Empowering Discipline Development Through Data: A Practice Case of Building an Academic Discipline Data Centre by a Higher Education Quality Assurance Department

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1. Background

Academic disciplines are the core carriers through which universities fulfil their fundamental missions of talent cultivation, scientific research, and social service. The quality of discipline development directly determines an institution’s core competitiveness. Driven by a new wave of technological revolution and industrial transformation, the paradigm of discipline development is undergoing profound change. Interdisciplinary integration and demand-oriented development have become inevitable trends. Leading global universities, such as Stanford University and the University of Edinburgh, have taken the lead in adopting industry-oriented discipline development models, breaking down traditional disciplinary

boundaries through systematic resource integration and injecting new momentum into academic innovation.

As a pioneer in exploring the concept of the “University of the Future,” Xi’an Jiaotong-Liverpool University (XJTLU) is actively advancing an ecosystem strategy centred on frontier fields such as artificial intelligence, semiconductors, and advanced materials. In this process, the University’s Education Quality Department identified three prominent bottlenecks in discipline development management.

First, the phenomenon of “data silos” is severe: key data related to teaching quality, research output, and faculty structure are scattered across different schools and functional departments, with no unified mechanism for aggregation and management. Second, data application lags behind development needs: traditional experience-based decision-making models struggle to accurately align dynamic discipline development with the University’s strategic priorities. Third, evaluation and benchmarking lack a solid scientific foundation: quantitative analysis capabilities for discipline development outcomes and talent cultivation quality remain insufficient, limiting the ability to provide robust data support for academic programme development.

To address these challenges, the Education Quality Department took the lead in launching the *Academic Discipline Data Centre* (ADDC) initiative.

The project aims to empower high-quality discipline development through data integration and in-depth analysis.

2. Solutions

Guided by the core objectives of "breaking data barriers, strengthening data empowerment, and supporting strategic implementation," the Education Quality Department established a systematic four-in-one solution encompassing *data integration, indicator systems, platform development, and governance mechanisms*, and advanced the construction of the data centre in an orderly manner.

(1) Establishing a Cross-Departmental Data Collaboration Mechanism

A dedicated task force was formed under the leadership of the Education Quality Department, with in-depth participation from the Research Management Office (RMO), the Library, the Management Information and Technology Services (MITS), and academic schools. Clear data ownership and responsibility matrices were defined for each unit. Through multiple rounds of thematic consultations, a shared data catalogue was established, covering four core categories: discipline and programme structure, talent cultivation outcomes, faculty structure, and research output and impact.

By integrating data from various departmental management systems, the initiative effectively addressed the issue of data silos and ultimately

established a data collection and management mechanism characterized by *unified standards, demand-driven aggregation, and real-time synchronization*.

(2) Building a Discipline-Specific Indicator and Evaluation Framework

Benchmarking against internationally recognized university and subject ranking systems such as QS and THE, and aligned with the University's core characteristics of *industry – education integration* and *interdisciplinary development*, a discipline development indicator matrix was constructed, comprising four major pillars and more than twenty core indicators.

The four pillars cover:

- **Discipline and programme structure** (e.g. number of programmes under the Chinese SCADC discipline classification);
- **Graduate development outcomes** (e.g. scale and employment quality of undergraduate, master's, and doctoral graduates over the past five years);
- **Faculty structure** (e.g. proportion of staff holding doctoral degrees, proportion of professors and associate professors);
- **Research output and effectiveness** (e.g. number of national-level research projects, number of Q1 journal publications).

This framework provides a scientific and precise quantitative basis for

discipline evaluation.

(3) Developing an Intelligent Data Service Platform

The data centre platform delivers three core functions. First, **data integration**, enabling real-time synchronization of data from different departments and one-stop access to key teaching, research, and faculty data. Second, **visualized and interactive analytics**, with role-based access control tailored for administrators, school leaders, and evaluation experts, supporting multi-dimensional queries and statistical analysis by school and discipline. Third, **analysis and benchmarking**, with built-in comparative models that support quantitative benchmarking against master’s and doctoral degree awarding criteria, providing data-driven support for discipline development planning.

Throughout the platform development process, practicality was prioritised to avoid introducing additional workload for departments, ensuring seamless integration with existing data collection workflows.

(4) Implementing a Phased Construction and Deployment Plan

A phased implementation strategy was adopted to ensure both quality and efficiency. From February to June 2025, the *planning and feasibility phase* focused on domestic and international benchmarking studies, precise data requirement analysis, indicator system design, and overall solution validation. From April to December 2025, the *development and testing phase* concentrated on data integration, analytical module

development, visual interface construction, and iterative testing and optimization. From January to March 2026, the *pilot and rollout phase* selected one to two representative schools for pilot operation, followed by iterative refinement and full-scale deployment across the University.

3. Outcomes and Benefits

(1) Significant Improvement in Data Management Efficiency

Inter-departmental information barriers were successfully dismantled, with over 10,000 discipline-related data records integrated into a unified core database supported by standardized data definitions.

(2) Enhanced Decision Support Capability

Leveraging a scientific indicator system and precise analytical functions, the platform provides quantitative recommendations for discipline development planning. For example, it supports applications for new master’s and doctoral programmes by delivering integrated analytical reports on faculty strength, research output, and graduate development over the past five years, significantly improving the persuasiveness and success rate of submissions.

(3) Strong Support for Evaluation and Rankings

The platform provides standardized data support for participation in global university rankings, covering key indicators such as research funding, highly cited papers, and international collaboration. It also

supplies objective, quantitative evidence for annual internal performance evaluations of schools, effectively reducing subjective bias and significantly enhancing the credibility and authority of evaluation outcomes.

