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Research and Practice on Curriculum Ideology and Politics in Big Data Platform Deployment and Operation Based on the Three-Color Lines

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Abstract: As a core course for the Big Data Technology major in higher vocational colleges aligning with the smart shipping industry chain, Big Data Platform Deployment and Operation possesses the dual characteristics of high technical abstraction and outstanding engineering practicality. However, traditional instruction commonly suffers from a "two-skin" phenomenon between ideological-political education and professional technical training. To address this practical dilemma, this paper—based on the overall institutional ideological and political educational framework of "Three Colors of Light Illuminating All-Round Education" at Jiangsu Maritime Vocational and Technical College—proposes a curriculum-based ideological and political design framework structured around the "Blue Maritime Power Line, Red Technology Power Line, and Cyan Digital Power Line." This framework deeply integrates real-world shipping industry scenarios, Information Technology Application Innovation (ITAI) technologies, and green development philosophies into six core instructional modules of low-level big data architecture operation and maintenance, such as Hadoop and Spark. At the level of instructional implementation, the course establishes a multi-dimensional framework consisting of "One Center, Two Lines, Three Vectors, Four Subjects, and Six Steps," paired with the innovative application of the "IDEAL" (Identify, Define, Explore, Execute, Reflect) project-driven model. Taking the deployment of a real-time navigation monitoring system in complex bridge areas along the Jiangsu section of the Yangtze River as a typical case study, the course achieves the simultaneous resonance of technical skill and moral virtue through extreme stress testing and crisis injection. Practical results demonstrate that this model effectively resolves long-standing bottlenecks in engineering curriculum ideology and politics, such as "mechanical integration" and "indistinct industry characteristics," thereby providing a reproducible paradigm reference for curriculum-based ideological and political construction in big data majors within industry-specific higher vocational institutions.

Keywords: Curriculum Ideology and Politics; Big Data Platform Deployment and Operation; Three-Color Lines; Higher Vocational Education; Maritime Characteristics; IDEAL Teaching Model.

1. Introduction

1.1. Research Background

Under the wave of deep integration between the digital economy and the real economy, the global shipping industry is undergoing an unprecedented "smart-digital" transformation. China has explicitly proposed to vigorously promote the construction of smart ports, intelligent ships, and digital waterways in a series of national top-level designs, such as Outline for Building a Transportation Power, Overall Layout Plan for Building a Digital China, and Strategy for Building a Maritime Power. The underlying core of modern smart shipping lies in the circulation, storage, computation, and secure governance of massive, multi-modal port and shipping data. This has directly led to an explosive growth in the entire industry's demand for composite, technically skilled talents in "Big Data + Shipping" who are both proficient in next-generation information technology and familiar with maritime shipping scenarios.

As the underlying cornerstone supporting data circulation and computing resource scheduling for smart shipping, the course Big Data Platform Deployment and Operation not only trains students to master high-availability distributed system architectures but also shoulders the political mission of cultivating "digital sentinels" for national critical digital port and shipping infrastructures. Giving full play to its institutional advantages, Jiangsu Maritime Vocational and Technical College has targeted these urgent, emerging "Big Data + Shipping" positions to develop the Big Data Technology major into a specialized program with distinct industrial characteristics. In the teaching practice of this course, breaking down the traditional barrier of low-level IT operations instruction—which is typically "purely software-oriented, code-heavy, and detached from industrial entities"—and seamlessly integrating national strategies, maritime culture, and hardcore IT technologies is the key to fulfilling the fundamental task of fostering virtue through education in higher vocational colleges.

1.2. Practical Dilemmas

In the long-term implementation of curriculum ideology and politics, the higher vocational Big Data Technology major frequently faces three deep-seated practical dilemmas due to rapid technological iteration and intense engineering practicality:

Mechanical integration of ideological and political elements, resulting in a "decoupled" phenomenon. Low-level IT infrastructure technologies (such as distributed file systems, high-concurrency stream processing, and cluster parameter tuning) are highly abstract and rigorously logical. When implementing curriculum-based ideological and political education, most specialized teachers tend to forcefully insert political slogans or historical anecdotes that are disconnected from the technical core. This lack of naturally integrated pedagogical logic causes ideological and political education to become superficial, failing to resonate with students and even triggering resistant emotions.

