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A Study on the Transformation of ICT Specialty Curriculum System in Vocational Education Driven by the "Competency Cube" Model

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Abstract. Addressing the dilemma where current ICT curricula in vocational education fail to adapt to rapid industry iteration and students' personalized development needs, this study, grounded in humanism and integrating Competency-Based Education (CBE) and modular theory, constructs a three-dimensional "Competency Cube" curriculum model. The model deconstructs the curriculum through three dimensions—Knowledge & Skills, Competency Hierarchy, and Growth Pathways—to form flexibly combinable modular units. This approach empowers students for autonomous growth across multiple tracks, including high-quality employment, interdisciplinary entrepreneurship, and sustainable further education. Through case studies, this research demonstrates the model's innovative value in enhancing the adaptability of vocational education and supporting students' all-round development.

Keywords: Adaptability of Vocational Education, Competency Cube, Multi-track Growth, Curriculum System, Humanism.

1 Introduction

In 2022, the General Office of the Central Committee of the Communist Party of China and the General Office of the State Council issued the "Opinions on Deepening the Reform of the Modern Vocational Education System," which called for "deepening the supply-side structural reform of vocational education," "adhering to a people-centered and competency-oriented approach," and establishing a robust education and training system for "multi-track growth." During the "14th Five-Year Plan" period, a new generation of information technologies, represented by artificial intelligence, big data, and the Internet of Things, is accelerating the formation of "new quality productive forces," placing unprecedented demands on the cultivation of high-quality technical and skilled talent [1]. In the context of building a strong nation in education, enhancing the adaptability of vocational education to resonate with economic and social development is a core issue in vocational education research [2]. Related studies indicate that digital

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empowerment and job market demands have become prominent research hotspots in vocational education [3].

As a key field for digital empowerment, the Information and Communication Technology (ICT) major urgently needs curriculum reform. However, existing curriculum systems generally suffer from three deep-seated problems. First, there is a deviation in value orientation; curricula emphasize cultivating students' job-specific skills, treating them as instrumental, whereas students, as "whole individuals," need to develop their potential and achieve comprehensive self-improvement while adapting to job roles. The current system fails to meet these developmental needs. Second, the structure is severely rigid. Most curriculum structures are linear and static, making it difficult to adapt to the fast-paced technological iteration and deep cross-disciplinary integration of the ICT industry. The teaching content is often disconnected from industrial practice [4]. Third, growth paths are monolithic. Curriculum design primarily focuses on employment, giving little consideration to students' diverse development needs, such as innovation, entrepreneurship, and further education.

The field of vocational education is continuously advancing curriculum system reform through theoretical exploration and practical innovation. For example, Deng [5] constructed a "four-level" curriculum system for the ICT professional cluster at Nanning College for Vocational Technology, which achieved success in "bottom-level sharing and middle-level separation," optimizing the linear path of knowledge transmission. However, curriculum reform is not merely about improving the efficiency of knowledge delivery but is a profound educational value transformation. Existing reforms still need further exploration in empowering students with autonomy in learning and choices in their growth. Zhou's [6] assertion that Chinese vocational education is undergoing a fundamental shift from "job-seeking" to "human-centered" explores a reform direction that returns education from cultivating "human capital" for job demand to promoting the "all-round development of the person."

Grounded in the educational essence of vocational training and guided by a human-centered value philosophy, this study proposes the "Competency Cube" three-dimensional curriculum model. It aims to construct a new paradigm for a curriculum system that not only closely aligns with industry demands but also fully respects students' personalized development and multi-track growth.

2 Theoretical Foundation

The construction of the "Competency Cube" model integrates and practically applies three major theories: Humanistic Education Theory, Competency-Based Education (CBE) Theory, and Modular Curriculum Theory. The construction of the “Competency Cube” model is not a simple superposition of three theories but an organic integration, with humanism as its core value, Competency-Based Education (CBE) as the main logical thread for content, and modular curriculum theory as its organizational framework. These three theories interact and build upon one another, collectively guiding the systematic design of the model’s three-dimensional axes and ensuring its coherence and scientific rigor in philosophy, content construction, and implementation.

