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Research on Project-Driven Interdisciplinary Practical Curriculum Construction

—A Case Study of the Course Investigation and Analysis of Urban-Rural Elements

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Abstract

Against the backdrop of rural revitalization and cultural heritage revitalization, rural development issues feature complex multi-factor coupling, which places higher demands on the interdisciplinary comprehensive practical competence of students majoring in human geography and urban-rural planning. Traditional field-practice teaching for urban-rural planning suffers from the limitations of a single-disciplinary perspective and the common pitfall of simple patchwork of multidisciplinary knowledge, while lacking real-world project carriers. Taking the course Investigation and Analysis of Urban-Rural Elements at Beijing Union University as a case, this paper adopts action research and case-study methods to interpret the construction path of a project-driven interdisciplinary practical curriculum based on the real-world cultural-tourism revitalization project of Daolingjian Village. This study constructs a four-dimensional integrated knowledge framework covering human geography and urban-rural planning, geographic information science, tourism management and cultural-heritage conservation. A multi-professional and multi-stakeholder collaborative teaching team is established, and discipline-boundary workshops are adopted to resolve conflicts among disciplinary standpoints. A whole-process diversified assessment system with process-oriented assessment and summative assessment each accounting for 50% is formulated. Teaching practice shows that this curriculum model can effectively foster students' capabilities in interdisciplinary knowledge integration, spatial analysis, complex-problem judgment and teamwork. Students' practical outputs can provide decision-making references for village development and realize mutual benefits between talent cultivation and local social services. This research provides referable practical samples for the reform of similar field-practice courses for human geography and urban-rural planning majors in China.

Keywords

Interdisciplinarity, Project-Based Teaching, Urban-Rural Planning, Field Practice, Real-Project-Oriented Teaching

1. Introduction

Against the background of rural revitalization, cultural-heritage revitalization and the construction of the capital's functions, rural areas face multiple complex demands including spatial governance, heritage conservation and cultural-tourism industrial development. A single-disciplinary perspective cannot deliver complete and feasible solutions, and the industry has an increasing demand for compound applied talents in urban-rural planning equipped with multidisciplinary integration competence. As a key link in talent cultivation for human geography and urban-rural planning majors, field-practice teaching undertakes the core tasks of training students' capabilities in element investigation, spatial analysis and comprehensive judgment of practical problems. It serves as a critical carrier for transforming theoretical knowledge into professional practical competence (Li et al., 2016). Traditional practical teaching tends to be theoretically-oriented and adopts simulated teaching scenarios, which are disconnected from real-world rural development conditions. Some curriculum reforms pursuing interdisciplinarity fall into the trap of simple patchwork: different disciplinary knowledge is taught in parallel without intrinsic logical connections, achieving only superficial accumulation of content rather than genuine in-depth interdisciplinary integration (Zhou et al., 2025), which hinders students from developing competence for solving complex problems. Meanwhile, Outcome-Based Education (OBE) and Project-Based Learning (PBL) have been gradually introduced into teaching reforms for planning majors. They advocate driving the whole teaching process with real-world project tasks and focus on students' competence output rather than knowledge indoctrination, offering an important theoretical path for reconstructing practical courses (Lv & Dai, 2019).

Scholars at home and abroad have carried out extensive explorations on project-based interdisciplinary practical curriculum construction. The United Nations Educational, Scientific and Cultural Organization (UNESCO) has long regarded interdisciplinary and practical modes in higher education as approaches to fostering students' competence for sustainable-development education (UNESCO, 2005). Xi Wangyuan et al. reviewed domestic research on interdisciplinary undergraduate education and pointed out that diverse mechanisms exert vital influences on interdisciplinary education (Xi et al., 2024). Many domestic universities have carried out reforms on practical teaching for human geography and urban-rural planning majors. Nevertheless, the implementation of interdisciplinary practical teaching is commonly plagued by simple patchwork of disciplinary knowledge. Different subjects are taught side-by-side without real-world problems as unifying bonds, failing to realize in-depth integration of knowledge and methodologies (Zhou et al., 2025).

In foreign geography and planning education, great importance is also attached to project-driven field-practice teaching. Based on the practice of multi-stakeholder collaborative project-oriented teaching, Wagner and du Toit pointed out that interdisciplinary project-based teaching can effectively improve students' capabilities in research-method application and cross-team communication. However, it also reveals teaching difficulties: students from different disciplines hold different knowledge paradigms. Without clear task frameworks and tutor-collaboration mechanisms, students from different majors tend to work separately and struggle to produce integrated deliverables (Wagner & du Toit, 2026).