Indistinct industry characteristics and a lack of systematic content refining. Big Data education across higher vocational colleges generally suffers from homogenization. Teaching projects frequently utilize generic e-commerce recommendations or rental housing analysis from the general internet sector. They fail to convert industrial-grade cases—such as the college's unique maritime cultural heritage, the rise of major shipping nations, and the governance of golden waterways—into implicit educational resources. Consequently, the cultivated students lack the industry sentiment and professional identity required to serve the national maritime strategy.

The dimension of teaching evaluation overemphasizes skills while neglecting virtue, making it difficult to quantify professional quality. Traditional course assessment systems universally rely on binary, result-oriented metrics like "whether the code can run successfully" or "whether the cluster can be deployed properly". They lack process-oriented and value-added quantitative evaluations of students' professional resilience, bottom-line thinking, and artisan spirit when confronting extreme system failures or critical data security threats, making it impossible to provide accurate feedback on the efficacy of combined skill-and-virtue cultivation.

1.3. Current Research Status and Trends

Comprehensively advancing the construction of curriculum ideology and politics is a strategic measure for implementing the fundamental task of fostering virtue through education. In May 2020, the Ministry of Education issued the Guidelines for the Construction of Curriculum Ideology and Politics in Higher Education Institutions, explicitly mandating that all colleges, disciplines, and majors fully implement this educational reform [1]. Subsequently, the Ministry established the Higher Education Curriculum Ideology and Politics Teaching Guidance Committee to provide organizational guarantees for comprehensive execution. Driven by these policies, research interest in curriculum ideology and politics within China has continued to climb, yielding a massive volume of academic output.

Regarding the overall research landscape, some scholars have utilized VOSviewer visualization technology to analyze 1,884 core journal documents from the China National Knowledge Infrastructure (CNKI). Their findings indicate that the academic collaboration network for university curriculum ideology and politics research is still forming, with achievements mainly concentrated on connotation interpretation, collaborative education between specialized and ideological courses, practical pathways, and evaluation systems. Other researchers, based on a visual analysis of CNKI core journal papers, have pointed out that existing literature revolves heavily around the definition, value significance, implementation pathways, and distinctions between specialized and dedicated ideological courses. In terms of evolutionary stages, research on curriculum ideology and politics in higher education can be divided into three phases: initiation, development, and deepening. In the field of higher vocational education, studies published in journals such as Education and Vocation have illustrated the thematic patterns of research across three dimensions—publication year, primary carrying journals, and highly cited literature—focusing primarily on five domains: "ontology," "value theory," "system theory," "model domain," and "action valve".

At the level of theoretical connotation, Wang et al. from systematically explored the concepts, components, and operational mechanisms of curriculum ideology, precision ideology, and micro-ideology [2]. Scholars have conducted deep discussions on foundational issues such as the definition of curriculum ideology and its relationship with dedicated ideological courses. To resolve practical implementation bottlenecks, Zhang [3] published an article in Educational Research, pointing out that the "decoupling" problem stems from the patched-on, tokenistic labeling of ideological elements in practice, which prevents deep integration between professional and ideological education. Wang et al. investigated practical strategies from a classroom instruction perspective to transition curriculum ideology from "suspension" to "grounded implementation" [4]. Han emphasized in China Higher Education that deepening the construction of curriculum ideology requires a profound grasp of the underlying talent cultivation and program construction logic [5]. Regarding evaluation frameworks, some studies have adopted the Delphi method to determine five primary indicators: course construction, teacher quality, teaching content, teaching methods, and learning outcomes; others have built an evaluation indicator matrix for instructional quality based on the CIPP evaluation model.

