

# A Study on the Impact of China's Educational Modernization Practices on the Development of Vocational Education in Southeast Asia under the “Belt and Road” Background

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**Abstract:** With the trend of educational reform around the world, the addition of technology and its cross-system application have started to play an important role in the development of regional vocational education. The first technology module is the standardisation and packaging mechanism for the organisational model of industry-education integration in China's educational modernisation, and it has good application prospects for vocational education in Southeast Asia. Analyze the transferable attributes and embedding paths of the three types of technological elements, study the cross-regional calibration logic of the vocational qualification framework, investigate the parametric redesign method for the dual-system teaching operation structure, and explore the construction method of knowledge transfer carriers and ability mapping relationships in teacher professional development. Based on the above, this paper will study the development trend of the Southeast Asian vocational education system after the addition of the characteristics mentioned above, such as the distributed adjustment of educational governance rights and responsibilities allocation, flexible reconstruction of modular curriculum systems, and the emergence of self-organising features in quality assurance mechanisms. Research has shown that the combination of elements in China's educational modernisation is not a simple case of model transfer; rather, through operations such as calibration, translation and redesign, an adaptive system has been built according to the local conditions in Southeast Asia, and structural changes have occurred in the regional vocational education system at the levels of governance structure, curriculum organisation and quality assurance.

**Keywords:** education reform, use of technology, integration paths, system development, vocational education in Southeast Asia

## Introduction

Cross-regional cooperation of vocational education systems is a problem that has attracted the attention of educational research. The problem is to know how technologies, teaching methods, organisational forms, etc., are spreading in different education systems and what effect this spread has on the receiving systems. In the process of educational modernisation in China, many technological modules, curriculum resource encapsulation schemes and organisational logics for industry-education collaboration have been developed independently and can operate in different ecological environments. They have good docking sites for the vocational education development needs of Southeast Asian countries. Research on the reasons for the flow of China's educational elements into Southeast Asian vocational education systems is still in its infancy. Most of the research on cooperation is still at a high level, and there is a lack of particular analysis of the transferability of technological elements, detailed operating paths for embedding, and the evolutionary logic of recipient systems. Therefore, we need to start by identifying and analysing the technological components, then systematically study the circumstances and ways in which they are transferred between systems, and finally trace the structural changes that have occurred in the governance, curriculum and quality assurance aspects of Southeast Asian vocational education systems after their introduction. This paper will provide some details of the internal regulations for cross-region flow of educational resources and offer a new reference point for comparative studies of vocational education systems.

## **1. Technological Elements and Capability Spillovers in the Process of China's Educational Modernisation**

### ***1.1 Core Technological Modules of the Digital Transformation of Education and Their Transferable Characteristics***

As a result of the process of education's digitalisation, many necessary technologies have arisen that can operate independently and be flexibly combined. The three modules mentioned above are: an adaptive recommendation engine based on learning behaviour data; an interactive task generator in a virtual simulation training environment; and a cross-terminal collaborative vocational skills training cloud platform. All modules have a loose-coupling design in their internal structure, so they can be taken out and used in different parts of education without depending on the main logic of the original system. All the modules have the same data interface and operating protocol, so they can be used together in cross-region applications.

The transferable attributes of the above technological modules are in the form of the following three characteristics: functional independence, semantic consistency and environmental adaptability. The purpose of a module is to keep the main teaching logic of the original system after it has been separated from that system. Semantic consistency can be achieved to ensure that there is the same behaviour-instruction and evaluation norm in all teaching situations and in various languages and cultures, by means of a pre-embedded domain knowledge graph and an operational terminology database. A Sense of Place and an Awareness of Network Change have been added to this module. Based on the above attributes, it can be seen that the technology module is ready to be used independently in the vocational education system of Southeast Asia.

### ***1.2 Standardisation of Vocational Education Curriculum Resources and Cross-border Adaptation Mechanisms***

In general, the form of encapsulation for vocational education curriculum resources is to organise the teaching content, learning activities, assessment items and so on, into independently exchangeable units according to uniform specifications. The three levels of encapsulation are: at the bottom is the domain knowledge ontology and the skill point coding system; in the middle is the teaching event sequence and the learning path template; and at the top is the interactive interface language pack and the media resource index. All the layers are in an open-encapsulation mode, and the resource units can be recognised, parsed and organised in different learning management systems. Generally speaking, an encapsulation can be used to remove the technical dependency of curriculum resources on their original development environments, and then they can be used independently as knowledge carriers in all places<sup>[1]</sup>.