Furthermore, based on current research, it has also been found that the reform of interdisciplinary practical teaching often remains at the surface level, merely achieving the juxtaposition and accumulation of knowledge from different disciplines without establishing an inherent logical connection based on real problems. This leads to superficial and formalized issues (Chen, 2026). Field training can facilitate the formation of collaborative teams among students from different majors to conduct joint research. Different professional perspectives complement each other, and they jointly complete field sampling, visits and interviews, problem analysis, and policy proposal formulation. This is an effective path for the implementation of interdisciplinary practice (Yuan, 2017).

Investigation and Analysis of Urban-Rural Elements is a compulsory concentrated practical course for human geography and urban-rural planning majors at Beijing Union University, lasting for two weeks and functioning as a bridge connecting theoretical foundations and comprehensive practice. It takes Daolingjian Village in Changping District, Beijing, as the real-world practice site. Surrounding the World Cultural Heritage of the Ming Tombs, this mountainous agricultural village integrates attributes of a cultural-heritage site and a potential cultural-tourism-development village. Conflicting demands for spatial governance, heritage conservation and tourism development intertwine here, making it a natural site for interdisciplinary practical teaching. Centered on the real-world demands from the Cultural-Tourism Development Planning Proposal proposed by the Daolingjian Village Committee, the course assembles teachers from urban-rural planning, geographic information science, tourism management and cultural-heritage conservation. Industry experts from the Ming Tombs Administration Center and cultural-tourism enterprises are invited to participate in teaching evaluation. The curriculum strives to mitigate limitations of single-disciplinary perspectives and simple patchwork of disciplinary knowledge in traditional practical teaching and improve students' competence for solving comprehensive problems.

This paper adopts classic action-research methodology following the iterative cycle of planning-action-observation-reflection. Up to now, this curriculum has completed 2 formal teaching cycles, involving two undergraduate cohorts (total N = 160 students). Heterogeneous mixed groups (4 - 6 students per group) were formed in each cycle to ensure diversified disciplinary perspective. The research team consisted of course instructors who participated in teaching delivery (as participant-

observers) and external researchers who did not join onsite teaching for neutral data collection. In the planning phase, the team designed curriculum framework, task system and assessment rubrics; in the action phase, two-week field practical teaching was implemented in Daolingjian Village; in the observation phase, multiple teaching outputs and process materials were collected; in the reflection phase, teaching challenges were summarized to revise task setting, workshop arrangement and evaluation indicators for subsequent teaching iteration.

2. Overview of the Course Investigation and Analysis of Urban-Rural Elements

2.1. Curriculum Nature and Interdisciplinary Characteristics

Investigation and Analysis of Urban-Rural Elements is a compulsory concentrated practical course for human geography and urban-rural planning majors and an important module of Comprehensive Urban-Rural Planning Management Practice, a Beijing-level high-quality course. Positioned as a bridge connecting lower-grade theoretical foundations and upper-grade comprehensive practical competence, it adopts two-week integrated indoor-and-outdoor practical teaching in Daolingjian Village. Guided by Outcome-Based Education (OBE), it trains students' two core professional practical capabilities: urban-rural regional element investigation and spatial-analysis, and cultivates compound applied talents for the construction of Beijing's "Four Centers" and the development of new-quality productive forces.

The course deeply integrates four professional fields: human geography and urban-rural planning, geographic information science, tourism management, and cultural-heritage regional conservation planning. Human geography and urban-rural planning builds the core analytical framework; geographic information science provides technical support for GIS-based spatial-data collection and analysis; tourism management undertakes research on cultural-tourism planning and industrial-operation evaluation; cultural-heritage conservation is responsible for exploring and inheriting historical values. Guided by four design principles—starting from real-world problems, breaking single-disciplinary perspectives, establishing systematic integration methodologies and promoting deliverable outputs—the course adopts interdisciplinary project-based teaching to enhance students' comprehensive literacy for coping with complex industrial scenarios.

2.2. Curriculum Objectives and Content

The curriculum objectives are to break the confinement of single-disciplinary perspectives, master pathways for in-depth integration of theories from urban-rural planning, geographic information science, tourism management and cultural-heritage conservation, and foster students' comprehensive innovative practical capabilities for data collection, investigation-and-analysis, spatial planning and countermeasure research in complex urban-rural scenarios, so as to produce cognitive or practical project outputs.