In the domains of industry characteristics and engineering applications, ideological and political practical teaching in industry-specific universities must incorporate collaborative innovation, exploring new paradigms such as the "Three Connections, Five Co-constructions, and Four-Party Synergy" model. Engineering curriculum ideology in high-level research universities emphasizes the mission of serving the country through science and technology alongside a spirit of scientific innovation. Against the background of the New Engineering Education (NEE), Zhang et al. proposed a systematic design and implementation framework for curriculum ideology in the Transactions of China Electrotechnical Society [6]. In maritime-related majors, studies have deeply excavated ideological elements across dimensions such as patriotic sentiments, national pride, dialectical thinking, innovative spirit, safety awareness, environmental protection concepts, professional ethics, and dedication. Internationally, while there is no explicit concept of "curriculum ideology and politics," engineering education universally emphasizes "Professional Ethics" and "Social Responsibility". Particularly in the fields of distributed computing and big data security, great emphasis is placed on practitioners' bottom-line awareness regarding data privacy, system security, and infrastructure reliability. Furthermore, emerging research directions such as AI-empowered and digital technology-enabled education have attracted significant attention [7].

However, for a hardcore technical course like Big Data Platform Deployment and Operation, which deals directly with data sovereignty and cybersecurity infrastructure within smart shipping, a reproducible, mature paradigm for systematically constructing a closed-loop integration of virtue and skill is still lacking. Standing upon the college's overall ideological framework of "Three Colors of Light Illuminating All-Round Education," reconstructing the curriculum ideology system for Big Data Platform Deployment and Operation not only addresses an urgent practical necessity but also possesses profound theoretical and practical value.

2. Design of Curriculum Ideology and Politics Based on the "Three-Color Lines"

2.1. Course Positioning and Reconstruction of General Teaching Objectives

Big Data Platform Deployment and Operation is a core compulsory course for second-year students majoring in Big Data Technology (a core specialty within the provincial-level high-level program cluster) in higher vocational education, comprising 96 credit hours and 6 credits. The course accurately maps to high-demand positions within the smart shipping industry chain, such as big data low-level architecture engineering and cluster disaster recovery optimization. Guided by the educational philosophy of "simultaneous cultivation of virtue and technical skills," the teaching team has dismantled the traditional logic of purely technical instruction, reconstructing the course's general teaching objectives into a three-in-one matrix spanning value shaping, knowledge transmission, and capability cultivation:

Value Shaping Objective: Deeply rooting the college's unique maritime cultural advantages to cultivate an artisan spirit of striving for perfection, establishing a strict safety bottom-line awareness for safeguarding national port and shipping digital assets, and fostering a new-era maritime spirit of "patriotic dedication and chasing deep-blue dreams."

Knowledge Transmission Objective: Systematically teaching the core operational principles of low-level big data architectures (such as Hadoop and Spark) deployment, cluster operation tuning, distributed high-availability mechanisms, and the governance of massive, multimodal data streams.

Capability Cultivation Objective: Focusing on enhancing students' innovative practical abilities to apply platform technologies to solve real-world engineering problems—including massive data storage, complex computations, extreme traffic surges, and operational maintenance—within intricate maritime business environments.

2.2. Theoretical Reconstruction of the "Three-Color Lines" Curriculum Ideology and Politics Panorama

To ensure that ideological education dissolves seamlessly into technical training like salt into water, the course team has deeply excavated ideological entry points from the full maritime industry chain ("shipbuilding, ship navigation, ship management"). As shown in Figure 1, these elements are systematically refined into a comprehensive curriculum ideology panorama structured around three interconnected colored lines: Blue, Red, and Cyan.

