

Establishing and Implementing a System for Integrating Ideological and Political Education into the “Epidemiology” Course in the Context of New Medical Education

Xinrui Li^{1*}, Xuechun Li^{2*}, Hongyan Kuang³, Wei Su⁴, Xuang Cao^{3#}, Yun Zhou^{5,6#}

¹Human Resources Department, Yunnan Medical Health College, Kunming, China

²School of Nursing, Dali University, Dali, China

³School of Clinical Medicine, Yunnan Medical Health College, Kunming, China

⁴School of Nursing and Rehabilitation, North China University of Science and Technology, Tangshan, China

⁵School of Public Health, Dali University, Dali, China

⁶School of Public Health, Fudan University, Shanghai, China

Email: #764198517@qq.com, #810506464@qq.com

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Abstract

Addressing the challenges in integrating ideological and political education into the “Epidemiology” course, this study developed a three-dimensional “knowledge-competency-values” framework for ideological and political education based on the OBE philosophy and the ADDIE model. It deeply explored ideological and political elements such as patriotism and the scientific spirit, adopted diverse approaches including blended learning, CBL/TBL, and extra-curricular practical activities, and conducted process-based assessments through a digital and intelligent platform. A post-course non-equivalent control group design was implemented among junior college students majoring in Health Management. The results showed that both professional identity and a sense of social responsibility were significantly enhanced in the experimental group ($P < 0.001$). This indicates that the system can effectively promote the synergy between value cultivation and professional education, providing a replicable practical pathway for the integration of ideological and political education into core medical courses within the context of the “New Medical Disciplines” initiative.

Keywords

New Medical Disciplines, Epidemiology, Integrating Ideological and Political

*Co-first authors.

#Corresponding authors.

1. Introduction

Against the backdrop of the profound shift in the “Healthy China 2030” strategy from a “disease-centered” to a “health-centered” approach¹, the development of the “New Medical Disciplines” has set higher standards for medical education. The “newness” of the New Medical Disciplines is reflected not only in the evolution of medical technology but also in the deep “integration of medicine and the humanities” [1]. Currently, public health security has become an integral part of the national security framework, requiring professionals in the medical and health fields to possess not only solid professional skills but also a deep humanistic foundation, firm political convictions, and a broad social perspective. The Ministry of Education’s “Guidelines for Integrating Ideological and Political Education into Higher Education Curricula”² explicitly states that medical courses must strengthen education on medical ethics and professional conduct, ensuring that students internalize the values of safeguarding public health and saving lives. Therefore, how to break down the “island effect” between professional education and ideological and political education within the framework of the “New Medical Disciplines”, and how to build a curriculum system for collaborative education, has become a critical issue that medical and health education in the new era urgently needs to address.

As a core discipline and methodology in the fields of preventive medicine and health management, epidemiology is hailed as the “backbone of public health” [2]. Its scope of study—ranging from the macro level of population distribution to the micro level of disease mechanisms—naturally embodies rich elements of ideological and political education. In the practical response to public health crises—such as infectious disease outbreaks and the prevention and control of major chronic diseases—epidemiology not only provides data support for scientific decision-making but also reflects the scientific spirit of seeking truth from facts, the professional ethics of boundless compassion, and the sense of national and social responsibility embodied by medical scientists. From Wu Liande’s national spirit in combating the plague [3], to the institutional strengths demonstrated in schistosomiasis control in the early years of the People’s Republic of China [4] [5], to the “Chinese Solution” in modern global health governance [6], every case study in epidemiology courses serves as a vivid teaching tool for guiding students toward core values. Its rigorous logical reasoning and evaluation of scientific evidence—such as inferring causality between etiology and disease—effectively cultivate students’ dialectical materialist thinking, achieving a natural integration of professional knowledge transmission and value formation.