(4) Sustained Activation of Discipline Development Momentum

Schools are able to conduct routine benchmarking analyses through the platform, clearly identifying gaps relative to master's and doctoral degree awarding criteria. Data-driven and targeted resource allocation has strengthened the endogenous momentum for continuous discipline development.

4. Replicability and Promotion Value

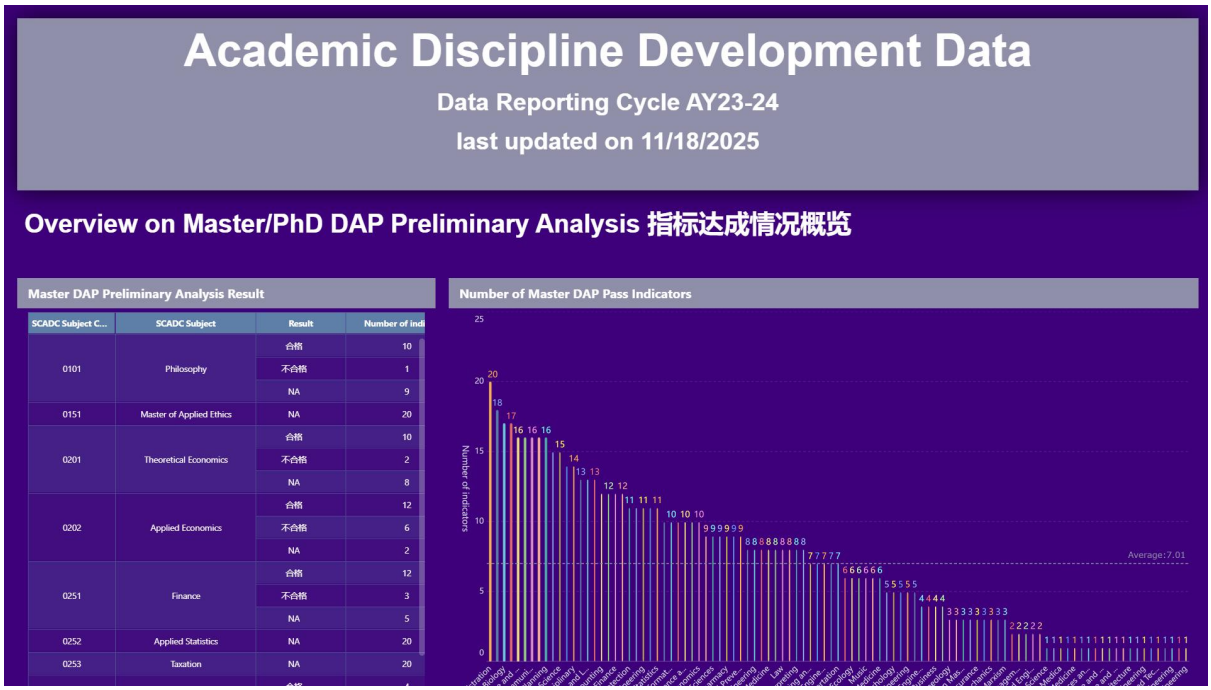

Figure 1. Overview on Master/Phd DAP Preliminary Analysis

Figure 2. Structure of Academic Programmes

Figure 3. Faculty Structure

Grounded in the common needs of discipline development across higher education institutions, the construction model and practical experience demonstrated in this case exhibit strong replicability and reference value for universities of different types.

(1) Governance Perspective: Cross-Departmental Collaboration as the Core Enabler

The working mechanism of *central coordination by a leading department,*

collaboration among functional units, and active participation by academic schools clearly defines responsibilities and data-sharing rules. This approach effectively addresses the widespread challenge of data silos in higher education and can be adapted by both comprehensive and discipline-focused universities according to their specific contexts.

(2) Technical Perspective: A Lightweight and Practical Development Approach

Rather than pursuing an overly comprehensive system, the platform focuses on core discipline development needs, prioritizing high-frequency foundational functions such as data integration and visualized queries. Seamless integration with existing management systems reduces implementation costs and adoption barriers. This demand-oriented development model is particularly suitable for resource-constrained or newly established universities, enabling maximum impact with minimal investment.

5. Next Steps

(1) Deepening Data Application Scenarios

Building on existing capabilities, a *discipline development forecasting module* will be developed to predict trends and potential using big data analytics, providing forward-looking support for discipline layout optimization. A *full-cycle talent cultivation analysis function* will also be

introduced, enabling end-to-end tracking and analysis from enrolment to graduation and employment.

(2) Expanding Data Resource Dimensions

The platform will actively integrate external industry and enterprise databases, incorporating labor market demand and competency requirements to form a combined *internal academic data + external industry data* ecosystem. International academic databases will also be further integrated to enhance the precision and timeliness of global benchmarking analyses.

(3) Strengthening Platform Promotion and Training

User-friendly operation manuals and collections of typical application cases will be developed. Tiered training programmes will be delivered to academic schools to enhance staff data literacy. A *School Data Liaison* mechanism will be established to collect feedback and respond rapidly to optimization needs, continuously improving platform service quality.

(4) Promoting Experience Sharing and Collaboration

Practical experience from the data centre initiative will be systematically summarized and shared through inter-university exchanges, academic conferences, and thematic reports. The University will also explore the establishment of an *Academic Discipline Data Sharing Alliance* with peer institutions to promote data interoperability, joint analysis, and collaborative development, fostering a mutually beneficial ecosystem for

discipline advancement.