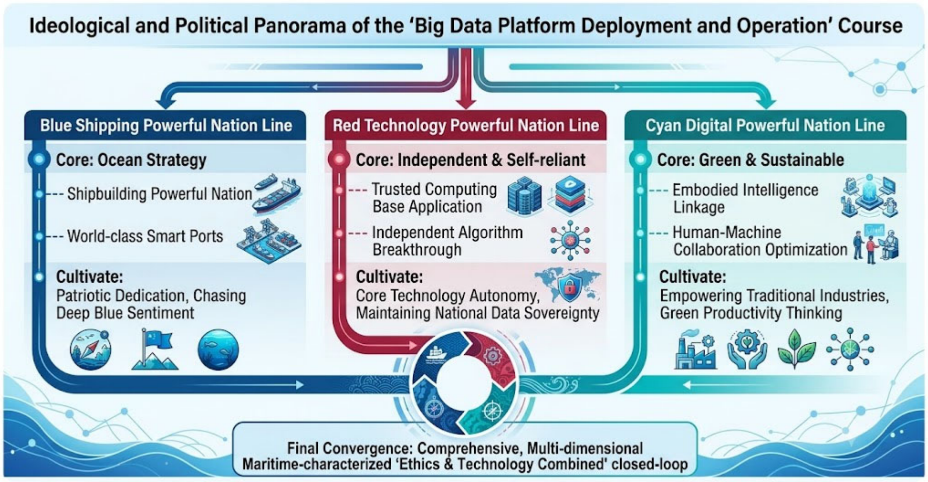

Figure 1. The structural of 'Three-Color Lines' course ideology and politics

2.2.1. Blue Maritime Power Line: Deeply Rooting Maritime Sentiments in the Industry

The Blue Maritime Power Line centers on serving the national maritime strategy. By incorporating backbone industrial cases such as large-scale integrated shipbuilding, world-class smart ports like Yangshan Port, and COSCO Shipping's global container logistics flows, the course connects technical components directly to national progress. When explaining the replica fault-tolerance mechanisms of the Hadoop Distributed File System (HDFS) and multi-tenant resource scheduling in YARN, instructors tightly couple these concepts with the global synergy and "same-boat" collectivism inherent in maritime crews. Utilizing big data platform technologies to sustain the computational power of national maritime arteries cultivates students' rigorous artisan spirit and inspires an industrial pride of dedicating themselves to the ocean.

2.2.2. Red Technology Power Line: Building a Bottom Line of Self-Reliance and Self-Improvement

The Red Technology Power Line focuses on self-reliance and self-improvement driven autonomously by large-scale industry models. Targeting the technological blockades and data security threats faced in infrastructure operations, the course thoroughly embeds an "Information Technology Application Innovation (ITAI) base" and "autonomous algorithms". During Linux security administration and the compilation/deployment of big data components, domestic secure operating systems (such as Kylin OS and UnionTech) and domestic database modules are actively introduced. By comparing the defensive security advantages of domestic ITAI bases against external cyber-attacks, the instruction highlights that technological self-reliance is the core of maritime digitalization, guiding students to establish a robust sense of data sovereignty and a resilient occupational bottom line for protecting national maritime assets.

2.2.3. Cyan Digital Power Line: Cultivating Green Empowering Thinking

The Cyan Digital Power Line converges on embodied intelligence and human-machine collaboration. With the rapid evolution of 5G, the Internet of Things (IoT), and Artificial

Intelligence, modern shipping is shifting toward a multimodal network of autonomous trucks, unmanned smart terminals, and automated vessels. This main line explores how big data platforms collaborate with automated hardware, guiding students to construct analytical models for port logistics turnover and ship Energy Efficiency Design Index (EEDI) verification. By mining carbon emission reduction pathways using big data infrastructure, the course fosters an innovative "green productivity" mindset that uses new-generation smart technologies to upgrade traditional shipping sectors.

2.3. Modularized Course Content Reconstruction Integrating the "Three-Color Lines"

As shown in Table 1, aligned with the "Three-Color Lines" blueprint, the teaching team has resolutely eliminated generic, industry-detached computing content, substituting it with real maritime datasets and industrial-grade scenarios embedded into six core instructional modules.

Table 1. Modular Teaching Content Matrix Integrated with the "Three-Color Lines"