2.1 Humanistic Education Theory: The Core Value of Curriculum Reform

Humanistic education theory serves as the philosophical cornerstone of the model. It shifts the ultimate goal of education from producing "instrumental" individuals who meet job requirements to promoting the "all-round development of the person," thus answering the fundamental question of "for whom are we cultivating people?" This theory emphasizes respecting students' individual differences, autonomy in learning, and the right to choose their growth paths. Humanistic education theory emphasizes respecting the dignity and value of students, promoting the development of their individuality, and unlocking their potential. In the teaching process, the teacher is student-centered, values students' emotional needs, and provides personalized learning guidance based on each student's uniqueness to foster all-round development. As Zhou [6] pointed out in the shift from "job-seeking" to "human-centered," this reorientation requires vocational education to achieve five reconstructions, such as shifting goals from skill-based to competency-based and restructuring the system from a disciplinary logic to a life logic. This profoundly reveals that the ultimate goal of curriculum reform is to "educate people," not to "produce tools." The "Competency Cube" model embeds this philosophy throughout its design, ensuring that every module and every path serves the student's self-discovery, self-planning, and self-realization. This directly guides the design of the model's Z-axis—the Growth Pathway Domain. By pre-defining three parallel and switchable paths—high-quality employment, sustainable further education, and interdisciplinary entrepreneurship—the model brings the core humanistic concern of "where students want to go in the future" to the forefront of curriculum design. The existence of the Z-axis ensures that the ultimate purpose of the entire curriculum system is to serve students' self-discovery, self-planning, and self-realization, thereby transforming humanism from an abstract educational philosophy into a concrete and operational pathway for student development.

2.2 Competency-Based Education (CBE): The Logical Thread of Curriculum Content

If humanism establishes the model's "human development" goal, then Competency-Based Education (CBE) provides the content construction logic to achieve this goal. It systematically addresses the questions of "what competencies to cultivate" and "to what level of proficiency." CBE advocates for reverse-designing curriculum content and evaluation standards based on the real-world activities students will need to successfully perform in their future careers (or in higher-level studies, entrepreneurship, etc.).Competency-Based Education (CBE) cultivates students' ability to perform job tasks by constructing a comprehensive training framework of knowledge, skills, and attitudes, and implementing modular curricula and personalized instruction to help students achieve predetermined professional competency levels. This requires teachers to break down vague training objectives into a series of clear, measurable competency module units. Students self-regulate their learning content and pace, with teachers acting as learning managers and advisors. This theory provides a scientific method for populating the content of each module in the "Competency Cube" model, ensuring that all curriculum modules are precisely targeted at specific competency goals, thus achieving the principle of "what is learned is what one can do." The CBE theory provides a scientific basis for populating the X-axis—the Knowledge and Skills Domain. The content of the three major module groups on the X-axis—"Platform Common," "Professional Core," and "Directional Elective"—is derived from the analysis and deconstruction of the core competencies required for the different growth paths on the Z-axis. For example, the competency needs of the "Employment Path" determine the content of relevant professional core and directional elective modules, while the "Further Education Path" requires the addition of common modules that strengthen theoretical foundations. Simultaneously, CBE's adherence to the cognitive law of competency development from lower to higher order also directly guides the design of the Y-axis—the Competency Hierarchy Domain. The three layers of the Y-axis—"Foundational Knowledge," "Application Integration," and "Transfer & Innovation"—ensure that regardless of the chosen path, a student's learning process follows a scientific progression from "knowing" to "doing" and finally to "innovating." This prevents the fragmentation of knowledge and guarantees the systematic development and depth of competencies.

2.3 Modular Curriculum Theory: The Structural Support for Curriculum Organization

Modular curriculum theory provides the structural form for implementing the model, offering a technical solution to realize the "personalized choice" of humanism and the "competency orientation" of CBE. It solves the challenge of "how to organize teaching to make all this possible." This theory advocates for breaking down a complex curriculum system into multiple functionally distinct, relatively independent, and flexibly combinable units, or "modules." A modular curriculum divides content into several integrable, relatively independent, and functionally distinct modules. Students can autonomously select and combine these modules based on their own needs and future development plans, thereby meeting the learning and skill requirements of different students. This flexible and open theory provides an effective solution to the problems of rigid structure and inability to adapt to personalized needs in traditional curriculum systems. In the "Competency Cube" model, modular theory acts as both an adhesive and a converter. It "encapsulates" the various competency goals defined by CBE (located at the intersections of the X and Y axes) into concrete, selectable "competency building blocks" (i.e., curriculum modules). Students can then, based on their chosen growth path on the Z-axis, freely combine these modules on the X-Y plane—much like solving a Rubik's Cube—to create a personalized learning plan. This flexibility not only grants students genuine choice (humanism) but also enables the curriculum system to respond quickly to industry changes by dynamically updating the module library, thus maintaining its adaptability and relevance.

