

A Study of Curriculum-Based Ideological and Political Education in the Big Data Technology Program: Integrating Three Color Coded Themes and Two Interwoven Strands

Enze Wu, Taizhi Lv *

School of Information Engineering, Jiangsu Maritime Institute, Nanjing 211170, China

* Corresponding author: Taizhi Lv (Email: lvtaizhi@163.com)

Abstract: To address fragmented educational content, insufficient attention to industry characteristics, and weak connections between values education and project practice in the Big Data Technology program, this study develops a framework integrating three color-coded themes and two interwoven strands. The framework draws on maritime project-based teaching at Jiangsu Maritime Institute. Its educational content is organized around a red theme of cultural development, a teal theme of digital development, and a blue theme of shipping development. Narrative and project strands connect biographical accounts, industry development, and workplace events with learning tasks, embedding values into project analysis, technical implementation, and outcome verification. Using a shipping data platform as the project vehicle, the study explains approaches to coordination across program courses, teaching organization, and process assessment. It offers a reference for curriculum-based ideological and political education in higher vocational institutions with distinctive industry orientations.

Keywords: Big Data Technology Program; Curriculum-Based Ideological and Political Education; Three Color-Coded Themes; Two Interwoven Strands; Maritime Orientation.

1. Introduction

Curriculum-based ideological and political education is an important approach to fulfilling the fundamental educational mission of fostering virtue and developing talent, while realizing the educational role of disciplinary teaching. The Big Data Technology program prepares technically skilled graduates for data collection, processing, analysis, and platform operations and maintenance. Their professional conduct involves information authenticity, the boundaries of data use, and responsibility for system operation. Teaching therefore needs to help students understand whom technology serves and how it affects society, translating truthfulness, integrity, safety awareness, and accountability into workplace practice. The Guidelines for Developing Curriculum-Based Ideological and Political Education in Higher Education call for implementation that reflects disciplinary characteristics [1]. The Overall Layout Plan for Building a Digital China emphasizes digital infrastructure, data resource systems, and digital security [2], providing a basis for educational objectives that give equal attention to competence and responsibility.

Wang et al. discuss the meaning and characteristics of curriculum-based ideological and political education and propose strategies emphasizing the integration of disciplinary teaching with values education [3]. Han examines its development through enhanced understanding, deeper practice, and improved institutional arrangements, offering insights for coordinated implementation across an academic program [4]. Representative publications indexed in the China National Knowledge Infrastructure (CNKI) indicate sustained interest in the field, with research covering overall course design, coordination across courses, and teaching assessment. Drawing on Chinese core-journal and Chinese

Social Sciences Citation Index (CSSCI) publications indexed in CNKI, Wang et al. identify rapid growth in publications while noting room for improvement in research collaboration, methodological integration, and thematic coverage [5]. In big data education, Lin et al. discuss approaches involving two-way integration, blended learning, integration across courses, and alignment with engineering requirements [6]. Mei et al. apply outcomes-based education to course objectives, teaching processes, and continuous improvement [7]. Through bibliometric and thematic knowledge-map analysis, Ding et al. classify research into conceptual, methodological, and practical categories, highlighting disciplinary characteristics and collaborative education as important directions [8]. Together, these studies suggest that attention has expanded from identifying ideological and political elements to designing coherent teaching systems. Further exploration is needed to develop industry-based learning vehicles that connect courses throughout a program.

Against this background, this study proposes a framework integrating three color-coded themes and two interwoven strands, drawing on the development of the Big Data Technology program at Jiangsu Maritime Institute. Supported by coordination across program courses, it uses a shipping data platform project to explore how values education can be embedded throughout the project process.

2. Starting Point for Values Education across Program Courses

The institute's Big Data Technology program builds on its maritime orientation by combining technical learning with an understanding of shipping operations. Through the Huawei ICT Academy and research and teaching platforms related to maritime big data, the program collaborates with port and shipping IT enterprises. Enterprise projects, including

intelligent vessel management and control, are adapted into a vessel data analysis system used across core courses. The program's distinctive approach is to derive problems from shipping operations, address them through data technologies, and develop students' technical competence and industry understanding through complete projects.

The starting point for values education across the program is to translate requirements dispersed among individual courses into shared objectives. Chen et al. emphasize that computing programs should coordinate core educational elements, basic principles, and implementation strategies in line with course characteristics and talent-development objectives [9]. This provides a reference for specifying educational objectives across a program. Foundational courses emphasize standards awareness and academic integrity; core courses emphasize data ethics, engineering responsibility, and collaboration; integrated practical training emphasizes industry service, innovation, and professional accountability. For example, data collection requires authorization and source documentation; data processing requires preservation of original evidence and truthful reporting of anomalies; platform operations and maintenance require access control and traceable changes; and analytical presentation requires clear limits on conclusions and appropriate interpretation. Courses contribute sequentially to the same project, creating a traceable educational process.

Further work is needed to integrate content and connect learning processes across courses, avoiding both repetitive use of the same materials and assessment of educational

effectiveness solely through project completion. Program-level links between educational themes and tasks should therefore be established, translating expectations for professional conduct into course standards, project briefs, and assessment requirements.

