

Construction of a Talent Cultivation Model for the Big Data Management and Application Program in Sino-Foreign Cooperative Education Based on the OBE Philosophy - A Case Study of the Beijing Wuzi University - University of New Haven Cooperative Program

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ABSTRACT

Addressing the tendency in Sino-foreign cooperative education to prioritize resource import over learning outcomes, this paper takes the Big Data Management and Application (Sino-Foreign Cooperative) program jointly run by Beijing Wuzi University and the University of New Haven as a case. Guided by the OBE philosophy of “reverse design, student-centeredness, and continuous improvement,” it deconstructs the closed loop of “5 program objectives - 10 graduation requirements - curriculum support matrix” in its 2025 scheme and constructs a three-dimensional integrated model of “competency objectives - curriculum chain - quality assurance.” A small-sample empirical test using authentic 2025-2026 final-examination scores shows that reverse-driven curriculum design effectively bridges foreign-course stacking and local educational outcomes, offering a replicable outcome-oriented reform path for similar programs.

KEYWORDS: OBE philosophy; Sino-foreign cooperative education; Big Data Management and Application; talent cultivation model; reverse design.

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1. INTRODUCTION

Amid the accelerating digital economy and the opening-up of higher education, demand for composite big-data talents who “understand data, grasp business, and possess an international vision” keeps rising. The National Plan for Building a Strong Education Nation (2024-2035) encourages renowned foreign universities of science and engineering to cooperate in China, shifting Sino-foreign cooperative education from “scale expansion” to “quality enhancement.” Big Data Management and Application, serving the digital economy, inherently combines technological frontier and business application, making it a key vehicle for importing high-quality overseas resources.

In practice, however, some programs still “import foreign courses while neglecting outcome design”: vague objectives, no quantifiable curriculum-requirement link, and disjointed English-taught courses. The root cause is evaluating “what was taught” rather than “what students attained.” The OBE philosophy [1-2]-reverse design, student-centeredness, outcome orientation, continuous improvement-offers the methodology to fix this. The Beijing Wuzi University-University of New Haven program (Pompea School of Business, AACSB-accredited [3], STEM Business Analytics) was approved in 2023 and endogenously adopted OBE

reverse design, forming an “objectives-requirements-matrix” loop-the case analyzed here.

2. The Intrinsic Congruence Between the OBE Philosophy and Talent Cultivation in Sino-Foreign Cooperative Education

OBE's core ideas [1-2] are four: reverse design-build the curriculum from graduate competencies, not from existing faculty and textbooks; student-centeredness-teaching organized around learners' competency attainment; outcome orientation-observable learning outcomes as the quality criterion; and continuous improvement-a Plan-Do-Check-Act (PDCA) loop.

This fits cooperative education's essence: not “moving courses in” but “importing resources, producing local talent.” Without a unified outcome yardstick, foreign courses pile up without clear competence. OBE shifts the evaluative anchor from “what teachers taught” to “what students can do,” integrating scattered courses under one competency system. The program's ten graduation requirements-professional knowledge; problem analysis; design/development; research; modern tools; communication; teamwork; lifelong learning; professional ethics; physical/mental health-echo engineering and business (AACSB [3]) accreditation and add cooperative-specific dimensions (international communication, professional ethics), giving reverse design an operational indicator system.

3. Deconstruction of the OBE Elements in the Case Program's Training Scheme

OBE thus becomes a deconstruction of concrete scheme elements, translating “abstract outcomes” into a “designable, assessable” indicator chain at four levels: program overview, objective-requirement mapping, curriculum support matrix, and dual-degree equivalence mechanism.

3.1. Project Overview and Dual-Degree Positioning

The program (code 120102) adopts a 4-year length (study 4-6 years) and a “3+1” dual-degree model: three years on campus, fourth year at the University of New Haven; Bachelor of Management (home) plus Bachelor of Science in Business Analytics (UNH, AACSB-accredited [3], STEM). Total 160 credits, with Chinese-side courses in Chinese and American-side courses in English-a “dual-language, dual-system” structure coordinated under OBE.

3.2. Reverse Design of Program Objectives and Graduation Requirements

The scheme defines five objectives (OB1 values; OB2 big-data competence; OB3 English/teamwork; OB4 lifelong learning/vision; OB5 health) decomposed into ten graduation requirements (G1-G10). A relationship matrix maps requirements to objectives with H/M intensity, forming the typical OBE objective-requirement loop (Table 1).