Teaching Module	Credit Hours	Core Professional Skill Points	Mapped Ideological Line	Core Ideological Integration Points & Typical Cases
Module 1: Big Data Infrastructure Environment Deployment and Linux Security Management	12	Linux system SSH passwordless configuration, firewall and network security policies	Red Technology Power Line	Introducing domestic operating systems to discuss localization and autonomous control; emphasizing the strategic significance of network defense in preventing data tampering along maritime critical bottlenecks.
Module 2: Hadoop High-Availability Cluster Deployment and Distributed Storage	16	Zookeeper coordination mechanisms, HDFS HA architecture, YARN multi-tenant resource scheduling	Blue Maritime Power Line	Integrating COSCO Shipping's global container logistics data streams to explain distributed redundancy backup principles, weaving in the maritime collectivism of solidarity and mutual assistance.
Module 3: Distributed Computing Framework Spark and Real-Time Stream Processing	20	Spark RDD operator tuning, Spark Streaming window computation, computing parallelism optimization	Cyan Digital Power Line + Blue Maritime Power Line	Typical Case: Real-time navigation monitoring and stream data processing for a complex bridge area along the Jiangsu section of the Yangtze River. Optimizing computational resources to compress collision pre-warning latency to milliseconds, instilling the professional code of "respecting life and safeguarding security."
Module 4: Secure Operation and Maintenance of Massive Data Collection Components (Kafka/Flume)	16	Message middleware high-throughput configuration, multi-partition disaster recovery mechanisms, multi-source and	Red Technology Power Line	Utilizing tens of millions of high-concurrency dynamic trajectory records from the Automatic Identification System (AIS) to demonstrate source-level data governance, cultivating an artisan spirit of truth-seeking and meticulous execution.
Module 5: Data Warehouse Hive and Maritime Data Intelligent Analysis	16	Hive data modeling, partition and bucketing optimization, SQL statistics for complex maritime indicators	Cyan Digital Power Line	Constructing analytical models for port cargo turnover and ship energy consumption (EEDI), guiding students to mine carbon reduction pathways via big data platforms to establish a sustainable development philosophy.
Module 6: Intelligent Operations and Cloud-Native Big Data Platform Reconstruction	16	Prometheus cluster monitoring, Docker containerization, Kubernetes orchestration of big data components	Cyan Digital Power Line	Focusing on the "embodied intelligence" data closed-loop formed by unmanned automated guided vehicles (AGVs) and smart docks, teaching automated operations to foster an innovative mind for human-machine collaboration.

3. Implementation of Curriculum Ideology and Politics Based on the "Three-Color Lines"

3.1. Teaching Practice Framework

To ensure that the "Three-Color Lines" instructional design translates into highly effective classroom actions, the course deploys a comprehensive implementation framework that synchronizes multidimensional educational forces as shown in Figure 2.

One Center: Unswervingly maintaining students' balanced growth in integrity and skill as the focal point, utilizing the implicit synthesis of professional ethics as the baseline standard for validating technical instruction.

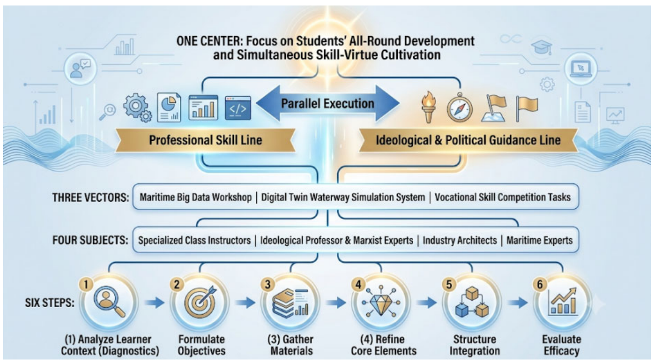

Figure 2. The multidimensional collaborative teaching implementation framework

Two Lines: Operating the technical skill delivery line and the ideological guidance line in parallel. Technical tracks break down architectures and optimization criteria, while the ideological track embeds core values imperceptibly during critical technical debugging phases.

Three Vectors: Harnessing the "Maritime Big Data Workshop" to onboard authentic industrial engineering files; constructing a "Virtual-Real Integrated Digital Twin Waterway System" to establish immersive, panoramic operations; and converting real tasks from national vocational skills contests into standardized modules to realize deep competition-course-classroom integration.

Four Subjects: Breaking the isolation of individual teachers by forming an educational community consisting of specialized IT instructors, Marxist theory professors, corporate big data architects, and maritime authority experts to co-revise syllabi, co-deliver lectures, and co-evaluate performance.

Six Steps: Strictly adhering to a closed-loop PDCA cycle of "Identifying learning issues→Formulating ideological targets→Gathering industrial materials→Refining core ideological elements→Structuring tactical integration→Evaluating educational efficacy" to drive the continuous improvement of every class.