Project-based teaching and real-project-oriented practice are adopted to re-

spond to the practical demands of the village. Teaching content includes investigating cultural relics, building-and-facility distribution and ecological conditions in Daolingjian Village, exploring tangible and intangible cultural heritage. Status assessment is conducted using remote-sensing data and village-provided status maps. Proposals for heritage conservation and utilization are put forward, including setting photo-taking spots at cultural relics and streets, planning tourist routes, signposts and landscape installations. Suggestions on cultural-tourism-agriculture integration and villagers' income growth are proposed for long-term village development. Practical tasks also include sorting out village stories, drawing tourist maps and compiling tourist explanatory texts.

2.3. Coupling-Integration Logic of Four Knowledge Domains

The curriculum team consists of teachers from human geography and urban-rural planning, geographic information science, tourism management and cultural-heritage conservation. In the design phase, joint site surveys and joint formulation of teaching task-books are carried out. In the teaching phase, collaborative lesson-preparation, multi-instructor joint lectures and multi-tutor group guidance are implemented. In the assessment phase, cross-review and joint formulation of evaluation rubrics are conducted. Human geography and urban-rural planning undertakes overall framework construction, spatial-pattern analysis and spatial-governance-condition evaluation. Geographic information science provides support for remote-sensing interpretation, spatial-data collection and GIS-driven spatial-analysis. Tourism management conducts cultural-tourism-resource assessment, tourism-product design and benefit evaluation of industrial operations. Cultural-heritage conservation explores tangible and intangible heritage values, defines heritage-conservation bottom lines and carries out heritage-revitalization interpretation. The four disciplines are not static and isolated modules. They keep interacting throughout the whole project practice. Supported by discipline-boundary workshops, students are guided to confront tensions among different disciplinary standpoints, balance multiple constraints of ecology, culture and industry, and finally generate integrated solutions (Figure 1).

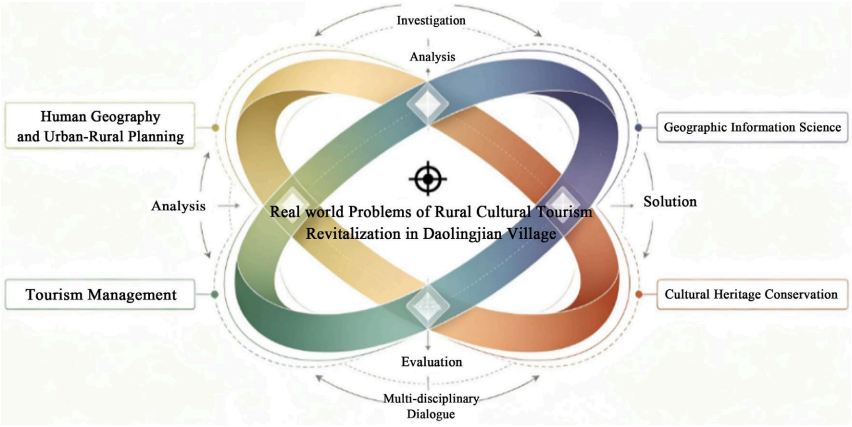


Figure 1. Schematic diagram of the inter-relationship among four knowledge domains.

3. Construction Scheme for Interdisciplinary Project-Based Practical Curriculum

This course is not a simple linear internship workflow but an operating system composed of external-demand input, multi-dimensional condition support, teaching implementation, assessment-and-evaluation and output delivery. Driven by the real-world cultural-tourism-revitalization project of Daolingjian Village, it is supported by on-campus interdisciplinary teaching staff, off-campus industrial and local practitioners, theoretical foundations including OBE and interdisciplinary-integration theories, as well as teaching resources (Figure 2).