The cross-border adaptation mechanism will solve all the problems of encapsulated curriculum resources in vocational education in Southeast Asia. The first two goals of the above mechanism are semantic mapping and task localisation. Semantic mapping is used to compare the skill descriptions in the encapsulation unit with the current vocational qualification levels in various Southeast Asian countries and establish equivalence relations that can be recognised by local assessment systems. Task localisation changes the attributes of the case scenarios, tools and operating methods in the resources by replacing them with locally available equipment models or types of raw materials, but it does not change the main goals of skill training. The above operations have distributed the standardised curriculum materials in all areas and maintained the quality of teaching.

### ***1.3 Evaluation of the Systematic Output Potential of the Industry-Education Integration Organizational Model***

The Organisation model of the industry-education integration industry is that of school-enterprise cooperation. The two are a joint management committee, an alternating teaching workshop operation system and a real-order-based curriculum production process. Schools and enterprises will share teaching spaces, equipment, etc., and work together to develop new teaching models and improve the quality of vocational education. The three are a work-process-oriented curriculum development model, a dual-position teacher rotation system and a product quality standard-based academic evaluation system; together they form a complete and self-consistent organizational operation logic.

The evaluation of the application scope of this model in the vocational education system of

Southeast Asia will be based on the three dimensions of institutional compatibility, organisational absorption capacity and degree of technical ecological fit. Institutional incompatibility is the extent of the conflict between this model and the current educational governance system in Southeast Asian countries, and it generally refers to the space for distributing decision-making power and regulating the flow of funds. The first necessary condition for using this model in vocational colleges in Southeast Asia is the organisation's absorption capacity, that is, its management ability, teacher team and funds. The degree of technical ecological matching refers to how difficult it is to connect the information management tools and equipment interconnection protocols in this model with the current technical infrastructure in Southeast Asia. Based on all the above conditions, it can be concluded that a practical way to present the results of this model systematically is to build one; however, some parameters will need to be adjusted according to the degree of industrial concentration and institutional autonomy in different countries.

## **2. Embedding Paths of China's Educational Modernisation Elements in the Vocational Education System of Southeast Asia**

### ***2.1 Cross-regional Calibration and Localised Translation of the Vocational Qualification Framework***

Cross-regional calibration of the vocational qualification framework should be carried out to build relevant links with the qualification system in Southeast Asian countries. Therefore, by taking measures to match the level descriptors, it is possible to align the three dimensions of knowledge requirements, skill complexity and responsibility autonomy in China's vocational skill level standards with the corresponding levels in the national qualification frameworks of Southeast Asian countries. Calibration is based on functional mapping; that is to say, it does not aim for a one-to-one correspondence with level numbers but rather verifies whether the typical types of vocational activities and performance requirements at different levels are in line with each other according to the target framework. The result of the above operation is a two-way conversion table, and one can find the corresponding acceptance range in the Southeast Asian framework for a certificate of a certain level in the Chinese system<sup>[2]</sup>.

Localisation of translation is to put the content within the framework of qualifications according to calibration. The three kinds of changes to the translation work are the localisation of industry terms, the redirection of the legal reference system and the replacement of the typical case database. At the level of industry terminology, job titles and process names that are specific to China's industrial environment need to be converted into general vocational titles in Southeast Asian countries and regions. At the level of the legal reference system, the particular technical standards or safety regulations mentioned in the original framework need to be deleted and replaced with equivalent documents that are currently available and in force in Southeast Asian countries. For the level of the typical case database, the original cases should be replaced with actual work situations of local enterprises. After translation, there will be no longer be the original marks of China's education system in the revised qualification framework; instead, it will be presented as a set of independent local assessment standards directly applicable by vocational education institutions in Southeast Asia.

