institutions. These patterns show that governance scale is not only a matter of administrative size; it shapes how actors coordinate, how quickly reforms diffuse, and where implementation risks appear.

These differences suggest that vocational education reform cannot be explained only through policy vocabulary such as industry-education integration, practical learning, or digital

transformation. Similar concepts operate through different institutional ecologies. In Taiwan, industry-academia collaboration is mediated by institutional diversity, private-sector participation, and local industry networks. In Mainland China, industry-education integration is embedded in state-led coordination, strategic major adjustment, and the policy agenda of industrial upgrading. The comparison therefore supports selective policy learning rather than direct model transfer.

Theoretical and Practical Implications

Theoretically, the findings extend comparative vocational education research by connecting policy borrowing, VET governance typologies and work-based learning. Comparative education cautions against treating successful policies as portable models; this study shows why that caution is necessary in cross-strait vocational education. A mechanism that appears similar at the policy-language level may perform different functions once it is embedded in a smaller diversified system or a large state-coordinated system.

The six-dimensional framework also adds value to the analysis of VET governance. Governance structure and system scale clarify who coordinates reform and at what level; institutional composition, industry-education cooperation and teacher development show how actors and resources are organized; curriculum adjustment and digital transformation show how systems respond to industrial transition. This links the institutional design of vocational education with the learning conditions through which students encounter workplace knowledge, practical tasks, and technological change.

For policymakers, the comparison suggests that vocational education reform should strengthen quality assurance for work-based learning, improve teacher-industry mobility, and build transparent qualification recognition mechanisms. Taiwan's experience points to the value of flexible pathways and local partnerships, as well as the need to manage demographic and enrolment pressures. Mainland China's experience points to the value of coordinated reform and strategic alignment with emerging industries, but also to the need to monitor uneven implementation and regional disparities.

For cross-strait policy learning, three areas are especially promising. First, joint research on teacher development could clarify how dual-qualification standards are recognized and implemented. Second, digital teaching platforms and professional communities could facilitate the sharing of resources while preserving the practical orientation of vocational learning. Third, comparative studies of industry-education cooperation could identify the conditions under which enterprise participation improves educational quality rather than narrowing training to firm-specific tasks.

CONCLUSION

As a qualitative, document-based empirical study, this paper compared vocational education reform in Taiwan and Mainland China across six dimensions: governance structure, system scale and institutional composition, curriculum and major adjustment, industry-education cooperation, teacher development, and digital transformation. The findings show convergence in applied talent cultivation, practical learning, and stronger links with industry, but they also show that these shared goals operate through different institutional logics. Overall, the comparison indicates that shared reform goals are mediated by the institutional conditions under which they are implemented. Taiwan's smaller and more diversified TVE system emphasizes flexibility, private institutional participation, and adaptive learning, while Mainland China's large-scale system emphasizes national coordination, industrial upgrading, and strategic major adjustment. The evidence therefore supports selective policy learning rather than direct model transfer.

For policy and practice, this means that cross-strait learning should focus on adaptable mechanisms rather than whole-system imitation. Promising areas include teacher-industry collaboration, quality assurance for work-based learning, digital resource sharing, and transparent qualification recognition. These mechanisms need to be adjusted to system scale, institutional incentives, and the local conditions under which enterprises, schools, and teachers cooperate. This study has several limitations. First, it is based mainly on policy documents, official reports, and

secondary literature, so it cannot directly observe school-level implementation or classroom practice. Second, the statistical categories used in Taiwan and Mainland China are not fully equivalent, which limits direct numerical comparison. Third, the study focuses on system-level comparison and does not examine differences among regions, institutions, or professional fields. Fourth, the corpus may contain language and document availability bias because publicly accessible materials differ between the two systems, and some local implementation documents may not be equally available. Finally, the study does not include stakeholder perspectives from policymakers, vocational school leaders, teachers, students, or enterprise mentors.

Future research can address these limitations by conducting interviews with policymakers, vocational school leaders, teachers, students, and enterprise mentors. Survey research can examine how teachers and students experience industry-education cooperation and digital transformation, while sector-specific case studies in information technology, healthcare, tourism, or advanced manufacturing could provide more detailed evidence of how vocational education responds to different industrial contexts.

AUTHOR CONTRIBUTIONS STATEMENT

This journal uses the Contributor Roles Taxonomy (CRediT) to recognize individual author contributions, reduce authorship disputes, and facilitate collaboration.

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C : Conceptualization

M : Methodology

So : Software

Va : Validation

Fo : Formal analysis

I : Investigation

R : Resources

D : Data Curation

O : Writing - Original Draft

E : Writing - Review & Editing

Vi : Visualization

Su : Supervision

P : Project administration

Fu : Funding acquisition

CONFLICT OF INTEREST STATEMENT

The authors declare that they have no known competing financial or non-financial interests that could have appeared to influence the work reported in this paper.

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