Although initial progress has been made in integrating ideological and political education into epidemiology courses [7]-[9], numerous challenges remain in ac-

¹https://www.gov.cn/gongbao/content/2016/content_5133024.htm

²https://www.gov.cn/zhengce/zhengceku/2020-06/06/content_5517606.htm

tual teaching, with a widespread disconnect between theory and practice. First, the incorporation of ideological and political elements tends to be “fragmented”, lacking systematic top-level design, which often results in such integration remaining superficial and failing to penetrate the discipline’s underlying logic; Second, teaching methods are relatively monotonous; traditional “cram-style” lecturing fails to resonate emotionally with students, resulting in insufficient appeal for ideological and political education [10]. Finally, the evaluation system is inadequate; for a long time, it has focused on closed-book assessments of professional knowledge while neglecting the quantitative evaluation of students’ implicit qualities, such as values, professional attitudes, and a sense of social responsibility. This current situation—characterized by “prioritizing intellectual development over moral development and a disconnect in evaluation”—severely limits the quality and effectiveness of ideological and political education within the curriculum. Based on this, this study attempts to introduce the OBE (Outcome-Based Education) philosophy and the ADDIE instructional design model to explore the construction of a systematic, measurable framework for ideological and political education in epidemiology courses, with the aim of providing an evidence-based reference for public health talent development.

2. The Logic behind the Top-Level Design of the Curriculum-Based Ideological and Political Education System

Table 1. Mapping relationships in the OBE-ADDIE integration framework.

OBE Outcome-Based Education Session	OBE-ADDIE Integrated Logical Mapping Relationships	Specific Practical Activities
Define Learning Outcomes	A (Analysis) + D (Design)	Based on the context of the New Medical Education Initiative and an analysis of student learning situations, we have established a three-dimensional educational framework centered on “knowledge, competence, and values”
Developing a Path to Achievement	D (Development)	Revise the curriculum standards and develop a case study database and teaching materials for the eight core chapters on ideological and political education
Positive Teaching Approach	I (Implementation)	Online Smart Platform + CBL/TBL Classroom Debates + Community Surveys
Assessment of Output Achievement	E (Evaluation)	Quantitative Scale Assessment + Qualitative Text Mining + Digital and Intelligent Sentiment Trajectory Analysis
Continuous Quality Improvement	E → A/D Negative Feedback	Assessment results inform academic performance forecasting and drive the dynamic iteration of syllabi and case study repositories

Against the broader backdrop of the deepening development of the “New Medical Disciplines” initiative, the integration of ideological and political education into the “Epidemiology” course is no longer a simple addition to professional instruction, but rather a systematic restructuring grounded in the logic of student development. Addressing pain points in traditional teaching—such as the fragmented integration of ideological and political education and the difficulty in measuring its implicit educational effects—this study adopts the Outcome-Based Education (OBE) philosophy as its guiding principle and the ADDIE instructional design model as its implementation engine to construct a course-based ideological and political education system characterized by “starting with the end in mind, backward design, forward implementation, and closed-loop improvement”. In this framework, the OBE philosophy anchors the three-dimensional “knowledge-competency-values” learning outcomes, while the ADDIE model (Analysis-Design-Development-Implementation-Evaluation) serves as the specific operational methodology, integrating OBE’s outcomes-based approach throughout the entire teaching lifecycle to achieve a deep alignment between philosophy and operational pathways. Their comprehensive mapping relationship is shown in **Table 1**.

2.1. Redefining Educational Goals Based on the OBE Philosophy: Establishing a Three-Dimensional Framework of “Knowledge-Competence-Values”

This study adheres to the principles of Outcome-Based Education (OBE), emphasizing the use of students’ final learning outcomes as the logical starting point to design instructional objectives in a backward-design approach, thereby establishing a new “knowledge-competency-values” trinity as the framework for education. Among these, knowledge objectives serve as the “foundation” of education; closely aligned with the demands of health management positions, they require students to master the basic principles of disease prevalence measurement, descriptive research, and screening evaluation, with a focus on understanding the logic behind population health risk assessment and the identification of chronic disease epidemiological characteristics; Competency objectives serve as the “backbone” of education, cultivating students’ ability to identify community health issues through comparative analysis of populations and a prevention-oriented mindset, and equipping them with practical job skills for conducting community health surveys, managing chronic disease follow-ups, performing basic health data cleaning, and delivering public health education and outreach; Value-based objectives are the “soul” of education, shaping students’ professional ethics of “great medical virtue and sincere dedication” and a scientific attitude grounded in seeking truth from facts. They particularly reinforce students’ sense of professional mission and social responsibility to take root at the grassroots level and serve community public health, thereby facilitating their transition from “health practitioners” to “grassroots health guardians”.

