

Innovative Practices and Explorations in Cultivating Students Through the Statistics Course from the Perspective of Ideological and Political Education

Meijuan Shan, Mengxue Xu

Xi'an Eurasia University; Xi'an, Shaanxi 710065, China

Abstract

As curriculum-based ideological and political education spreads across Chinese universities, the statistics course—a core applied methods subject—still holds moral-educational potential that has rarely been examined in depth. Taking the statistics course as its object, this study combines a literature review, questionnaire surveys and case analysis to look into how ideological and political education is actually carried out in the classroom. The survey points to three stubborn problems: ideological-political content is inserted only superficially, teaching methods are rather uniform, and the assessment system lags behind. Building on the disciplinary character of statistics, we tested several vehicles—history-of-statistics instruction, livelihood-data cases and project-driven practice—and mapped out workable paths for a deeper fusion of professional knowledge and value education. The paper proposes a three-dimensional teaching model of "theory-practice-ideological and political education" together with four sets of refinement strategies: mining ideological-political elements, renewing teaching methods, building the teaching force and improving evaluation. The intention is to make knowledge delivery, ability growth and value guidance reinforce one another in statistics teaching, so as to offer a usable reference for curriculum-based ideological and political education in statistics courses serving economics, management, science and engineering programmes, and to help cultivate statistics talents who are ethically sound as well as professionally competent.

Keywords

Curriculum-based ideological and political education; Statistics course; Educational practice; Teaching optimization; Talent development.

1. Introduction

In 2020, the Ministry of Education issued the Guidelines for Ideological and Political Construction of Courses in Institutions of Higher Education, which established nurturing virtue through education as the fundamental mission of higher education and called for a 'Three-Full Education' structure in which value guidance is woven ever more deeply into specialist classroom teaching. In the big-data era, statistics is a basic methodological discipline for data analysis and evidence-based decision-making; it is used almost everywhere and, just as importantly, it is itself rich in ideological-political educational resources. Yet in most Chinese universities, statistics teaching still revolves around technical competence—deriving formulas, applying methods—while its moral-educational dimension receives little attention. The familiar 'two skins' problem remains: specialist teaching and ideological-political education run on two separate tracks, which sits uneasily with the demand for new-era graduates who combine moral character with professional ability. It is against this background that we examine how ideological-political education can be implemented in the statistics course. Theoretically, the study enriches the research framework for ideological-political education in

statistics and clarifies the internal logic linking specialist knowledge with ideological-political content. Practically, it confronts problems such as the stiff, mechanical insertion of ideological-political elements and the mediocre results this produces. Beyond improving students' technical proficiency, we hope to shape their scientific outlook, professional ethics and sense of social responsibility, and to provide workable reference points for teaching reform.[1]

Research on this topic, at home and abroad, still leaves much to be desired. Abroad, the exact term 'curriculum-based ideological and political education' has never been formally proposed, but disciplinary ethics and values education in statistics teaching receive considerable attention, with the emphasis falling on practical competence and respect for research norms; a coherent, systematic educational framework, however, has yet to emerge. In China, progress has been made: scholars have sorted out ideological-political elements suitable for the statistics discipline and experimented with ways of bringing them into the classroom. Even so, theoretical results remain fragmented, practical models look much alike, and empirical studies are scarce. The internal mechanism linking ideological-political education to the statistics discipline has not been probed deeply enough, and readily replicable frameworks are rare. In response, this paper draws on literature review, questionnaire survey and case study, supported by field teaching practice, to identify the main difficulties in teaching and to construct a three-dimensional integrated teaching model of 'theory-practice-ideological and political education.' It also sets up a diversified, multi-party evaluation scheme that breaks away from the over-reliance on examination scores, so as to promote the coordinated development of students' professional competence and ideological-political literacy and to help fill the gaps left by earlier studies.[2]

2. The Theoretical Foundation and Integration Logic of Integrating Ideological and Political Education into the Statistics Course

2.1. The Connotation and Educational Objectives of Curriculum-Based Ideological and Political Education

Curriculum-based ideological and political education is not an extra course bolted onto the timetable; it is an educational philosophy that should run through the whole process of student development, steadily and in every direction. Its basic task is to dig out the moral-education resources hidden inside specialist courses and blend ideological-political ingredients—Core Socialist Values, a scientific spirit and professional ethics among them—into professional teaching, so that knowledge delivery and value guidance reinforce each other rather than compete for class time. This is not a matter of reciting ideological-political doctrine to students. Rather, it follows the principle of 'educating through subtle influence': teachers use the situations that naturally arise in specialist teaching to guide students toward sound views of the world, life and values, with the aim of producing high-quality applied professionals who have solid ethics, real technical skill and the ability to put theory to work.[3]