In summary, humanism establishes the model's educational goal (Z-axis), CBE defines the specific content and proficiency levels to achieve this goal (X and Y axes), and modular curriculum theory provides the flexible structure to realize it all. The three are interlinked, forming the complete theoretical framework of the "Competency Cube" model and achieving a seamless connection from educational philosophy to teaching practice.

3 Construction of the "Competency Cube" Three-Dimensional Curriculum System Model

The "Competency Cube" is a three-dimensional, dynamic curriculum structure model that systematically reconstructs the ICT curriculum system from the dimensions of knowledge, competency, and growth. It provides a three-dimensional representation of learning choices and growth paths for vocational ICT students, offering theoretical support to empower multi-track growth.

3.1 Design Philosophy

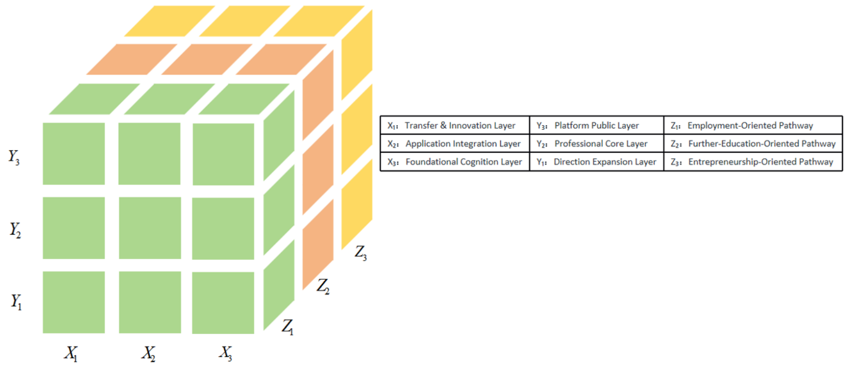


Fig. 1. The "Competency Cube" model.

The model follows the design principles of "student-centered, competency-oriented, open and flexible, and industry-education symbiosis." By introducing the growth pathway domain, it brings the key question of "where students want to go in the future" to the forefront of curriculum design. Students participate in planning their future and selecting courses, truly shifting from "school-unified planning" to "teacher-student co-construction of a learning map." First, it is student-centered: all curriculum modules are designed, combined, and evaluated to promote students' autonomous development, fully respecting individual differences and developmental needs. Second, it is competency-oriented: it breaks down disciplinary barriers and restructures various knowledge and skill points into modular units centered on meeting professional competencies, emphasizing the precise alignment of abilities with job requirements. Third, it is open and flexible: it establishes a dynamically updated module library and designs diverse course selection paths to adapt to the dynamic needs of industry development and student growth. Fourth, it is an industry-education symbiosis: it builds a school-enterprise collaborative mechanism to jointly develop curriculum modules, ensuring that course content is synchronized with the technological frontiers of the industry and job competency requirements. The model structure is shown in Fig. 1.

3.2 X-Axis—Knowledge and Skills Domain

This axis defines the scope of student learning, primarily addressing "what to learn." It reflects the breadth and specialization of the learning content. Based on the characteristics of the ICT profession, it integrates knowledge and skills into three major modules: Platform Common Modules, Professional Core Modules, and Directional Elective Modules.

Platform Common Modules. These are compulsory modules for all students, focusing on cultivating foundational skills. They cover core content such as professional ethics, information ethics, computer network fundamentals, and the Linux operating system, laying the groundwork for subsequent learning.

Professional Core Modules. These modules contain the main courses of the major, reflecting its distinctive features. They include core content like cloud computing architecture, data analysis and visualization, and network security, helping students build core professional competitiveness.

Directional Elective Modules. These modules are configured with different courses according to the sub-fields of the ICT profession to meet students' personalized development needs. They cover cutting-edge content such as HarmonyOS application development, AIOps (AI for IT Operations), and industrial digitalization solution design. Students can choose freely based on their interests and career plans.