2.2. System Design Based on the ADDIE Model: Deep Integration of Ideological and Political Education Elements with Core Chapters

To ensure the effective implementation of the aforementioned three-dimensional objectives, this study conducted systematic course resource development based on the ADDIE instructional design model. Preliminary analysis of student learning profiles revealed that while contemporary medical students generally possess strong information literacy, they lack sufficient understanding of the historical depth of their discipline and its broader value in societal governance. This necessitates that the integration of ideological and political education elements be both contemporary and relatable. Building on this, the course team comprehensively revised the “Epidemiology” course standards, striving to construct a repository of ideological and political education case studies covering eight core chapters to achieve a precise alignment between professional knowledge points and ideological and political education touchpoints. For example, in the “Overview of Epidemiology” chapter, the history of smallpox eradication and lessons from the Black Death were introduced to reinforce the concept of a community with a shared future for mankind; in the “Measurement and Distribution of Disease Frequency” and “Descriptive Studies” chapters, the 1918 influenza pandemic, the “Typhoid Mary” incident, and community health surveys of the elderly were incorporated to explore social responsibility, the elimination of discrimination, and the ethical balance of public interest; In the “Inference of Causes” and “Analytical Studies” chapters, the focus is on introducing the rigorous scientific logic demonstrated in the investigation of waterborne transmission of cholera, as well as case studies such as the lung cancer etiology study among tin miners in Yunnan Province and Chinese scientists’ attribution analysis of COVID-19, to inspire students to cultivate the contemporary spirit of rooting themselves in grassroots communities and serving the nation through science and technology, along with cultural confidence; In the “Experimental Epidemiology” and “Screening” chapters, the course uses the classic dietary treatment trial for scurvy (the Lind trial) and China’s Early Diagnosis and Treatment Program for Cancer to thoroughly explain medical ethical principles (such as informed consent) and the prevention-oriented philosophy of health management, thereby establishing a curriculum framework where “every chapter incorporates ideological and political education, and every case study embodies a guiding spirit”. Furthermore, given that associate degree students in health management tend to pursue careers at the grassroots level and focus on technical applications, the course team placed special emphasis on “simplification and practical application” in case selection. Avoiding complex, purely mathematical modeling and inference, the team focused on selecting vivid cases closely related to community chronic disease management, health screening, and public health ethics. For example, in the “Screening” chapter, the course integrates national initiatives for early cancer diagnosis and treatment as well as community chronic disease screening programs to help students recognize the value of health

management as the “first line of defense”. In the “Descriptive Research” chapter, it uses a health survey of elderly community residents as a starting point to cultivate students’ humanitarian values, such as respect for vulnerable groups and care for community residents. See **Table 2**.

Table 2. Integration of ideological and political elements into core chapters.

Core Chapters	Corresponding Classic Cases	Ideological and Political Education Reference Points
Epidemiological Overview	The Eradication of Smallpox and the Historical Lessons of the Black Death	A Sense of Mission in One’s Discipline and an Awareness of the Community with a Shared Future for Mankind
Measurement and Distribution of Disease Prevalence	The 1918 Influenza Pandemic, Typhoid Mary	The Ethical Balance Between Social Responsibility, Individual Freedom, and the Public Interest
Etiology and Causal Inference	John Snow and Horace Waterhouse’s Investigation into Waterborne Diseases	Rigorous scientific thinking and a fact-based scientific approach
Descriptive Study	Community Survey on the Health of Older Adults	Humanistic Care in Medicine, Protection of Vulnerable Groups
Cohort Study	A Cohort Study of Lung Cancer Among Tin Miners in Yunnan Province	Taking Root at the Grassroots Level, Dedication to the Frontier, and Serving National Strategies
Case-Control Study	Chinese Scientists’ Analysis of the Origins of COVID-19	Cultural Confidence and the Spirit of the Times: Serving the Nation Through Science and Technology
Experimental Epidemiological Study	Dietary Treatment Trial for Scurvy (Lind Trial)	Ethical Guidelines, Informed Consent, and the Boundaries of Human Experimentation
Screening	China’s Early Cancer Diagnosis and Treatment Program	A preventive approach centered on prevention and whole-life-cycle health management

2.3. Implementation Pathways and Closed-Loop Evaluation Mechanisms: Integration of Online and Offline Approaches and Dynamic Feedback-Driven Improvements