2.2. The Educational Value of the Statistics Course

Statistics, by its very nature, carries educational value on several levels. Its scientific rigour is a natural training ground for a careful, truth-seeking temperament. Techniques such as sampling inference, hypothesis testing and data analysis rest on mathematical foundations and demand strict respect for objective laws—there is no room for subjective guessing or data falsification—so students gradually acquire a research attitude of seeking truth from facts and upholding academic integrity. Its strong practicality, meanwhile, feeds the formation of professional ethics. Statistics serves decision-making across society and covers the entire chain from data collection and collation to analysis; handled properly, the course gives students repeated opportunities to practise honesty, self-discipline and a solid, unpretentious working style. Finally, its wide

applicability helps grow a sense of social responsibility. Once statistical data are connected to social welfare, national development and industry trends, students begin to care about real social issues, recognise national achievements, and feel national pride and social responsibility more keenly.[4]

2.3. The Integration Logic of Curriculum-based Ideological and Political Education and Statistics

The deep integration of statistics with curriculum-based ideological and political education is both necessary and feasible. On the necessity side, the big-data era has made data ethics, data security and information privacy ever more pressing; a student who leaves the course with technique alone but no values may well slide into professional misconduct. Ideological-political education is needed precisely to fill this value gap and keep professional behaviour within bounds. On the feasibility side, ideological-political material is scattered generously across every part of statistics teaching: working with data builds integrity and an ethical sense; reasoning through statistical theory shapes a scientific cast of mind; applying statistics to real problems grows social responsibility; and the history of the discipline naturally awakens national pride and patriotism. All of this gives teachers plenty of raw material for integration.

At the core of the integration is a triple logic of 'empowerment through knowledge, through values and through ability': professional knowledge acts as the carrier, value guidance as the core, and practical competence as the goal, so that professional skill and ethical awareness advance together.[5]

3. Survey on the Current Status and Problem Analysis of Integrating Ideological and Political Education into the Statistics Course

3.1. Research Design and Implementation

To obtain an objective picture of how ideological and political education is being integrated into the statistics course, we selected twelve tertiary institutions of different types and conducted questionnaire surveys and in-depth interviews targeting statistics teachers and students majoring in economics, management, science and engineering. The teacher respondents varied in teaching experience and professional title, and the students covered different grades and disciplines, so the sample was reasonably broad and representative. The questionnaire and interview items covered teachers' and students' awareness of ideological-political education, the ways ideological-political elements are embedded, teaching methods, the operation of evaluation systems, and the difficulties and needs encountered in practice. Quantitative analysis of the questionnaire data was combined with qualitative analysis of the interview records to ensure the reliability of the findings.

3.2. Survey Results Analysis

The survey data show that although ideological and political education has begun to enter statistics courses, the overall effect of this all-round education is far from satisfactory, and the difficulties concentrate in three areas. First, the introduction of ideological-political elements is often skin-deep: as many as 78% of the teachers interviewed said they only occasionally insert such content, usually through brief case illustrations, without unpacking the deeper ideological-political meaning behind the knowledge point; the insertion therefore tends to feel disjointed and perfunctory. Second, teaching methods are rather monotonous: 62% of the classes still rely on conventional theoretical lecturing, while richer formats such as case-based learning, project-driven practice and scenario simulation are underused; moreover, the existing methods are not well matched with ideological-political educational goals, so student participation in class remains low. Third, the evaluation mechanism is weak: 85% of course examinations focus

primarily on the mastery of specialist knowledge, with limited assessment content, indicators and subjects; ideological-political awareness, practical ability and professional ethics are rarely included, making it impossible to judge whether the educational goals have truly been achieved. The survey also found that while most teachers recognise the educational value of curriculum-based ideological-political education, only a small proportion have received dedicated training in it. The lack of sufficient teaching competence, together with the absence of institutional incentives and support, has become a major constraint on implementation.