3.3 Y-Axis—Competency Hierarchy Domain

This axis follows the general cognitive patterns of student learning and designs a progressive learning hierarchy: Foundational Knowledge Layer, Application Integration Layer, and Transfer & Innovation Layer. It reflects the depth of student learning, defining "to what extent to learn," ensuring the systematic and coherent nature of learning content, and avoiding the fragmentation of knowledge and skills.

Foundational Knowledge Layer. This layer focuses on theoretical teaching and basic experiments, cultivating students' mastery of core concepts and basic principles, as well as their familiarity with basic tools. The emphasis is on "knowing" and "understanding" theoretical principles.

Application Integration Layer. This layer uses project-based learning, virtual simulations, and real enterprise cases as its main teaching methods. It corresponds to the competency goals of "proficient operation" and "comprehensive application," focusing on developing students' ability to skillfully use learned knowledge and basic tools to complete tasks in simulated or real scenarios.

Transfer & Innovation Layer. This layer is dominated by high-level practical activities such as science and technology innovation projects, skill competitions, and entrepreneurship incubation. It focuses on cultivating students' comprehensive abilities, such as "problem-solving skills" for unconventional complex problems and "innovative application skills" for preliminary innovative design.

3.4 Z-Axis—Growth Pathway Domain

The Z-axis embodies the "multi-track growth" philosophy. It starts from the students' future development, bringing the core question of "where students want to go in the future" to the forefront of curriculum design. It defines three parallel and flexibly switchable main growth paths: the Employment-Oriented Path, the Further Education-Oriented Path, and the Entrepreneurship-Oriented Path.

Employment-Oriented Path. This path focuses on cultivating technical talent for professional positions. Students choosing this path need to delve into elective modules related to their target positions, complete in-depth learning and high-level application integration training projects, and develop specialized expertise in a certain field to build core job competitiveness quickly.

Further Education-Oriented Path. Students on this path, after completing professional modules, also need to take elective modules that strengthen their theoretical and mathematical foundations, such as Advanced Mathematics and Linear Algebra, to solidify their theoretical knowledge for upgrading from a vocational diploma to a bachelor's degree or pursuing higher education.

Entrepreneurship-Oriented Path. Students on this path need to integrate professional technology modules with innovation and entrepreneurship elective modules, taking interdisciplinary courses in business, management, etc. The focus is on developing their project practice skills and comprehensive qualities to provide the necessary capabilities for technology-driven entrepreneurship.

After the "Competency Cube" curriculum system is constructed, students, under the guidance of their academic advisors, autonomously select and combine curriculum modules within this three-dimensional coordinate system based on their interests, strengths, and career plans, forming their personalized "Competency Cube." Students can also adjust their paths at any time during their studies, avoiding being locked into a wrong path due to insufficient consideration. Compared to Deng's [5] "four-level" model, the "Competency Cube" adds different growth paths, evolving from two dimensions to three. It truly returns the choice of what to learn and future development to the students, practicing the philosophy of humanistic vocational education.

4 Model Application: Case Analysis of Multi-Track Growth Paths

This section selects three virtual student cases with different development goals and provides an in-depth analysis of their personalized learning paths to demonstrate the practical value of the "Competency Cube" model.

4.1 Case One: Employment-Oriented Path

Student Background and Goal. Xiao Ming has a strong interest in network security technology and dreams of becoming an enterprise network security engineer. Based on his career goal, Xiao Ming chose the Employment-Oriented Path (Z1).

Learning Path Construction and Analysis. Xiao Ming's module selection should focus on the network security field, aiming for deep and thorough learning of related knowledge. His learning path exhibits a "vertical deepening" characteristic. The specific module configuration is shown in Table 1.

Table 1. Xiao Ming's curriculum module configuration.

Cube Coordinates	Module	Core Courses/Projects	Core Competency Goals
(X1, Y1, Z1)	Platform Common Theory	Advanced Mathematics (Engineering); Computer Organization Principles	Cultivate scientific thinking and build foundational understanding of computer hardware.
(X2, Y1, Z1)	Core Technical Principles	Computer Networks; Operating Systems	Master the basic principles of networks, systems, and data.
(X3, Y1, Z1)	Track Technical Introduction	Introduction to Cybersecurity; Fundamentals of Cryptography	Build a high-level, big-picture understanding of the cybersecurity field.
(X2, Y2, Z1)	Core Role Project	Comprehensive Web Penetration Testing Project	Gain practical skills expected of a junior penetration testing engineer.
(X3, Y2, Z1)	Track Skills Practicum	Enterprise Security Operations & Maintenance (SecOps) Practicum	Be able to build and operate enterprise-grade security defense systems.
(X2, Y3, Z1)	Core Technical Breakthrough	Real-World Vulnerability Discovery & Analysis	Develop self-directed learning ability and advanced technical problem-solving skills.