The vitality of the curriculum-based ideological and political education system lies in its efficient implementation pathways and scientific evaluation and feedback mechanisms. This study developed a blended teaching model that deeply integrates online and offline elements. In the initial phase, platforms such as Yunbanke were used to distribute videos of historical materials related to the discipline to evoke emotional resonance. In the middle phase, in-person classroom sessions employed the Case-Based Learning (CBL) and Team-Based Learning (TBL) methods; for example, debates were organized around legal and ethical conflicts in historical public health events, guiding students to internalize values through critical thinking. Finally, a dynamic, closed-loop assessment mechanism was established. This mech-

anism incorporates students' performance in classroom interactions, the depth of their post-class reflection journals, and behavioral feedback from community public health practice into the formative assessment framework. Combined with the value judgment scores from open-ended case analysis questions in the final exam, this approach yields a diversified set of assessment results. These results are not only used to measure students' attainment of ideological and political literacy but also serve as critical feedback data to retrospectively evaluate the rationality of the analysis and design phases, driving the continuous iteration and optimization of course standards and the case repository, thereby achieving dynamic management that fosters a spiral-like improvement in teaching quality.

3. Exploring and Integrating Distinctive Ideological and Political Education Elements in "New Medical Disciplines"

The development of "New Medical Sciences" calls for medical education to transcend mere technical rationality and shift toward a deep integration of "value rationality" and "instrumental rationality". This study conducts an in-depth analysis of the knowledge map of the eight core chapters of "Epidemiology". By "tracing historical developments longitudinally and benchmarking against contemporary hot topics horizontally", it identifies four dimensions of ideological and political education that align closely with the discipline's key concepts, thereby constructing a matrix of ideological and political elements that integrates "history, events, and principles".

3.1. A Sense of Belonging to Home and Country and the Mission of Our Times: From "Local Practices" to "China's Solutions"

In the chapters "Introduction to Epidemiology" and "Distribution of Diseases", the course places particular emphasis on strengthening students' sense of national identity and their sense of mission in the current era. The course introduces the case study "Eradication of Smallpox" [11], highlighting China's pioneering contribution to the invention of variolation as early as the Song Dynasty, as well as the institutional advantages of modern China in the elimination of schistosomiasis and malaria, thereby fostering a sense of national pride. In the "Cohort Studies" chapter, a classic local case study—the epidemiological investigation of lung cancer among tin miners in Yunnan Province [12]—is specifically introduced. By recounting the struggles of older generations of epidemiologists who settled in the remote southwestern frontier and established world-class cohorts under arduous conditions, students are guided to understand the profound meaning of "writing research papers on the vast land of our motherland", thereby encouraging them to dedicate themselves to grassroots public health work. Furthermore, drawing on the COVID-19 pandemic, the course compares differences in epidemic control strategies between China and the West and provides an in-depth analysis of the "people first, life first" philosophy underlying the "dynamic zero-COVID" policy and subsequent optimizations, enabling students to deeply understand the supe-

riority of the Chinese path to health and medical development.

3.2. The Scientific Spirit and Seeking Truth from Facts: From “Exploration in the Mist” to “Precise Inference”

The chapters on “Etiology and Inference of Causes” and “Descriptive Studies” are central to fostering students’ critical thinking and scientific spirit. Using water-borne transmission of cholera as a starting point, the course recreates the scientific process by which John Snow, in his investigation of the “Broad Street Well”, broke free from the prevailing “miasma theory” of the time. Through mapping mortality rates and applying rigorous logical reasoning, he identified the source of the disease and removed the pump handle. This case vividly illustrates the disciplinary spirit of epidemiology—“bold hypotheses, careful verification”—and teaches students that when facing unknown public health crises, they must maintain an objective and rational scientific attitude, dare to question authority, and insist on letting the data speak for itself.