3.2. "IDEAL" Project-Based Teaching Model

In the micro-implementation of daily classroom instruction, the course applies the project-driven "IDEAL" model to transform dry code syntax into an inspiring professional mission of safeguarding infrastructure security:

I (Identify) - Identify Pain Points: Commencing with authentic industrial bottlenecks (such as severe data ingestion blockages and latency caused by massive concurrent shipping traffic) to establish an engineering crisis scenario.

D (Define) - Define Tasks: Translating the industrial bottleneck into explicit low-level big data operational technical parameters.

E (Explore) - Explore Pathways: Directing students to run benchmark comparisons between open-source components and domestic secure alternatives, exploring optimal compute orchestration plans.

A (Execute) - Execute Tasks: Guiding students through panoramic hand-on practices in digital twin environments, conducting extreme stress loading and structural role-switching within project groups.

L (Reflect) - Reflect and Sublimation: Reviewing system execution logs to reflect on how single configuration oversights could compromise critical national infrastructure, internalizing an unyielding commitment to professional reliability.

Figure 3. The tactical execution flow of the selected case

3.3. Deep Analysis of a Typical Teaching Case

Taking the core module "Distributed Computing Framework Spark and Real-Time Stream Processing" and its representative lesson Real-Time Stream Processing Cluster Deployment and Parameter Tuning as an example, the full implementation cycle of the "Three-Color Lines" is analyzed as shown in Figure 3.

3.3.1. Pre-class Preparation: Context Construction and Data Source Introduction

The Jiangsu section of the Yangtze River stands as one of the densest and most navigable waterways worldwide, featuring a high concentration of cross-river bridges and a massive volume of concurrent vessel movements. If a real-time stream computing platform suffers even a few seconds of delay due to improper cluster tuning, maritime supervisors cannot issue timely collision warnings to off-course ships, potentially leading to catastrophic bridge-vessel collisions. Prior to class, the instructor issues a preparatory task via Chaoxing Xuexitong, granting students access to the proprietary "Multimodal Digital Twin Waterway Simulation System" and introducing an industrial dataset containing tens of millions of concurrent AIS coordinate strings, Vessel Traffic Services (VTS) radar sweeps, and hydrological flow readings.

3.3.2. In-class Implementation: Extreme Stress Testing, Crisis Injection, and Synchronicity of Virtue and Technique

Phase 1: Task-Driven Baseline Cluster Setup (IDEAL: I, D) In the lab, the instructor delivers the primary directive: students must independently configure a Spark Streaming computation cluster, initialize core memory properties, and simulate stream ingestion for regular vessel traffic across the bridge area. At this point, the digital twin console displays smooth ship trajectories with rendering latency contained within standard millisecond bounds.

Phase 2: Extreme Stress, Abrupt Failure, and Ideological Awakening (IDEAL: E, A) The instructor suddenly uses the master control panel to increase the background ingestion rate dramatically, simulating an "extreme traffic surge" where a massive fleet resumes navigation simultaneously following the clearance of a heavy fog. Ingestion pipelines encounter an abrupt 20-fold spike in data volume. Because several student groups specified conservative configuration properties or inadequate worker thread allocations during initialization, their compute clusters immediately experience severe "data skew" and Out-Of-Memory (OOM) exceptions. Vessel tracks on the digital twin visualization lock up, computing latency jumps from milliseconds to over 15 seconds, and the bridge zone on the big screen flashes an ominous crimson alert!

Phase 3: Deep Reflection and Ethical Alignment (IDEAL: L) As alarms blare across the lab and processing pipelines stall, the instructor deliberately halts all technical troubleshooting guidance. Instead, the main projector displays a historical video documenting a real-world catastrophe caused by a maritime system failure that led to a vessel striking a bridge fender, resulting in a structural collapse and loss of life. The instructor addresses the silent room: "Look at the latency counters flashing on your screens. If an operational engineer displays negligence or settles for 'good enough' when tuning platform parameters, what do those few seconds of delay translate to in the real world?" The classroom mood turns solemn; the previously detached attitude of viewing cluster parameters as simple numbers vanishes, replaced by absolute focus. This structural pivot successfully elevates basic parameter optimization into a profound professional commitment to safeguarding public safety and critical infrastructure, perfectly executing the "Red Technology Power Line's" objective of shaping bottom-line safety awareness.