After selecting the curriculum modules, Xiao Ming's learning path is illustrated in Fig.2.

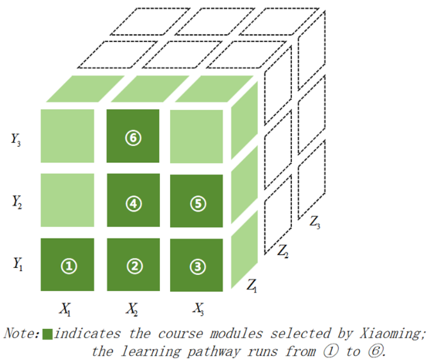


Fig. 2. Learning path diagram for Xiao Ming (Network Security Engineer track).

Following this path allows for a precise match with the competency requirements of a network security engineer. It should be noted that in the Core Job Project module (X2, Y2, Z1), industrial mentors and professional teachers co-instruct, designing multiple simulated tasks. In this module, Xiao Ming moves away from the traditional passive learning method of "you lecture, I listen" and is required to complete real enterprise-level tasks, which greatly enhances his comprehensive practical abilities. Through the combination of "Common-Core-Elective" modules and a progressive learning process from "foundational knowledge" to "core application" and "technical specialization," Xiao Ming's core professional competitiveness is systematically cultivated, achieving a precise alignment between professional skills and job demands.

4.2 Case Two: Entrepreneurship-Oriented Path

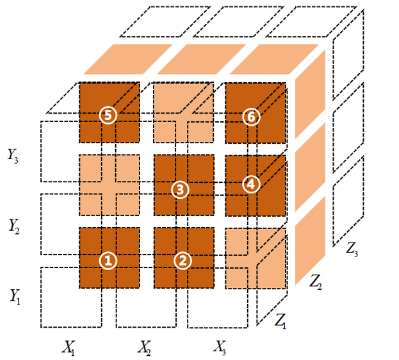
Student Background and Goal. Xiao Hong is a dynamic thinker with strong business acumen. She plans to develop a SaaS application for small and medium-sized enterprises with her peers after graduation. She chose the Entrepreneurship-Oriented Path (Z2).

Learning Path Construction and Analysis. After confirming her entrepreneurial path, Xiao Hong actively selected her course modules. After consulting with her mentor, her module configuration was determined as shown in Table 2. Her path displays a horizontal, cross-disciplinary characteristic, reflecting the fusion of technology and business.

Table 2. Xiao Hong's curriculum module configuration.

Cube Coordinates	Module Name	Core Courses/Projects	Core Competency Goals
(X_1, Y_1, Z_2)	Platform Common Theory	Business Mindset & Communication; Team Collaboration & Communication	Develop business literacy and soft skills.
(X_2, Y_1, Z_2)	Core Technical Principles	Introduction to Cloud-Native Technologies; Modern Web Development Frameworks	Master the core technology stack for SaaS application development.
(X_2, Y_2, Z_2)	Core Role Project	Full-Stack Cloud Application Development Project	Ability to independently develop, deploy, and maintain web applications.
(X_3, Y_2, Z_2)	Track Skills Practicum	Product Prototyping Design & User Experience (UI/UX)	Master design methods from user needs to product solutions.
(X_1, Y_3, Z_2)	Platform Common Innovation	Lean Startup Practicum; Digital Marketing & Brand Promotion	Learn entrepreneurship methods and go-to-market promotion strategies.
(X_3, Y_3, Z_2)	Track Expansion Innovation	“Challenge Cup” Startup Project Incubation	Integrate technology and business knowledge to form a complete business plan.

Xiao Hong's path is built upon core technologies like cloud-native development and expands horizontally to include cross-disciplinary skills such as business thinking, product design, and marketing, laying a solid technical foundation for her post-graduation development work. Her specific learning path is shown in Fig. 3.



Note:■indicates the course modules selected by Xiaohong; the learning pathway runs from ① to ⑥.

Fig. 3. Learning path diagram for Xiao Hong (Innovation and Entrepreneurship track).