3.3. Professional Ethics and Awareness of the Rule of Law: From “Individual Rights” to “Collective Well-Being”

In the chapters on “Experimental Epidemiological Research” and “Screening”, medical ethics and legal education are integrated throughout. Taking the example of scurvy and dietary treatment trials, while James Lind’s pioneering experiment laid the foundation for clinical trials, the course further guides students to reflect on core principles in modern clinical trials—such as informed consent and ethical review—to move beyond unregulated growth and establish a “people-centered” baseline for scientific research. In the “Measurement of Disease Prevalence” and infectious disease prevention and control modules, the tragic case of “Typhoid Mary” is introduced to facilitate a legal debate among students on “the boundaries between individual freedom and public safety”. This helps students deeply recognize that laws and regulations such as the “Law on the Prevention and Control of Infectious Diseases” serve as the cornerstone for balancing individual rights and collective interests. Public health practitioners must possess a strong sense of the rule of law and humanistic care to avoid “technical indifference” during law enforcement. At the same time, by integrating the China Cancer Early Diagnosis and Treatment Program into the screening chapter, we explore issues of equity in the allocation of health resources, fostering in students a professional ethic that prioritizes vulnerable groups and promotes health equity.

3.4. A Global Perspective and a Sense of Community: From “Historical Lessons” to “Joint Construction and Shared Benefits”

Building on the content of “An Introduction to Epidemiology” and the epidemiology of infectious diseases, this course focuses on cultivating students’ capabilities in global health governance. By reviewing the devastating impacts of the Black Death and the 1918 influenza pandemic on human civilization, the course illus-

trates the objective reality that viruses know no borders and reveals that, in the face of major infectious diseases, humanity is a community with a shared future. In light of current global public health challenges, the course guides students to understand the role of international organizations such as the World Health Organization (WHO) in coordinating the global response to pandemics, as well as China's active participation in global health governance and its responsibility to provide public health products to the world. By incorporating these grand narratives, the course broadens students' international perspectives, inspiring them to embrace the lofty aspiration of building a "community of health for all humanity" and facilitating their transformation from "public health artisans" to "medical professionals of a major power".

4. Practical Approaches to Integrating Ideological and Political Education into Courses and Teaching Innovation

Once the top-level design and ideological and political elements have been defined, the core of building this system lies in how to transform abstract value guidance into concrete teaching practices. Drawing on modern information technology, this study constructs a practical pathway for integrating ideological and political education into epidemiology courses that is "process-driven, multidimensionally interactive, and empowered by digital intelligence", with the aim of achieving synergy between the transmission of professional knowledge and the shaping of values.

4.1. Establishing a Blended Online-Offline Teaching Model: Extending the Scope of Holistic Education across Time and Space

4.1.1. Pre-Class Reflection: The Smart Teaching Platform Inspires Thought and Fosters Learning

During the lesson preparation phase, teachers leverage smart teaching platforms such as Chaoxing Learning Pass and MOOCs to distribute pre-class resources with strong ideological and political implications in advance through platforms like Cloud Class. For example, before studying "Epidemiology of Infectious Diseases", instructors share short videos from "Chronicles of China's Fight Against the Pandemic" or historical materials on "Wu Liande's Fight Against the Harbin Plague". By posing thought-provoking discussion questions (such as "How should individual freedom and social responsibility be balanced in the face of a public health crisis?"), they guide students to develop emotional resonance and a sense of inquiry before entering the classroom, facilitating a shift from passive reception to active critical thinking.

4.1.2. In-Class Internalization: A Deep Integration of Case-Based Learning (CBL) and Team-Based Learning (TBL)

Classroom instruction is the primary arena for internalizing ideological and political education. This study moves away from traditional "cram-style" indoctrination and adopts an interactive model that combines Case-Based Learning (CBL)

with Team-Based Learning (TBL). Instructors select classic case studies—such as the “Mary Typhoid” ethical controversy and “John Snow’s Cholera Investigation”—as entry points, dividing students into learning groups to facilitate team collaboration. Students are required to apply specialized epidemiological knowledge—such as the three-room distribution and bias control—to analyze the cases and engage in debates on ideological and political issues, including professional ethics, ethical principles, and social justice. Through these “immersive” discussions, students not only hone their professional logical thinking while simulating the resolution of real-world public health problems but also deepen their inner commitment to the ideals of “excellent medical ethics and integrity” and “serving the nation through science” through the clash of values.