### ***2.2 Redesign of the Dual-System Teaching Operation Structure and Its Operational Logic***

The Redesign of the Dual-System Teaching Operation Structure will be in line with the organisational conditions of the vocational education system in Southeast Asia. First, it was planned that the company would organise some training and theoretical classes in cooperation with the school, and the rotation period would generally be two to four weeks; however, now it depends on whether the company can provide a fixed training position. Given that small and medium-sized enterprises account for a relatively large proportion of the workforce in some areas of Southeast Asia and labour demand is irregular, the revised plan will reduce the training cycle to daily sessions or offer half-day training to decrease the demand on enterprises for extended training. At the same time, the new system will divide all vocational activities into several small tasks and have these tasks carried out by various enterprises; thus, the concentration of demand for training resources will be reduced.

The first goal of the operation logic is to keep the original closed-loop characteristic of dual-system teaching; that is to say, training tasks motivate theoretical study, and the results of the theoretical study provide feedback and direction for the next round of training by modifying the rules for time and resources. The new plan is to increase the frequency of preparatory classes and follow-up assessments

to correct any deficiencies in the teaching and guiding ability of the enterprises. The company only needs to provide a standard task execution scenario and basic materials; the teaching guidance will be carried out jointly by mobile instructors sent from the schools and regular employees of the company at the site. Changes will be made to the original distribution of rights and responsibilities in the dual-system model where enterprises lead the training, and a hybrid operating logic will be established with the school as the dispatch centre and the enterprise as the task site. The reason is that the actual scale of cooperation between vocational colleges and local enterprises in Southeast Asia is relatively small<sup>[3]</sup>.

### ***2.3 Knowledge Transfer Carriers and Competency Mapping Relationships in Teacher Professional Development***

Carriers of knowledge transfer in teacher professional development include explicit teaching methodology toolboxes, video case databases of classroom events, reusable teaching design templates, etc. A typical feature of these carriers is that they have taken the teaching experience gained in China's educational modernisation and transformed it into forms that can be directly used by teachers in other places. The toolbox of teaching methods includes classroom organisation plans for all kinds of skills, and each plan has information on when it can be used and how to deal with typical problems. Select the representative teaching moments from all the teaching units in the video case database and add timestamps and teaching decision annotations. Teaching Design Templates have set up the framework of course objectives, activity sequences and evaluation methods; teachers only need to fill in the specific content to obtain a usable lesson plan.

The competency map links the teaching behaviour of the knowledge carrier mentioned above with the current competencies of local teachers in Southeast Asia. The two stages of the mapping are as follows: First, identify the teacher competency items that need to be addressed by the carriers, such as the ability to control the speed of the class, give timely feedback, differentiate instruction, etc.; Second, break down each competency into observable behavioural indicators and compare them with the behaviours that Southeast Asian teachers have already shown in their daily teaching. For the competency items that are missing, an extra hierarchical training module will be added to the mapping relationship, and each module will be an independent, learnable behaviour unit. Based on the mapping and supplementation mechanism above, the knowledge carriers do not need to keep their original forms; instead, they will be added to the existing competency structures of local teachers in stages and gradually expand professional development.

## **3. Evolutionary Trends of Southeast Asian Vocational Education Systems Influenced by China's Educational Modernisation**

### ***3.1 Distributed Adjustment of Educational Governance Rights and Responsibilities Allocation and Multi-actor Collaboration***

The distributed governance logic of education modernisation in China has changed the structure of rights and responsibilities for students and schools in the vocational education system of Southeast Asia. The power of decision-making has moved away from the education administrative office and is now distributed among colleges, industry organizations and regional training consortia; together, these various places have begun to exercise some degree of governance. The number of training courses offered by vocational colleges has been gradually increasing, the curriculum has been reformed more flexibly, industry consortia have started to participate in the negotiation process for skill standards, and cross-institutional resource allocation platforms have been given some power to decide on budgets and staffing. Although there is decentralisation of power at all levels, the central government still exercises some supervision and has created a hierarchy of authority by issuing general policies from above and implementing them in specific areas closer to the people<sup>[4]</sup>.

Therefore, the model of many-party cooperation has also changed. The initial relationship of the parties was set out in administrative orders, and now a cooperative network of contract and mutual recognition agreements has been gradually built. Educational institutions have set up a vertical link in the course credit mutual recognition system, and colleges and employers have achieved horizontal alignment through the joint development of teaching modules. All parties to the cooperation will have more specialised functions; industry organisations will provide real-time information on the skills required in the industry, educational institutions will translate this information into teaching content,

and third-party evaluation institutions will assess how well the teaching results meet the demands of the industry. Based on the above distributed adjustment and cooperation model, the whole system will no longer need to wait for changes in the labour market to be reflected in new directives from the centre; instead, local nodes will be able to identify problems and make adjustments independently.