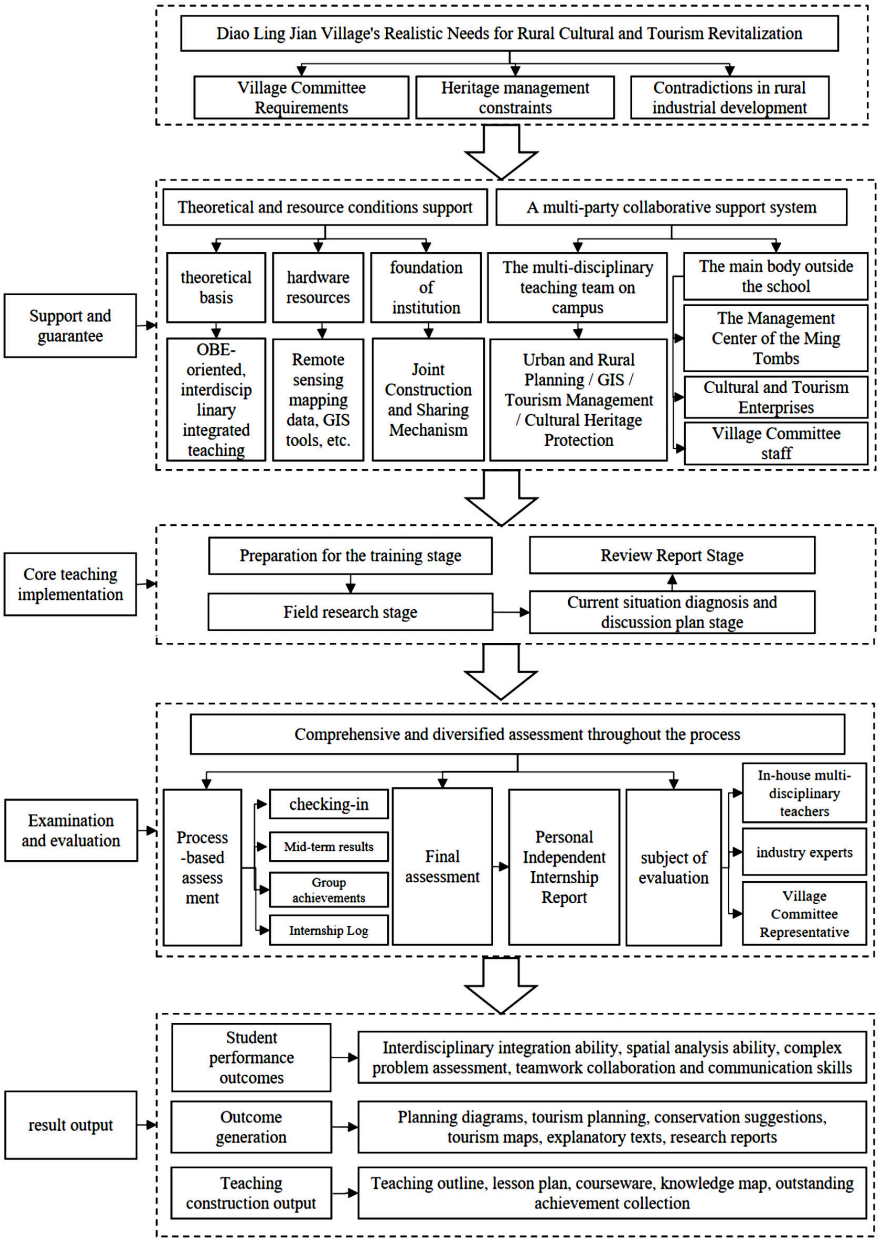


Figure 2. The overall operation flowchart of the interdisciplinary practical course under the project-driven model.

3.1. Construction of Interdisciplinary Collaborative Teaching Team and Whole-Process Collaboration Mechanism

The prerequisite for implementing interdisciplinary courses is to build a multi-professional integrated teaching team and break the traditional mode in which teachers teach independently according to disciplines. A whole-process collaboration mechanism covering curriculum design, teaching delivery and assessment is established.

3.1.1. Teaching Staff Composition

Led by human geography and urban-rural planning, the on-campus teaching team includes teachers of geographic information science, tourism management and cultural-heritage conservation. Industry experts from the Ming Tombs Administration Center and Nashi Mingyue (Beijing) Cultural Tourism Co., Ltd., as well as practitioners from the Daolingjian Village Committee, are involved in teaching activities. Teachers of urban-rural planning take charge of overall curriculum design, practical-activity organization and resource coordination. GIS-specialized teachers deliver training on spatial-data collection and spatial-analysis techniques. Tourism-management teachers conduct cultural-tourism planning, industrial-operation research and economic-benefit evaluation. Teachers of cultural-heritage conservation are responsible for heritage-value exploration, conservation-planning and explanatory-text compilation. Industry and village-committee practitioners provide real-world project demands and site constraints and participate in task release and achievement evaluation.

3.1.2. Whole-Process Division-of-Labor and Collaboration Mode

A three-phase collaborative workflow covering design, implementation and evaluation is established to realize deep multi-subject collaboration.

Design phase: joint site surveys and co-development of teaching task-books. Teachers from multiple disciplines conduct joint field surveys in Daolingjian Village. Combined with practical development demands of the village committee, internship thematic tasks are discussed, and teaching task-books are jointly compiled to unify curriculum objectives, practical tasks and deliverable requirements and avoid disconnection of teaching objectives among different disciplines.