4.1.3. Extracurricular Activities: Second-Classroom Programs and Social Research Projects

The effectiveness of ideological and political education is ultimately reflected in behavioral change. Based on the applied nature of the health management major, this study actively developed a distinctive “Community + Health Management” extracurricular program. Students were organized to conduct in-depth surveys in communities and on campus, focusing on college students’ health literacy, the chronic disease management needs of elderly community residents, and the transition to digital health. Students applied survey designs learned in the classroom to real-world scenarios. While completing data collection and analysis, they designed simple health guidance manuals and public education presentation plans tailored to the health preferences of community seniors. This hands-on training, characterized by “learning through doing and growing through practice”, not only enhanced students’ on-site communication and practical health management skills but also allowed them to deeply appreciate the social value of health management services when interacting with grassroots communities. This effectively strengthened vocational pride and the willingness to serve at the grassroots level among vocational college students.

4.2. The Application of “Digital and Intelligent” Methods in Ideological and Political Education: Precise Profiling and Emotional Trajectory Tracking

Against the backdrop of the New Medical Education Initiative, the evaluation of ideological and political education in the curriculum is shifting from an “experience-driven” to a “data-driven” approach. By analyzing unstructured data from teaching platforms such as Yunbanke—including the emotional tone of comments in discussion forums, the viewing duration of ideological and political videos, and the frequency of keywords in practical reports—a “dynamic profile of students’ ideological and political literacy” is constructed. Using Natural Language Processing (NLP) technology to analyze students’ emotional feedback at different stages of instruction enables the precise identification of their emotional trajectories—from “emotional fluctuations” to “attitudinal alignment” and ultimately to

“value internalization”. For example, if data analysis reveals that student discussions on a specific case are highly active but exhibit significant biases in their viewpoints, instructors can adjust subsequent teaching strategies in real time to provide precise guidance. This precision-based teaching approach, grounded in “digital and intelligent” methods, not only enhances the relevance of ideological and political education but also provides an evidence-based foundation for the objective evaluation of teaching outcomes, ensuring the continuous optimization and dynamic evolution of the curriculum-based ideological and political education system.

5. Evaluation of Teaching Outcomes and Analysis of Effectiveness

5.1. Methods

5.1.1. Study Design and Participants

This study was conducted during the second semester of the 2024-2025 academic year (March-July 2025) using a post-course non-equivalent control group design. The study participants were students majoring in Health Management at a higher vocational college. The control group consisted of students from the Class of 2023 (n = 20), who received conventional instruction; the experimental group consisted of students from the Class of 2024 (n = 13), who received reformed instruction integrating ideological and political education with digital community practice. Students in both groups belonged to the same college and attended classes in the same classrooms and training labs. The curriculum, total credits, class hours, and teaching facilities were identical for both groups. There were no statistically significant differences between the two groups in terms of admission cutoff scores or the distribution of grades in prerequisite courses ($P > 0.05$). See Table 3. However, due to teaching schedule constraints, this study did not collect pre-test data prior to the course, and the two groups were drawn from different grade cohorts. Therefore, the analysis in this study focuses on comparing post-course group differences rather than measuring the net improvement directly attributable to the intervention.

Table 3. Analysis of differences in entrance exam scores and grades in completed foundational courses between the two groups of students ($\bar{x} \pm s$).

Variables	Total (n = 33)	Control Group (n = 20)	Experimental Group (n = 13)	t	P
College Entrance Exam Scores	307.94 ± 44.71	310.44 ± 44.08	304.36 ± 47.03	0.38	0.703
Basic Medical Science Grades	72.18 ± 7.58	72.10 ± 8.14	72.29 ± 7.01	-0.07	0.945
Preventive Medicine Grades	73.09 ± 9.35	72.65 ± 9.50	73.71 ± 9.45	-0.32	0.749

5.1.2. Intervention Dose and Fidelity

The experimental group utilized the ChaoXing/Yu Classroom teaching platforms to release case studies by chapter, requiring students to complete online discussions and ideological and political education quizzes. In addition, students were required to complete a designated health literacy survey and health education practicum, and submit a 1500-character practicum summary report. The control group employed traditional classroom lectures combined with conventional case analyses, without including online ideological and political education modules or on-site community practicums.

This course was taught by the same teaching team; standardized lesson plans and uniform requirements for both regular and final grades were established to ensure the homogeneity and consistency of instructional delivery.