3.3. Analysis of the Root Causes of Core Issues

The first root cause lies in outdated educational concepts. Influenced by the notion that "professional skills matter more than moral education," some teachers treat statistics as a purely technical subject and overlook its educational function; they also lack the ability to identify ideological-political elements systematically and the teaching skills to integrate them naturally. The second cause is insufficient support for teaching reform. Universities lack specialised research and training resources for integrating ideological-political education into statistics courses, and teachers have neither the new ideas nor the platforms needed to push innovation forward. The third cause is that the all-round education safeguard mechanism is not yet in place. No evaluation and incentive system tailored to the statistics discipline has been established, so teachers have little enthusiasm for integrating ideological-political education, and the sustainable driving force for curriculum-based ideological-political education is missing.

4. Practical Case Studies and Outcomes of Integrating Ideological and Political Education into the Statistics Course

4.1. Integration of Statistical History: Fostering Students' Sense of National Identity and Patriotism

When teaching units such as Probability Theory and Mathematical Statistics, we bring in cases from the educational work of Chinese statisticians and organise ideological-political education around the research career of Mr. Xu Baolu. Widely regarded as one of the founders of statistics in China, Mr. Xu Baolu devoted himself to multivariate statistics and statistical inference under very difficult research conditions and produced a series of internationally leading achievements, laying a solid foundation for the development of the discipline in his homeland. By recounting how he persevered in scientific research and served his country, we let students see for themselves the scholarly dedication and patriotism of Chinese scholars, which nurtures their national pride and sense of professional belonging. In addition, by referring to ancient Chinese statistical practices—population and land surveys, for instance—and to the achievements of modern Chinese statistics in serving national development, students are guided toward the professional ideal of "putting knowledge into practice and serving the country and its people."

4.2. Minsheng Data Application: Fostering Students' Sense of Social Responsibility

Starting from key content such as statistical analysis of datasets, chart production and sampling surveys, we fold real social data—the distribution of educational resources, the layout of healthcare provision and public-welfare initiatives—into scenario-based teaching. In classes on statistical grouping and data analysis, figures on educational expenditure and teacher deployment across regions are used, so that students, while processing the data, form a direct impression of how equitably education is developing; in the hands-on session on constructing statistical charts, data on the distribution of healthcare resources lead students to think about

how social resources are allocated. Reading social phenomena through professional statistical eyes pushes students beyond the textbook and into real situations. In doing so they come to appreciate more deeply the role statistics plays in supporting social governance and improving people's lives, and their sense of social duty and humanistic awareness are effectively cultivated.

4.3. Project-Based Practical Training: Cultivating Professional Competence and Collaborative Skills

We have designed lightweight practical projects—"Statistical Analysis of Energy Conservation and Emissions Reduction on Campus" and "A Survey of Current Campus Consumption Patterns," for example—and deliver them through collaborative, group-based teaching. Working in teams, students complete a full cycle from drafting research proposals and conducting sampling surveys, through collecting and analysing data, to writing up reports. During data collection and processing, students are held to strict standards of truthfulness and completeness, and any tampering with or fabrication of data is ruled out, which reinforces professional integrity and self-discipline; during teamwork, clear division of roles, joint effort and discussion build students' ability to communicate, cooperate and solve problems; in summarising the results, students are guided to put forward reasonable improvement suggestions based on their data analysis, which sharpens their ability to apply what they have learned and deepens their sense of responsibility.

4.4. Case-Based Educational Effectiveness Assessment

We assessed the teaching effects from several angles, and the results show that this series of ideological-political educational measures has worked. Student feedback indicates that the great majority have become noticeably more interested in their specialist studies and have a stronger sense of national identity and social responsibility. A comparison of academic records before and after the reform shows that both average course marks and the proportion of high grades rose appreciably, and students' ability to apply knowledge improved markedly. In terms of overall attainment, students' critical thinking, teamwork and practical innovation all improved, and they volunteered for academic competitions and research activities far more often than before. In this way, the threefold goal of integrating knowledge, competence and personal quality has been achieved.

5. Optimization Strategies for Integrating Ideological and Political Education into the Statistics Course

5.1. Deeply integrate ideological and political elements to enrich the curriculum-based educational content

Ideological-political elements suited to each knowledge point should be mined systematically across the whole teaching process, so that ideological-political content and specialist knowledge are matched precisely rather than forced together. In the Data Processing unit, the focus is on professional qualities such as honesty, self-discipline, and seeking truth and being pragmatic; in the Statistical Theory unit, what is cultivated is a scientific spirit of rigour, respect for facts and willingness to innovate; in the Statistical Application unit, real cases from public welfare, the economy and scientific research are used to grow a sense of social duty; and in the Discipline Development unit, the history of statistics in China and abroad serves to build national identity and devotion to the country. In step with the times, new material on big-data ethics, data security and the use of statistics in artificial intelligence should also be introduced, so that curriculum-based ideological-political education keeps up with industrial trends and social needs and avoids stiff design or forced political insertion.