The main content of her Directional Innovation module involves participating in entrepreneurship project incubation competitions. Traditional final exams are not suitable; her evaluation is adjusted to be a comprehensive assessment based on the quality of her business plan, the completeness of the product prototype, and her performance during the project's operation.

4.3 Case Three: Further Education-Oriented Path

Student Background and Goal. Xiao Gang is a strong learner who, due to an underperformance in the college entrance exam, did not get into his ideal university. He hopes to continue his studies and get into his dream undergraduate program in Computer Science and Technology through a "diploma-to-degree" pathway. Therefore, he chose the Further Education Path (Z3).

Learning Path Construction and Analysis. Xiao Gang's path needs to focus on the systematic learning of theoretical knowledge. In his module selection, he added public theoretical courses like Advanced Mathematics, strengthening his theoretical foundation to achieve a seamless transition from vocational education to general higher education. The specific module configuration is shown in Table 3.

This path is designed closely around the knowledge system and competency requirements for the "diploma-to-degree" transition. It strengthens core foundational subjects at the foundational layer, deepens theoretical application abilities at the application layer, and conducts preliminary academic training at the innovation layer. Unlike the other two students, Xiao Gang's assessment places more emphasis on the scores of core theoretical courses. His specific learning path is shown in Fig. 4.

Table 3. Xiao Gang's curriculum module configuration.

Cube Coordinates	Module Name	Core Courses/Projects	Core Competency Goals
(X_1, Y_1, Z_3)	Platform Common Theory	Advanced Mathematics (Enhanced); Linear Algebra; College English (Academic)	Solidly build the foundational disciplines required for further study.
(X_2, Y_1, Z_3)	Core Technical Principles	Data Structures & Algorithms; Computer Organization; Operating Systems Principles	Systematically learn the core theories of computer science.
(X_3, Y_1, Z_3)	Track Technical Introduction	Discrete Mathematics	Develop abstract thinking and logical reasoning skills.
(X_2, Y_2, Z_3)	Core Application Project	Algorithm Design & Analysis Project	Deepen understanding and application of core theory; strengthen logical thinking.
(X_1, Y_3, Z_3)	Platform Common Innovation	Academic Paper Writing Workshop	Build foundational skills in literature search, academic writing, and research.
(X_2, Y_3, Z_3)	Core Technical Innovation	Introduction to Compilers	Take on a classic advanced course in computer science.

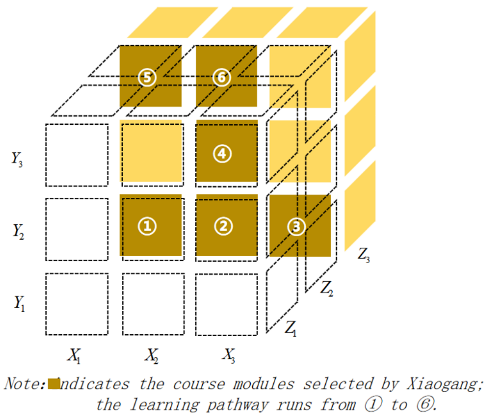


Fig. 4. Learning path diagram for Xiao Gang (Further Education track).

This path paves a channel for Xiao Gang to advance from vocational education to general higher education, fully demonstrating the "Competency Cube" model's support for students' academic advancement and sustainable development.

4.4 Case Comparison and Model Value Analysis

To better demonstrate the applied value of the "Competency Cube," a comparative summary of the three typical cases is presented in Table 4.

Table 4. Comparison of typical cases.

Dimension	Z1: Quality Employment	Z2: Innovation & Entrepreneurship	Z3: Academic Advancement
Development Goal	High-quality employment	Technology-driven entrepreneurship	Pursue further academic study; continued deep specialization
Talent Profile	Technical specialist	Hybrid talent (tech + business)	Academic pre-research profile
Path Logic	Vertical deepening; capability focus	Horizontal crossover; integration of technology and business	Stronger theory; solid academic foundations
Z-Axis Choice	Z1: Quality Employment	Z2: Innovation & Entrepreneurship	Z3: Academic Advancement
X-Axis Module Emphasis	Concentrate on X2 (core specialization) and X3 (track expansion)	X1 (business), X2 (technology), X3 (product) evenly distributed	Emphasize academically strong X1 (mathematics) and X2 (core theory)
Y3 Layer Module	Technical breakthrough type	Startup incubation type	Academic pre-research type