5.1.3. Measuring Tools

At the conclusion of the course, the “Scale for Assessing Professional Identity and Social Responsibility Among Higher Vocational Health Management Students” was used to evaluate students’ emotional and attitudinal development. The scale consists of 10 items, divided into two dimensions: Professional Identity (5 items) and Social Responsibility (5 items). A 5-point Likert scale was used (1 = Strongly Disagree, 5 = Strongly Agree), with a score range of 5 - 25 points per dimension.

5.1.4. Text Mining and Content Analysis

To provide an in-depth interpretation of the quantitative survey results, this study conducted qualitative content analysis and keyword frequency mining on the 13 community practice summary reports submitted by the experimental group. The Jieba library in Python was used to perform tokenization and stopword filtering on the 13 reports, extracting high-frequency thematic terms and emotionally charged words to help substantiate the psychological and cognitive changes students experienced during the practice process.

5.2. Statistical Analysis

All data collected in this study were entered into a database and analyzed using R software. Continuous variables are expressed as mean $\pm$ standard deviation ($\bar{x} \pm s$), and comparisons between groups were performed using an independent samples t-test; categorical variables are expressed as frequencies and percentages (%), and chi-square tests were used. A P-value < 0.05 was considered statistically significant.

5.3. Results

5.3.1. Quantitative Evaluation

The quantitative evaluation consisted of two parts: the comprehensive course grade and the Professional Identity Scale. For the academic performance component, 20% of the final exam was allocated to case analysis questions, focusing on assessing students’ logical analysis and ethical decision-making abilities in complex public health contexts. The assessment of ideological and political literacy

utilized the “Scale of Medical Students’ Professional Identity and Social Responsibility” for post-course evaluation. The results showed that the control group’s final overall score was 71.60, while the experimental group’s final overall score was 69.00; the difference in final overall scores between the two groups was not statistically significant ($t = 1.16$, $P = 0.256$); The control group’s professional identity score was 10.45, while the experimental group’s was 18.23; the difference in professional identity scores between the two groups was statistically significant ($t = -13.17$, $P < 0.001$); The control group’s social responsibility score was 11.75, while the experimental group’s was 18.15; the difference in social responsibility scores between the two groups was statistically significant ($t = -13.20$, $P < 0.001$). See **Table 4**.

Table 4. Analysis of differences in assessment scores and ideological and political literacy scores between the two groups of students ($\bar{x} \pm s$).

Variables	Total (n = 33)	Control Group (n = 20)	Experimental Group (n = 13)	t	P
End of Term Grade	70.58 ± 6.34	71.60 ± 5.00	69.00 ± 7.95	1.16	0.256
Professional Identity Score	13.52 ± 4.19	10.45 ± 1.85	18.23 ± 1.30	-13.17	<0.001
Social Responsibility Score	14.27 ± 3.45	11.75 ± 1.41	18.15 ± 1.28	-13.2	<0.001

5.3.2. Qualitative Evaluation

Qualitative analysis further explored the deeper implications of education through qualitative research methods. Text mining of the 13 “Reflections on Epidemiology Field Training” reports from the experimental group revealed that keywords such as “life above all”, “data rigor”, and “frontier mission” appeared most frequently. Several students wrote in their journals: “Through studying the lung cancer research on tin miners in Yunnan, I realized that epidemiology is not just dry data, but a shield that protects the people’s health”.

6. Discussion

6.1. Synergistic Enhancement of Teachers’ Awareness and Capabilities in “Ideological and Political Education”

Faculty members are the “primary driving force” behind the integration of ideological and political education into the curriculum. Against the backdrop of the New Medical Disciplines, the role of epidemiology faculty must shift from that of mere “instructors of research methods” to “champions of public health values”. This study found that the key to the success of integrating ideological and political education into the curriculum lies in addressing faculty members’ “capability anxiety”. First is awareness: Faculty members must move beyond the misconception that “ideological and political education is the responsibility of dedicated ideological and political educators” and deeply recognize that the rigor of every bias con-

trol in epidemiology and the ethical considerations of every case investigation inherently possess ideological and political attributes. Second is collaborative capacity-building: By establishing interdisciplinary teaching communities and conducting collective lesson planning, the issue of specialized faculty members not sufficiently delving into ideological and political elements has been effectively resolved. As Zhan Tiansong [13] pointed out, only by elevating teachers' political awareness and sense of the times can we ensure that ideological and political elements in the classroom are not "awkwardly delivered" or "superficially tacked on", but rather truly "blend in like salt in water".