5.2. Innovate diverse teaching methods to enhance the effectiveness of ideological and political education

Conventional lecture-based instruction has obvious limits and should give way to a diversified, integrated teaching model. Thematic case-based teaching is one path: cases that combine specialist knowledge with ideological-political education—pharmaceutical clinical trials, public-welfare research and industrial quality inspection, for example—can be selected so that students reflect on research ethics and social responsibility while analysing them. Scenario-based teaching is another: lifelike situations such as market research, data analysis and problem-solving allow students to experience and practise professional ethics directly. Project-based practical teaching should run regularly, with training projects tied to real campus and social issues, supporting "learning by doing" and "understanding through practice" and ensuring that ideological-political education runs through the whole practical process. On top of this, blended online and offline teaching can be used to extend the reach of ideological-political education beyond the classroom in both time and space, while increasing classroom interaction and the depth of the educational impact.

5.3. Strengthen the development of the teaching faculty to solidify the core force for education and talent development

Teachers are the key to delivering curriculum-based ideological-political education, so the competence of statistics teachers in this regard must be raised across the board. Universities should run regular dedicated training on curriculum-based ideological-political education, hold teaching-and-research seminars and organise sessions for sharing exemplary cases, helping teachers clarify their educational philosophy and master the techniques for integrating ideological-political content into their lessons. Cross-disciplinary exchange platforms should also be built—for example, pairing statistics teachers with ideological-political education teachers to refine instructional design together. At the same time, sound incentive arrangements are needed: the reform of curriculum-based ideological-political education and its outcomes should be factored into performance appraisal and reward systems, so as to motivate teachers to innovate and to build a teaching force that combines solid specialist knowledge, high ideological-political awareness and strong teaching ability.

5.4. Refine the diversified evaluation system and establish a sound educational orientation

A comprehensive three-in-one assessment scheme combining "knowledge + competence + personal quality" should be established to move beyond the traditional model in which scores alone decide everything. The knowledge strand tests basic content such as statistical theory, formulas and methods; the competence strand assesses students' data-handling, problem-analysis and practical innovation skills; and the personal-quality strand evaluates ideological-political awareness, including classroom performance, teamwork, professional integrity and sense of duty. The assessment subjects should also be diversified—teacher evaluation, student self-evaluation, within-group peer evaluation and evaluation of practical results—so that the scheme covers all learning scenarios from classroom teaching to after-class practice and project training, giving a rounded and objective picture of students' overall attainment. In this way, scientific evaluation becomes a lever for raising the quality and effectiveness of curriculum-based ideological-political education.

6. Conclusion and Outlook

6.1. Research Findings

Through theoretical analysis, empirical investigation and teaching case practice, this paper has systematically elaborated the practical paths and optimisation strategies for integrating ideological-political education into statistics courses. The study first identified the multiple educational values inherent in the statistics course—cultivating a scientific spirit, professional ethics, patriotism and a sense of social responsibility—and clarified the internal logic for integrating specialist education with ideological-political education. The empirical investigation then exposed the main difficulties encountered in practice: superficial integration of ideological-political content, monotonous teaching methods, imperfect evaluation mechanisms and insufficient teaching competence among faculty. Teaching cases show that history-of-statistics instruction, livelihood-data application and project-based practical training all serve as effective carriers for integration. Building on these findings, the paper proposes optimisation strategies in four areas—mining ideological-political elements, renewing teaching methods, strengthening faculty development and improving evaluation—and thereby constructs a feasible, replicable framework for ideological-political education in statistics courses, achieving a genuine deep integration of specialist and ideological-political education.

6.2. Research Outlook

In the new era, the rapid development of big-data and artificial-intelligence technologies has brought new opportunities for integrating ideological-political education into statistics courses, and several directions are worth pursuing. Cutting-edge content such as data ethics and intelligent data analysis can be incorporated to enrich the content system of curriculum-based ideological-political education. Cross-disciplinary integration can be deepened by drawing on the disciplinary contexts of economics, medicine, sociology and other fields, extending the reach of ideological-political education. Long-term follow-up studies are also needed to refine the educational models and evaluation mechanisms continuously, track graduates' professional development, verify the lasting effects of the education, and steadily improve the ideological-political education system of the statistics course. Together, these efforts will provide high-quality, practical support for ideological-political education reform in applied specialist courses at universities.

Project Title

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