Implementation phase: collaborative lesson-preparation, multi-instructor joint lectures and multi-tutor group guidance. Cross-disciplinary teachers conduct collective lesson-preparation to discuss thematic tasks, technical key points and disciplinary conflicts. The "multi-instructor joint lecture" mode is adopted for classroom and on-site teaching: different teachers interpret the same real-world problem from respective disciplinary perspectives. In field practice, each group is assigned tutors with diversified disciplinary backgrounds to respond to students' interdisciplinary consulting demands in a timely manner.

Evaluation phase: cross-review and joint formulation of evaluation rubrics. Teachers from different disciplines cross-examine group deliverables and intern-

ship reports. Evaluation rubrics are revised jointly, and assessment criteria for interdisciplinary-knowledge integration and multi-perspective application are incorporated to avoid perspective limitations caused by evaluation solely from single-disciplinary teachers.

3.2. Curriculum Design and Implementation

3.2.1. Design Philosophy

The curriculum adheres to the design philosophy of real-problem orientation, in-depth integration methodology and competence-oriented improvement. Driven by real-world cultural-tourism-development demands of Daolingjian Village, it rejects simple accumulation of disciplinary knowledge and emphasizes in-depth integration of knowledge and methodologies from urban-rural planning, GIS, tourism management and cultural-heritage conservation. Guided by OBE, teaching activities are designed backwards with the improvement of students' interdisciplinary comprehensive practical competence as the core objective. Part of class hours are transferred to real-world village sites for site-embedded learning to facilitate the shift of students' thinking from single-disciplinary to interdisciplinary comprehensive thinking.

3.2.2. Practical-Implementation Mainline

The course lasts for 10 practice days (two weeks), following the spiral progressive mainline: status cognition-problem diagnosis-scheme formulation-evaluation and optimization. (1) Preparation and training phase (3 days): multi-disciplinary theoretical-method training and definition of integrated practical tasks; (2) Field-investigation phase (3 days): interdisciplinary collaborative field surveys and multi-source data collection; (3) Indoor-analysis phase (3 days): integration of multi-disciplinary knowledge and compilation of integrated planning schemes; (4) Report-and-improvement phase (1 day): interdisciplinary joint review, revision and optimization of deliverables to realize competence transfer.

The workflow is not purely linear. Iterations take place among investigation, analysis and scheme formulation. Supplementary surveys can be conducted whenever practical problems emerge.

3.3. Design of Interdisciplinary Teaching Content

3.3.1. Discipline-Boundary Workshops for Resolving Conflicts among Disciplinary Standpoints

Discipline-boundary workshops are specially set up to cope with conflicts of disciplinary standpoints in real-world rural scenarios. Controversial practical topics such as homestay-construction-scale control and cultural-tourism-development intensity around heritage sites are selected. Teachers from different disciplines state standpoints and constraint bottom-lines from respective fields: urban-rural planning focuses on spatial-governance requirements; GIS highlights technical feasibility of data; tourism management evaluates industrial-market benefits; cultural-heritage conservation clarifies heritage-protection red-lines. Students are

guided to confront viewpoint tensions among disciplines and seek practically feasible consensus under multiple constraints, breaking the mindset of pursuing one-size-fits-all standard answers.

For this study, interdisciplinary knowledge integration is defined as an assessable construct: students synthesize theories, technical tools and constraint logics from two or more disciplines, negotiate contradictory disciplinary standpoints, and generate holistic solutions responding to real-world multi-constraint rural problems. It is distinct from parallel disciplinary contribution (simple patchwork), in which students merely assemble separate paragraphs/plots from different subjects without negotiating conflicting constraints or forming unified comprehensive judgements.

3.3.2. Thematic-Task System

Seven thematic tasks are formulated according to practical demands of Daolingjian Village: tourist attractions & routes, ancient-building conservation, ecological-protection, tourism-facilities, intangible-cultural-heritage inheritance, rural revitalization and red-culture. Thematic tasks can be dynamically adjusted according to the latest practical demands of the village committee in practice. Each thematic task cannot be confined to a single discipline. Students are required to adopt theories and methodologies from no less than two disciplines for analysis.