3. Educational Practice Integrating Three Color Coded Themes and Two Interwoven Strands

Building on its maritime orientation and project-based teaching through a shipping data platform shared across courses, the program implements the proposed framework. The three color-coded themes organize educational content around cultural identity, digital responsibility, and a commitment to shipping development. The two interwoven strands connect red-history narratives with technical skills projects: project tasks arise from historical narratives, while those narratives continue to inform project development, helping students understand the professional responsibilities underlying technical choices. Through needs analysis, solution design, implementation, outcome verification, and reflection and improvement, values are translated into task constraints, operating standards, and assessment criteria. This connects content integration, the learning process, and assessment feedback, supporting the coordinated development of technical competence, professional qualities, and values. Figure 1 presents the overall framework.

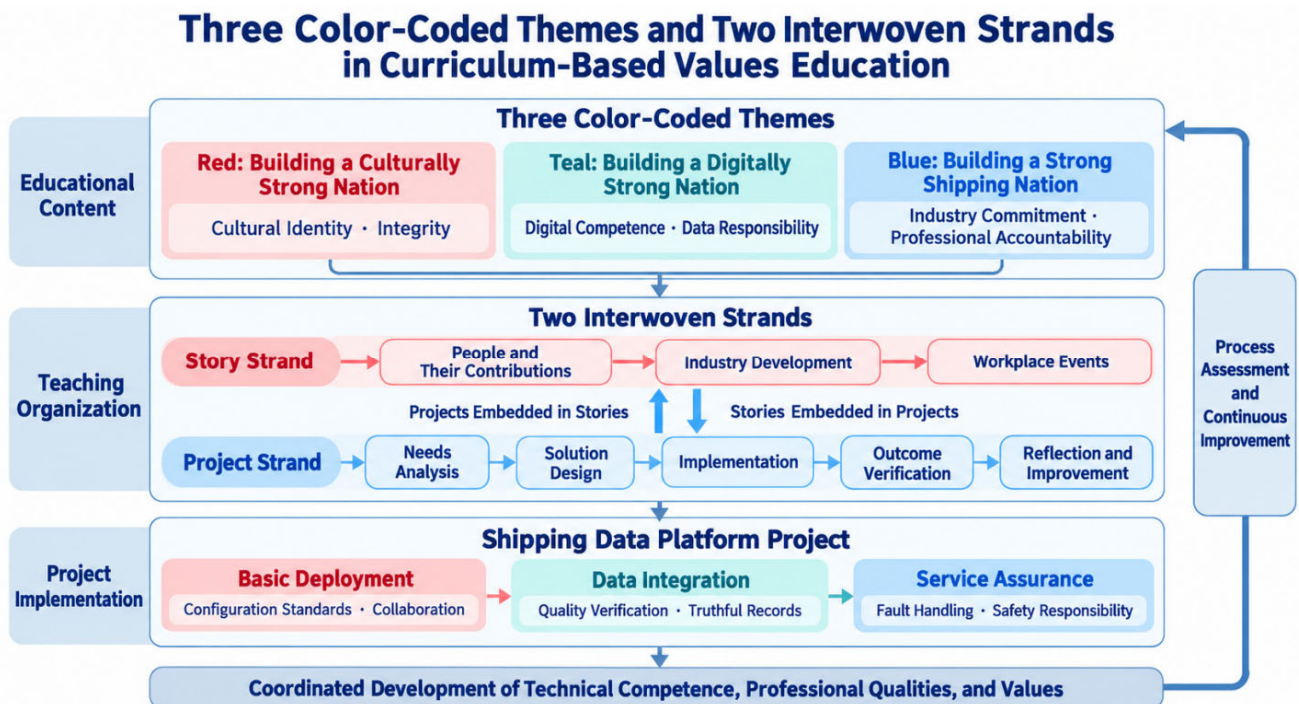


Figure 1. Framework for curriculum-based ideological and political education integrating three color-coded themes and two interwoven strands

3.1. Organizing Educational Content around Three Color Coded Themes

The framework organizes educational content around a red theme of building a culturally strong nation, a teal theme of building a digitally strong nation, and a blue theme of building a strong shipping nation. These themes emphasize cultural identity, digital responsibility, and commitment to the industry, respectively. They serve shared program objectives

while receiving different emphases in different course tasks, forming a coherent body of content throughout the program.

The red cultural theme focuses on values and convictions. Reliable accounts of figures in revolutionary history, the preservation of historical archives, and cultural digitization cases help students understand the relationship between cultural transmission, authentic information, and complete records. Respect for historical facts and commitment to duty become practical requirements: identifying data sources,

preserving processing evidence, and reporting results truthfully. Professional tasks extend the educational significance of historical narratives, deepening students' cultural identity as they organize, preserve, and present information.

The teal digital theme focuses on capability development. Reflecting the requirements for data resources and security in the development of Digital China, teaching objectives combine digital competence with professional responsibility. Data collection addresses authorization for use; data cleaning addresses transparent rules; platform deployment addresses configuration standards; and analysis addresses the evidence supporting conclusions. At key technical stages, students discuss the relationships between efficiency and security, and between sharing and protection, learning to justify technical choices and assess their potential effects.