Table 1. Relationship Matrix Between Graduation Requirements and Program Objectives (Intensity: H=High / M=Medium)

Graduation Requirement	OB1	OB2	OB3	OB4	OB5
G1 Professional Knowledge	M	H	H	H	M
G2 Problem Analysis	M	H	H	H	M
G3 Design & Development of Solutions	M	H	H	H	M
G4 Research	M	H	H	H	M
G5 Use of Modern Tools	H	H	H	H	H
G6 Communication	M	M	H	H	H
G7 Individual & Teamwork	H	M	H	H	H
G8 Lifelong Learning	M	M	M	H	H
G9 Professional Ethics	H	M	M	M	H
G10 Physical & Mental Health	H	M	M	H	H

G5 (tools) is H for all objectives, highlighting the technical foundation; G6 (communication) is H for OB3-OB5, underscoring international communication; this prioritized mapping embodies “define outcomes first, then assign support.”

3.3. Curriculum System's Support Matrix for Graduation Requirements

The 160-credit structure-general 49, disciplinary 52, professional 36, practical 17 (32.3% of credits), innovation 6-grounds competency output in credits. Each required course is marked H/M/L against the ten requirements (H≥80%, M≥50%, L≥30%), forming the course-requirement support matrix (Table 2).

Table 2. Support Intensity of Representative Courses for Graduation Requirements (Excerpt)

Course	G1	G2	G3	G4	G5	G6	G7	G8	G9	G10
Management in the Digital Era	H	H	M	H	H	H	M	M	H	M
Value Chain Information Analysis (Foreign)	H	H	H	H	H	M	M	H	H	H
Machine Learning 1	H	H	H	H	H	M	M	L	M	M
Data Visualization & Communication (Foreign)	H	M	H	H	H	M	M	L	M	H
Foundations of Large Language Models	H	H	H	H	H	H	M	L	H	M

Foreign courses systematically support professional/communication dimensions (“Value Chain Information Analysis” nearly all H); technical courses build data thinking (G1-G5); the graduation project/internship close the loop via G3-G4.

3.4. Foreign-Side Courses and Dual-Degree Equivalence Mechanism

Thirteen English-taught foreign courses (disciplinary, interdisciplinary, and professional tiers) satisfy the “ $\geq 1/3$ foreign resources” rule and ground G6/G2 in authentic contexts. Leveraging UNH's AACSB accreditation [3] and STEM status, its formative-plus-summative assessment is aligned with local requirements; “Microeconomics” is credit-recognized by both sides. Annual matrix-based assessment with foreign feedback forms an “assessment-feedback-improvement” loop.

4. Construction of the OBE-Based “Three-Dimensional Integration” Talent Cultivation Model

The scheme has OBE's “skeleton”; we integrate it into a three-dimensional model - competency objectives, curriculum chain, quality assurance - mapping OBE's output definition, teaching organization, and evaluation improvement.

4.1. Competency Objective Dimension: Composite Competency Profile

Condensing G1-G10 and OB1-OB5 yields a four-element profile:

- Data thinking (G1, G2, G5): methodological awareness of mathematics/statistics, programming, databases, and machine learning.
- Business insight (G3, G4): judgment of “solving business problems with data,” directly addressing OB2.
- Technical implementation (G3, G4 in projects): end-to-end output from data processing to decision recommendations.
- International communication (G6, G7, G8): supported by English-medium foreign courses and cross-cultural modules, addressing OB3/OB4.

4.2. Curriculum Chain Dimension: Three-Tier Progressive Curriculum Chain

Centered on the profile, courses form a three-tier chain-Chinese management foundation, American business analytics, frontier AI-each tier benchmarking clear requirements (Table 3).

Table 3. Correspondence Between the Three-Tier Curriculum Chain and Competencies-Graduation Requirements

Curriculum Chain Tier	Representative Courses	Primary Competency Dimension	Key Supported Graduation Reqs.
Chinese-side Management Foundation	Management in the Digital Era; Operations Research; Database Principles; Machine Learning 1; Computer Networks; Management Decision Analysis	Data Thinking + Business Insight	G1, G2, G3, G5
American-side Business Analytics	Business Analytics 1/2 (Foreign); Value Chain Information Analysis (Foreign); Data Visualization & Communication (Foreign); Business Finance/Marketing/Ops (Foreign); Macro/Microeconomics (Foreign, credit-recognized)	Business Insight + International Communication	G2, G3, G6, G7
Frontier AI Expansion (Elective)	NLP & Applications; Recommender Systems; LLM Foundations; Data Mining Algorithms; Cloud Computing; Data Acquisition & Processing	Technical Implementation + Data Thinking	G1, G4, G5

Tier 1 builds Chinese-context fundamentals; Tier 2 (AACSB [3]) trains G6/G3 with Microeconomics credit-recognized; Tier 3 connects to LLM/NLP frontiers. Disciplinary competitions amplify real-problem output beyond the curriculum.