### ***3.2 Flexible Restructuring of the Modular Curriculum System and Efficiency of Labor Market Matching***

With the spread of the idea of modular curriculum design in the course of educational modernisation in China, the vocational education curriculum system in Southeast Asia has begun to move away from a sequenced structure of fixed courses and is now adopting a disassemblable and recombinable building-block structure. The first step of the division is to separate the original curriculum content of each grade into several independent teaching modules, and each module should correspond to a specific vocational competence that can be assessed separately. The difficult prerequisites for these units have been removed, and learners can choose various combinations of units according to their own starting points and goals. Although the reformed curriculum system still covers all the knowledge, no longer is there a single learning speed for everyone; instead, many different learning paths can be chosen.

The two reasons for the improvement in the efficiency of labour market matching are the fine-grained adjustment capability and the dynamic update ability of the module. Fine-grained calibration can quickly obtain the necessary units from the existing module library to create a short-term skill-improvement plan for a particular job vacancy, and not all courses need to be developed from scratch. Dynamic Update Capability: A particular module can be added or deleted independently of the other parts of the system; when there is a change in the demand for a certain type of vocational skills, only the content parameters of that module need to be modified or new modules added to keep the curriculum supply in line with changes in the market. A matching mechanism can reduce the time lag between the appearance of a demand signal and the response of teaching, correct systematic deviations in the skill structure of graduates and job requirements, and improve the degree of alignment between vocational education output and the structure of employment absorption<sup>[5]</sup>.

### ***3.3 Self-organising Features of the Quality Assurance Mechanism and Improvement of Dynamic Adaptability***

Another self-organising characteristic of the quality assurance system is that the mode of generation for evaluation standards, evaluation objects and evaluation activities has shifted from external prescription to internal development. Under the indirect influence of factors related to China's educational reform and opening up, a process of quality definition in cooperation with colleges, enterprises and graduates has begun to emerge in the vocational education system of Southeast Asia. The old uniform standards set by the top are no longer in force, and after many discussions among all parties, some particular standards have gradually been established for different areas and industries. The scope of the evaluation object has been extended from the original scope of the education regulatory office to cover all-weather groups of industry certification bodies, third-party testing service organisations and alumni networks<sup>[6]</sup>.

The degree to which the quality assurance system can be adjusted in light of changes in the educational environment is called dynamic adaptability. The old quality assurance system has been updated periodically, but the revised content is no longer in line with the current teaching circumstances. At the same time, there is also an independent mode and an unbroken feedback loop; formative assessment data obtained during the course of teaching, employer feedback after graduates enter the workforce, and monitoring signals of new skill demand in the industry are automatically collected and fed into the update algorithm of the evaluation system. If the collected data show that the correlation between a certain evaluation index and actual work results has dropped significantly, then that index will be modified or its weight will be changed by the system. Therefore, quality assurance will no longer be an occasional external audit but will be incorporated into the daily work of the vocational education system, and we will be able to keep up with the changes in the economic structure and technical conditions of Southeast Asian countries.

## Conclusion

Identify the transferable attributes of the three main components in the process of educational modernisation in China - digital technology modules, standardised curriculum resources and the organisational model for industry-education integration - and explore how they can be applied to the vocational education system in Southeast Asia. Cross-regional calibration and localisation of the vocational qualification framework; Parametric redesign of the teaching operation structure in the dual system; Construction of knowledge transfer carriers and competency mapping relationships in teacher professional development. Based on the above reasons, some changes have occurred in the vocational education system of Southeast Asia; namely, the division of governance powers and responsibilities has shifted from a centralised mode to a collaborative one, the structure of the curriculum system has changed from a fixed sequence to a modular and flexible one, and the quality assurance mechanism has been reformed from external inspection to an internal, continuous-feedback loop system. Based on the above results, it can be concluded that the modernisation elements of Chinese education have been organised through calibration, translation and redesign to create localised operating logics. In the future, we will find out whether the different levels of industrial concentration and institutional autonomy in various countries affect embedding, and how stable the long-term development trend will be.

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