3.3.3. Complete Teaching Chain

A complete teaching chain is constructed: multi-source data collection → status-quo problem diagnosis → interdisciplinary scheme formulation → integrated-deliverable output. Multi-source data collection adopts remote-sensing interpretation, GIS tools, field surveys and villager interviews, integrating information from physical and human geography. In the status-quo-diagnosis stage, GIS-driven spatial-analysis identifies spatial conflicts; the tourism-management-oriented SWOT-PEST model evaluates industrial potential; cultural-heritage theories assess the feasibility of heritage revitalization. In the scheme-formulation phase, multiple constraints of spatial governance, industrial-operation and heritage conservation are coordinated. Final integrated outputs include planning drawings, cultural-tourism-product proposals, conservation suggestions, economic-calculation texts, rural-tourist maps and tourist explanatory texts (Table 1).

Before conducting villager interviews and collecting community data, teaching team obtained formal research and practice permission from Daolingjian Village Committee. Students received pre-practice training on research ethics: verbal informed consent was obtained before each villager interview; participants could opt out at any time. Personal identifiable information of interviewees was anonymized in all student outputs. Original village spatial data was provided exclusively by village committee under data-use agreement; raw community knowledge was allowed to be used only for teaching-practice purposes and shall not be released for other external usage without further community authorization.

Table 1. Complete teaching chain for interdisciplinary practice.

Stage	Core Tasks	Tools & Methodologies	Involved Disciplines
Multi-source data collection	Field surveys, interviews, remote-sensing interpretation, GIS spatial-data collection	Liuzhijiao APP, GIS tools, remote-sensing images, status-quo survey maps	Planning + GIS
Status-quo problem diagnosis	Identification of spatial conflicts, industrial-potential assessment, feasibility evaluation of heritage revitalization	GIS spatial-analysis, SWOT-PEST analysis, cultural-heritage assessment	Planning + GIS + Tourism + Heritage Conservation
Interdisciplinary scheme formulation	Coordination of multiple constraints: spatial governance, industrial-operation and heritage conservation	Multi-disciplinary collaborative seminars, discipline-boundary workshops	Collaboration of four domains
Integrated-deliverable output	Planning drawings, cultural-tourism-product proposals, conservation suggestions, economic calculation, tourist maps, explanatory texts	Report-and-defense, multi-stakeholder review	Collaboration of four domains

3.4. Implementation of Diversified Teaching Methods

3.4.1. Interdisciplinary Project-Based Teaching: Real-Project-Oriented Practice for Village Planning Demands

Centered on real-world demands from the Cultural-Tourism Development Planning Proposal of Daolingjian Village Committee, real-project-oriented teaching is implemented. Group outputs produced by students provide references for village-decision-making. Teaching tasks originate from local practical demands rather than fictional simulation topics, enabling students to experience the whole workflow of real-world planning projects.

3.4.2. Digital-Technology Empowerment

Digital tools including GIS software and the Liuzhijiao APP are embedded throughout investigation, analysis and mapping. Emphasis is placed on technology serving planning thinking rather than decoupling technical tools from planning analysis, so as to enhance students' digital-empowered spatial-analysis practical competence.

3.4.3. Pathways for Integrating Curriculum-Based Ideological-and-Political Education

Ideological-and-political elements are organically integrated into the whole practice process. Eight class-hours are allocated for labor-education activities: students help villagers promote homestays and sell agricultural products to establish a people-centered planning value. Field investigations of the Ming Tombs World Cultural Heritage help students enhance cultural-confidence. Discussions on village-ecological-protection issues strengthen students' responsibility for "lucid waters and lush mountains are invaluable assets" and professional ethics of law-abiding planning (Table 2).

Table 2. Key points of diversified teaching-method implementation.

Teaching Method	Implementation Mode	Educational Orientation
Interdisciplinary project-based teaching	Real-project-oriented practice based on village-committee demands; outputs serve village-development decision-making	Competence for solving complex practical problems
Role-playing simulation	Students act as planners, GIS analysts, tourism operators and villager representatives	Multi-stakeholder-perspective thinking
Digital-technology empowerment	GIS software and Liuzhijiao APP adopted throughout investigation-analysis-mapping workflows	Digital-empowered spatial-analysis competence
Curriculum ideological and political education	Eight-hour labor-education, cultural-heritage-oriented cultural-confidence cultivation, ecological-responsibility education	People-centered planning values

3.5. Support from Scientific-Research and Practical Conditions

In terms of scientific research, Beijing Municipal Education Science Planning Project and university-level teaching-reform projects as well as relevant teaching-research papers provide theoretical support for undergraduate-student-research-competence cultivation, multi-instructor collaborative teaching and project-oriented-teaching modes. In practical terms, the course has taken Daolingjian Village as a practice site for years and accumulated abundant site materials and teaching experience. Foundations for building practical-teaching bases have been established with the Ming Tombs Administration Center and Daolingjian Village Committee. Cooperation has been built with Nashi Mingyue (Beijing) Cultural Tourism Co., Ltd. to introduce real-world industrial-project demands and industry experts. Students' practical outputs are submitted to the village committee for reference in village-development-decision-making, realizing social-service outputs of teaching activities.