6.2. The "Value-Added Effect" of Integrating Ideological and Political Education into Courses on the Mastery of Professional Knowledge

From the perspective of educational psychology, ideological and political education case studies—such as the rigorous logic behind the cholera investigation and the sense of national and patriotic commitment demonstrated in COVID-19 prevention and control—provide emotional anchors for abstract epidemiological principles. When students understand the bottom line of medical ethics through the James Lind's scurvy trial, or appreciate the perseverance of scientists through the Yunnan lung cancer cohort study, their motivation to learn is elevated from a mere "need to pass exams" to a "drive fueled by professional mission". This deep emotional identification significantly enhances cognitive engagement, enabling students to demonstrate stronger logical integration and problem-solving abilities when confronting complex etiological inferences and research designs. Therefore, integrating ideological and political education into the curriculum is not a "burden"; rather, by infusing knowledge with warmth and strength, it promotes the deep processing and long-term retention of professional knowledge.

6.3. The Spillover Effects of "Teaching According to Individual Abilities" in Vocational Education

Compared to traditional undergraduate education, which emphasizes scientific research thinking and theoretical deduction, students in higher vocational programs generally have relatively weak foundational knowledge and low tolerance for purely theoretical instruction; however, they are highly motivated to engage in hands-on activities and have strong emotional attachment to their chosen professions. This study, by establishing an OBE-oriented ideological and political education system, skillfully translates abstract epidemiological methodologies into concrete community health service scenarios and discussions on social ethics. Data from the experimental group indicate that students' professional identity (scores rose from 10.45 to 18.23, $P < 0.001$) and sense of social responsibility improved significantly. This demonstrates that the key to tailored instruction for health management vocational students lies in "fostering learning through emotional engagement and reinforcing knowledge through practical application". By integrating ideological and political education into health management work sce-

narios, this approach effectively addresses the challenges of “professional inferiority” and the “disconnect between learning and practice” commonly faced by vocational students, providing a differentiated reference model for implementing curriculum-based ideological and political education in medical and health-related programs at higher vocational colleges.

It must be clarified that, since this study employed a post-test non-randomized controlled design—which did not include pre-test measurements prior to the course implementation—and the control group ($n = 20$) and experimental group ($n = 13$) belonged to different grade cohorts, the aforementioned statistical differences reflect the cross-group differences in professional attitude scores between the two groups after the course concluded, rather than the changes or net growth in scores for students within the same group before and after the intervention. Combined with the results of qualitative keyword analysis of the 13 community practice reports from the experimental group (high-frequency terms included “community chronic disease management”, “service awareness”, “professional identity”, and “sense of responsibility”), this between-group difference reflects, to a certain extent, the positive impact of the integrated teaching model of “online case discussions + community practice” on the professional identity of specialized health management students.

However, given the potential confounding effects of cohort effects, the current data are insufficient to directly prove that this improvement is entirely attributable to the curriculum reform intervention. Future research should incorporate pre- and post-tests and expand the randomized controlled sample within the same cohort to further validate the net intervention effect of this curriculum model.

In summary, although the framework developed in this study has achieved preliminary success, it still faces sustainability challenges in practice. First is the issue of the timeliness of the resource repository: epidemiology is a discipline closely linked to current social events, and the emergence of new infectious diseases requires that the ideological and political education case repository have a dynamic update mechanism. In the future, a model for the collaborative creation and sharing of resources based on a “digital and intelligent” platform should be established to incorporate, in real time, new developments in the global fight against the pandemic, such as those arising from the construction of the “Community of Health for All”. Second, attention must be paid to the long-term tracking of evaluation dimensions. Current evaluations tend to focus on immediate outcomes and lack long-term follow-up studies on students’ professional ethics performance after they enter clinical or public health positions. It is recommended to integrate these efforts with graduate quality tracking surveys to further validate the long-term educational value of ideological and political education. Finally, evaluation methods need to be refined. Greater use should be made of big data and artificial intelligence technologies to improve analytical models tracking students’ emotional identification trajectories, thereby achieving a continuous transition from “broad-brush evaluation” to “precision-oriented education” and ensuring that the curriculum-based ideological and political education system achieves a spiral-like ascent

through dynamic iteration.

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Author Contributions

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Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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