Phase 4: Resolving the Emergency, Demonstrating Skill and Virtue Combined Spurred by an urgent sense of professional responsibility, students instantly self-organize within their technical teams to initiate troubleshooting. Analyzing Spark master and worker logs, they locate partitions suffering from data skew, adjust spark.default.parallelism along with Kafka consumer fetch parameters, optimize resource scheduling configurations, and rapidly deploy a high-availability (HA) automatic fallback architecture. Through coordinated technical execution, the data pipelines clear the accumulation; processing latency drops below 35 milliseconds, and the digital twin warning zone switches from red to green as the vessel fleet clears the bridge structure safely.

3.3.3. Post-class Extension: Process-oriented Diagnosis and Value-added Literacy Feedback

Following the session, students submit their updated cluster tuning profiles and high-availability architecture topologies through Chaoxing Xuexitong. By extracting system log trails tracking each student's debugging time, code revisions, and iteration loops, the instructor evaluates not only whether the code compiled successfully but also whether the disaster recovery fallback path reflects deep bottom-line thinking. This granular analysis feeds into a comprehensive "Digital Growth Portrait," enabling data-driven, precise evaluation and reinforcing behavioral development.

4. Conclusion

4.1. Core Effectiveness and Innovation Points of the Project Practice

By reconstructing the curriculum ideology system for Big Data Platform Deployment and Operation, this research has yielded notable dual successes in combining skills training with moral development, creating three innovative educational paradigms:

Cross-industry scenario empowerment, eliminating the "decoupled" bottleneck. The project innovatively fuses underlying big data platform management with the real maritime industry chain. By converting high-risk waterway monitoring needs and extreme traffic surges into core laboratory tasks, it gives cold technical code a clear purpose: protecting public safety. This approach achieves a natural fusion of ideological guidance and hardcore computing technology.

Deep competition-course integration, reinforcing the artisan spirit. Winning achievements from national skills contests, such as bridge collision warning algorithms, have been fully converted into standard learning modules. Over the past three years, students from this program have secured numerous national and provincial first prizes; more importantly, they consistently display a rigorous "digital sentinel" mindset in daily operations, maintaining a 100% compliance rate for firewall configurations and automated security auditing.

Digital twin-enabled environments, creating immersive practical education. Utilizing the "Maritime Big Data Workshop" and the custom-built virtual-real digital twin platform, authentic river currents and radar data are mapped directly into simulated infrastructures. Through realistic role-switching and emergency simulations, students learn firsthand that data platform reliability directly impacts national maritime logistics infrastructure, realizing an impactful educational experience.

4.2. Continuous Construction Plan and Outlook for Future Deepening Reforms

While the "Three-Color Lines" methodology has achieved solid initial success, the rapid evolution of technology requires the teaching team to continue refining this collaborative, industry-focused model. Future efforts will focus on minimizing the information gap between industry updates and classroom materials, while delivering personalized moral and technical education tailored to individual student profiles.

Over the next five years, the teaching team will further integrate professional competitions and real-world cases, focusing on three major initiatives:

Deploying LLM Agent Technologies: The team will explore building a specialized "Maritime Big Data Large Language Model Educational Agent". This intelligent agent will continuously monitor global maritime developments and breakthroughs in domestic secure computing, automatically translating them into relevant case studies for Linux security or Hadoop scaling modules, thereby eliminating the update lag for classroom materials.

Upgrading the Digital Twin Infrastructure: Leveraging the provincial virtual simulation base, the current bridge monitoring setup will be expanded into a multi-scenario simulation matrix. This will include international mega-ports, polar waterway operations under extreme conditions, and autonomous fleet compute scheduling, providing a visually compelling environment for the "Blue Maritime Power Line."

Deepening Dual-Leader and Industry Attachment Mechanisms: The program will systematically send junior instructors to the Yangtze River Maritime Safety Administration and fully automated terminals for long-term industrial attachments. Concurrently, senior industry architects will be invited to co-author updated editions of the Big Data Platform Deployment and Operation (Maritime Edition) digital loose-leaf textbook series. This ensures that classroom instruction remains closely aligned with industry developments, cementing a distinct maritime-focused brand for big data professional education.

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