4.3. Quality Assurance Dimension: Immersive Education + Continuous Improvement

Quality assurance rests on four mechanisms: language immersion (10 communication credits + 13 English courses = “internationalization at home,” supporting G6/G8); internationalized faculty (UNH teachers on-site, embedded assessment); industry-education integration (17 practical credits tempering G3/G4); and continuous improvement (annual matrix assessment + AACSB [3] feedback → PDCA loop [4]).

5. Implementation Effectiveness and Optimization Path

If the model were merely a “blueprint” without effect, it would not convince. This section empirically tests the OBE model with authentic scores and proposes targeted improvements.

5.1. Data Source and Scope

Sample: 2025-2026 second-semester final scores, six Sino-foreign classes (grades 23-25), 2,161 valid records-13 foreign courses (864 instances), 106 Chinese (1,296). Absence/deferred (0) excluded from the failure denominator; “failure” = valid score <60.

5.2. Overall Test of Output Attainment

Foreign courses averaged 86.61 (97.5% pass); Chinese all 82.11 (91.8%); Chinese academic 77.87 (89.8%)-lower because they include hard-core math/CS courses, a discipline-attribute difference, not quality. OBE judges by requirement attainment, not raw averages [1-2].

5.3. Structural Performance and Shortboards of Foreign-Side Courses

Table 4 shows “overall attainment with localized pressure”: failures concentrate in accounting (Management Accounting 5, Financial Accounting 6) and Business Analytics 2 (5)-high-terminology business content, not English per se; extreme lows (Marketing 10, Machine Learning 2 46) signal adaptation gaps needing intervention.

Table 4. Score Distribution of Foreign-Side English-Taught Courses (Second Semester, 2025-2026 Academic Year)

Course	Instances	Average	Minimum	Pass Rate	Genuine Failures
Management Accounting (Foreign)	64	77.4	0	92.2%	5
Financial Accounting (Foreign)	62	78.7	0	90.3%	6
Business Analytics 1 (Foreign)	66	81.8	0	95.5%	3
Econometrics (Foreign)	71	84.7	67	100%	0
Machine Learning 2 (Foreign)	71	86.7	46	98.6%	1
Data Visualization & Communication (Foreign)	71	87.6	70	100%	0
Business Finance (Foreign)	63	87.7	21	98.4%	1
Macroeconomics (Foreign)	71	88.8	67	100%	0
Business Analytics 2 (Foreign)	63	89.3	48	92.1%	5
Value Chain Information Analysis (Foreign)	64	89.4	0	100%	0
Business Forecasting (Foreign)	71	90.4	78	100%	0
Operations Strategy (Foreign)	64	90.6	77	100%	0
Marketing (Foreign)	63	92.3	10	98.4%	1

5.4. Grade-Level Trends and Early Warnings

By grade: 23 (358 instances, 87.7, 1 failure), 24 (255, 86.7, 10), 25 (251, 85.0, 11)-a warning trend of decreasing averages and rising failures. Lower grades (especially freshmen) need prioritized language-immersion support, confirming the mechanism in Chapter 3.

5.5. Data-Based Optimization Path

Using the OBE continuous-improvement (PDCA) loop [1-2], four targeted paths emerge:

- Add a “professional English vocabulary + prerequisite module” before high-terminology courses to decouple language from professional load.

- Assign bilingual TAs and exercise sessions with scaffolding for Machine Learning 2 and Business Analytics 2.
- Shift English-reinforcement and learning-strategy modules earlier for freshmen to reduce grade-level decay.
- Embed the course-requirement matrix + scores into annual attainment assessment for a data-driven PDCA loop [4].

6. CONCLUSION

Through empirical evidence, this paper takes the Beijing Wuzi University-University of New Haven program as a case, permeating cultivation with the

OBE philosophy. It deconstructs the 2025 “5 objectives - 10 requirements - matrix” loop and constructs a “competency - chain - assurance” three-dimensional model. Real scores confirm overall attainment with foreign English courses not blocking competence, yet expose pressure in accounting/advanced-analytics courses and lower-grade decay.

Limitation: this remains a small-sample descriptive analysis lacking satisfaction, graduate-tracking, and employability evidence. Overall, reverse-driven design + dual-degree equivalence + data-driven PDCA moves cooperative education from “resource import” to “outcome orientation” [5]-a replicable reform path for similar programs.

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