The comparison shows that although the three students have different curriculum settings, evaluation standards, and learning methods due to their chosen growth paths, they all operate within the mechanism of the "Competency Cube." First, all paths follow the cognitive progression of the Y-axis, ensuring that the learning process aligns with cognitive and competency formation laws, which is fundamental to student development. Second, the choice on the Z-axis determines the orientation and resource allocation of learning, making personalized cultivation not just an empty slogan but something supported by tangible curriculum modules. Finally, the needs of the Z-axis are realized through the selection of modules on the X and Y axes, thus forming differentiated talent competency structures. The "Competency Cube" model is not a static, rigid training plan but a dynamic, adjustable empowerment system. The cultivation cases of Xiao Ming as a specialized talent, Xiao Hong as an interdisciplinary talent, and Xiao Gang as a potential academic talent also demonstrate the model's flexibility and adaptability.

5 Implementation Paths and Support Mechanisms

The implementation of the "Competency Cube" model requires systematic support, which can be broken down into four aspects.

First, reconstruct the teaching organization model. Establish cross-major, cross-disciplinary modular teaching teams, break down traditional departmental barriers, and promote teaching method reform. Focus on implementing project-based, case-based, and scenario-based teaching to meet the needs of modular curriculum instruction.

Second, build a digital support platform. Develop an intelligent education platform that integrates course selection guidance, learning process management, competency evaluation, growth warnings, and career planning. This will enable the visualization of each student's "Competency Cube" and dynamic tracking of their learning process. This measure precisely addresses the challenges of vocational education reform in the digital intelligence era proposed by Yin et al. [4], enhancing teaching management efficiency through technology.

Third, innovate a multiple evaluation system. Construct a process-based, value-added multiple evaluation system based on module credits and competency certification. This will break the single-exam evaluation model and comprehensively record students' growth trajectories in module learning, project practice, and competency improvement.

Fourth, deepen the industry-education integration mechanism. Co-construct curriculum modules, share training bases, and jointly promote science and technology innovation projects with leading ICT industry enterprises. Establish a dynamic update mechanism for curriculum content to ensure that the modules in the "Cube" remain consistent with industrial technological frontiers and job competency requirements, thereby enhancing the adaptability of vocational education.

6 Conclusion and Outlook

Based on the requirements set forth in the "Opinions on Deepening the Reform of the Modern Vocational Education System," this study integrates humanism, CBE, and modular curriculum theories to construct the "Competency Cube" three-dimensional curriculum model, focusing on addressing the practical dilemmas of the ICT curriculum system. Through the synergistic design of the X, Y, and Z axes, the model brings students' growth paths to the forefront, allowing for flexible selection of curriculum modules. It fully respects individual student differences, empowers multi-track growth, and effectively enhances the adaptability of vocational education to industrial development. It features three core innovations: first, it integrates competency-based, modular design with the multi-track growth philosophy into a three-dimensional model to address the difficult points of vocational education reform; second, through a "cube-like" mechanism of arrangement, deconstruction, and reconstruction, it endows the curriculum system with strong flexibility to better adapt to dynamic industry changes and students' personalized needs; third, by analyzing three typical cases, it presents a clear path from theory to practice, providing an operational blueprint for ICT curriculum reform in vocational colleges. Moreover, the "Competency Cube" model is not limited to the ICT major; other vocational education majors can design their own cube modules according to their professional characteristics to reconstruct their curriculum systems.

Implementing the "Competency Cube" model still presents challenges, placing higher demands on the teaching management, faculty, and evaluation systems of vocational colleges. We offer several action-oriented suggestions: first, establish curriculum committees at the major level, composed of professional teachers, industry experts, academic administrators, and student representatives, to jointly map out the "Competency

Cube" for their major and establish a module content iteration mechanism. Build an intelligent course selection guidance system to provide personalized guidance, such as career planning and module selection. Second, strengthen the development of "dual-qualified" teaching staff, focusing on enhancing teachers' abilities in modular curriculum development and project-based teaching. Third, improve a multiple evaluation mechanism that combines process-based and outcome-oriented assessments to provide institutional support for the model's operation.

The "Competency Cube" is not just a curriculum system model for the ICT major but also an educational philosophy that empowers student growth, activates teaching vitality, and deepens industry-education integration. It can also be applied to other vocational education majors. In the future, it is necessary to continuously optimize the module content and operational mechanism of the "Competency Cube" in practice to maximize its effectiveness.

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