4. Curriculum-Assessment System and Co-Construction-and-Sharing Operation Mechanism

To guarantee the achievement of interdisciplinary talent-cultivation objectives, a whole-process diversified assessment-and-evaluation system is established. Meanwhile, a cross-major co-construction-and-sharing operation mechanism is formulated, and phased curriculum-construction tasks and expected deliverables are clarified for sustainable iterative development of the curriculum.

4.1. Whole-Process Diversified Assessment-and-Evaluation System

The assessment orientation shifts from simple evaluation of professional knowledge and skills to priority evaluation of interdisciplinary-knowledge-integration, complex-problem-solving, innovation output and teamwork competence. Process-oriented assessment and summative assessment each account for 50 % of the total score (Table 3).

Table 3. Whole-process diversified assessment-and-evaluation system.

Assessment Category	Assessment Module	Weight	Evaluation Key Points
Process-oriented assessment	Attendance and comprehensive performance	5%	Attendance record, participation in field investigation, teamwork performance
	Mid-term phased deliverables	15%	Application of multi-disciplinary perspectives, depth of problem diagnosis, report presentation, teamwork
	Group investigation deliverables	20%	Interdisciplinary-knowledge-integration level, scheme innovation, technical standardization, heritage-sensitivity
	Internship journals	10%	Ten journals in total; each journal for field-investigation days shall contain no less than 300 words
Summative assessment	Individual internship report	50%	Data adequacy 20%, analytical rationality 25%, scheme innovation 30%, drawing quality 15%, structural logic 10%

4.2. Cross-Major Co-Construction-and-Sharing Mechanism

A cross-major co-construction-and-sharing operation mode of consensus-reaching - resource sharing - faculty co-training - achievement reuse is established. The curriculum-construction group consists of teachers from multiple majors to reach consensus on interdisciplinary talent-cultivation objectives. Basic spatial data, cultural-heritage archives and cultural-tourism-operation data of Daolingjian Village are sorted out jointly to build a curriculum-case database. Teachers from different majors participate in teaching-research activities mutually, and the mechanism of mutual appointment of interdisciplinary undergraduate supervisors is explored. Excellent practical outputs of students are incorporated into graduation-project topic pools of various majors to realize teaching reuse of practical achievements.

4.3. Phased Planning for Curriculum Construction

In Table 4, curriculum construction is divided into four phases with clarified core tasks and phased deliverables:

Table 4. Phased planning for curriculum construction.

Phase	Time	Core Tasks	Phased Deliverables
Preparation and initiation	2026.04-2026.06	Establishment of co-construction mechanism, village-demand investigation, curriculum-scheme design	Interdisciplinary-curriculum co-construction agreement, investigation report on teaching resources, curriculum-construction-implementation scheme
Construction-and-tackling phase	2026.07-2027.06	Development of teaching resources, multi-professional teaching-research seminars, first-round trial teaching	Revised integrated teaching syllabus, teaching plans, courseware, analysis report of the first-round trial teaching

Continued

Improvement and optimization phase	2027.07-2027.12	Curriculum iteration and optimization, improvement of evaluation system, consolidation of teaching deliverables	Analysis report of the second-round teaching, evaluation report on students' interdisciplinary-competence-achievement, interdisciplinary-knowledge-graph, collection of excellent practical outputs
Summary and promotion phase	2028.01-2028.03	Project acceptance and summary, external promotion of curriculum experience	Curriculum-construction summary report, external achievement-promotion outputs

5. Teaching Implementation Effects and Discussion

5.1. Teaching Implementation Effects

5.1.1. Competence Improvement at the Student Level

Multiple sources of evidence were triangulated to evaluate students' competence growth. Process materials including internship journals, mid-term presentation PPTs, group outputs and final individual internship reports were mandatory course deliverables and centrally collected after each teaching cycle. Semi-structured feedback interviews were conducted with village committee representatives, heritage-site administrators and enterprise experts after final defense. A deductive qualitative coding framework was developed, with pre-defined coding dimensions derived from curriculum objectives: (1) interdisciplinary knowledge integration; (2) spatial analysis capability; (3) complex-problem judgment; (4) teamwork and communication. Traditional field internships for urban-rural planning majors mostly focus on training of single-professional capabilities such as investigation methodologies and mapping skills. Students are accustomed to accepting given conditions and tasks from teachers and completing internships following standardized workflows, while seldom reflecting on conflicts and trade-offs among different disciplinary perspectives (Li et al., 2022). This course adopts heterogeneous grouping, discipline-boundary workshops and the whole workflow of real-project-oriented teaching. Growth changes in students' multi-dimensional capabilities can be observed from internship journals, mid-term-report PPT, group posters and final internship reports.