The blue shipping theme focuses on direction and purpose. The ambition to develop a strong shipping nation is translated into professional responsibilities for safe, efficient, and green shipping, consistent with the Outline for Building China's Strength in Transport [10]. Cases involving vessel movements, port operations, and maritime services help students understand the operational consequences of data delays, missing information, and platform failures. Commitment to the industry thus becomes part of specific tasks, informing checks on data quality, system stability, and service improvement.

The three themes converge within the same project: truthful records demonstrate integrity, standardized processing demonstrates digital responsibility, and attention to service users demonstrates commitment to shipping. The teaching team jointly reviews the relationship between cases and tasks and determines each course's emphasis, rather than mechanically attaching every educational theme to every knowledge point.

3.2. Organizing Teaching through Two Interwoven Strands

The two strands interweave red-history narratives and technical skills projects. The narrative begins with the uprising aboard the Hailiao and extends to the development of shipping in the People's Republic of China and changes in China's shipping industry. It follows a progression from the Hailiao uprising to shipping development, industry growth, and smart transformation. The technical project strand involves collecting, cleaning, storing, analyzing, and presenting relevant data. The strands share a central inquiry: how has Chinese shipping changed, and how can these changes be represented through data? Students use professional skills to understand industry development, deepening their appreciation of earlier generations' contributions and their own contemporary professional responsibilities. Xu's approach of telling stories well, completing projects effectively, and building connections provides a reference for this teaching organization [11].

Embedding projects in stories requires historical narratives to generate questions that can be investigated through data. After introducing the Hailiao uprising and its connection to the institute's revolutionary heritage, teachers invite students to ask how shipping in the People's Republic has developed and how China's ports, fleets, and transport capacity have changed. A project analyzing the development of China's shipping industry is organized around these questions. Students collect port cargo throughput, container throughput,

waterway freight volume, and transport-vessel carrying capacity data from public sources such as statistical yearbooks and industry bulletins. They standardize fields, handle missing values, convert units, and check consistency in statistical definitions. Time-series analysis, regional comparisons, and visualization allow them to describe the industry's development through data, naturally extending historical narratives into disciplinary inquiry.

Embedding stories in projects requires analytical findings to advance the narrative. Students plot trends, compare the development of ports in different regions, and identify periods of notable change. They then consult reliable industry sources to explain the background, following a process of posing questions, analyzing data, checking contextual evidence, and interpreting changes. For example, analysis of port throughput can lead to an examination of infrastructure development and transport demand; comparisons of vessel carrying capacity can prompt inquiry into fleet restructuring and shipping service capabilities; and discussions of smart shipping can draw on specific cases to explain how data platforms support industry operations. Teachers place the patriotic aspirations reflected in the Hailiao uprising within the continuing development of Chinese shipping, grounding values education in data and industry understanding. Students must also distinguish descriptive trends from causal explanations and state the coverage and limitations of their data, developing an evidence-based professional attitude.

At program level, the shipping industry development analysis project connects courses and establishes a progression from understanding history to analyzing the present and serving the industry. Data collection and processing courses organize industry data; database courses build a thematic database on shipping development; data analysis and visualization courses produce reports and dashboards; and platform deployment and operations courses support storage, updating, and query services. Drawing on Sun et al.'s work on collaborative education across courses [12], courses address shared questions sequentially and share their outputs. As their skills develop, students enrich their understanding of Chinese shipping through a pathway that derives questions from the Hailiao story, analyzes development using professional skills, and tells the story of shipping through data-based outputs.

4. Conclusion

The framework integrates cultural identity, digital responsibility, and commitment to shipping development into values education across the Big Data Technology program. Red-history narratives and technical skills projects interweave throughout teaching, while shared projects support connections between courses. Beginning with the Hailiao uprising, the framework extends the institute's revolutionary history into an examination of China's shipping industry. Data collection, processing, analysis, and presentation enable students to understand industry change and deepen values-based identification through disciplinary inquiry. The key is to translate values into task constraints, operating standards, and assessment criteria, so that students develop technical competence, understand professional responsibility, and connect their own growth with industry development while analyzing shipping trends and solving data problems.

Future work should expand teaching resources that connect revolutionary institutional history, the shipping industry, and

digital technologies. Continuously updated narrative resources, industry datasets, and projects at different levels of difficulty should address port development, fleet structure, green shipping, and smart shipping, keeping teaching relevant to contemporary developments and workplace needs. Coordination across courses should also be strengthened, enabling disciplinary teachers, ideological and political education teachers, and industry practitioners to develop projects and guide practice jointly. Data analysis findings can then become learning outputs suitable for presentation, discussion, and application. Assessment should combine student work, operational records, analytical reports, and longitudinal follow-up to examine changes in data authenticity, adherence to technical standards, professional judgment, and industry understanding. Such evidence can support continuing teaching improvement and inform adaptation of the framework to other industry-oriented programs.

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