During the internship, students' interdisciplinary-integrative thinking is effectively cultivated. Many students reflect that their previous studies were confined to urban-rural-planning knowledge, and their understanding of GIS technology, cultural-tourism industrial-operation and cultural-heritage-conservation regulations was fragmented. After seminars in discipline-boundary workshops and multi-tutor guidance, students begin to realize that one rural issue can be interpreted from multiple disciplinary perspectives. GIS software and the Liuzhijiao APP are embedded throughout multi-source-data collection, spatial-analysis and mapping. Students no longer treat GIS merely as independent-software-operation exercises. They gradually establish the mindset of "technology serving planning", and can revise remote-sensing and spatial-analysis outputs combining humanistic information acquired from field surveys to avoid pure-technical analysis divorced

from rural realities. Moreover, students' capabilities for problem identification and comprehensive judgment are cultivated. Daolingjian Village is constrained by multiple objectives including buffer-zone regulations of World Cultural Heritage, ecological-red-line restrictions, villagers' livelihood improvement and cultural-tourism-industry development. There are no textbook-standard answers. Students need to interview villagers and village-committee members independently, sort out real-world village contradictions and seek relatively feasible solutions under multiple constraints.

5.1.2. Materialized Practical Deliverables

In real-project-oriented teaching, students' practical outputs are not merely assignments for course grading but materialized deliverables serving the development of Daolingjian Village. Deliverables include comprehensive status-quo investigation reports for Daolingjian Village, conservation-and-revitalization schemes for cultural relics, rural-tourism-route-planning schemes, proposals for tourism-facility and landscape-installation construction, ideas for intangible-cultural-heritage and red-culture revitalization, and development suggestions for integrating culture-tourism-agriculture to increase villagers' income. Practical outputs also include sorting-out of rural stories, rural-tourist-map drawing and compilation of tourist explanatory texts. Sorted outputs are submitted to the Daolingjian Village Committee to provide reference materials for compiling the Cultural-Tourism Development Planning Proposal. Teaching outputs are transformed into social-service deliverables, bridging on-campus practical teaching and local rural-development practice.

After sorting and compiling, the students' achievements have been officially transferred to the Dinglingjian Village Committee. The village committee will use the part of the research materials, tourism route plans and heritage protection suggestions made by the students as reference documents for village construction. Some of the students' proposed site selections for landscape nodes and tourism routes were also discussed at the village's working meetings, to be used for the subsequent preliminary feasibility screening.

5.2. Practical Challenges in Implementation

Despite certain achievements in curriculum reform, constrained by faculty resources, students' prior competence, uncertainties of real-world projects and the inherent complexity of interdisciplinary assessment, multiple practical challenges emerge and restrict further improvement of interdisciplinary talent-cultivation effects.

First, high time-coordination costs for interdisciplinary teaching teams. Team teachers belong to different departments and undertake teaching, scientific-research and postgraduate-supervision tasks. Joint site surveys, collective lesson-preparation, multi-instructor on-site teaching and cross-review of deliverables require synchronized schedules for multiple teachers, which easily leads to time conflicts. It is difficult for all interdisciplinary teachers to participate in the full

two-week field practice, and partial links can only be supported by segmented participation, which partly weakens real-time interdisciplinary guidance.

Second, objective thresholds exist for cultivating students' interdisciplinary thinking, and students' competence levels vary greatly. Previous courses are offered following traditional disciplinary systems, and students are accustomed to single-disciplinary thinking modes. Some students can quickly understand interdisciplinary-dialogic logic, while quite a number of students only complete GIS mapping, cultural-tourism-planning writing and excerpting of heritage-conservation provisions, merely assembling materials rather than realizing genuine in-depth knowledge integration. Students differ greatly in GIS-operation competence and field-interview experience, which leads to capability differentiation within groups and increases difficulties in group-teaching management.

Third, dynamic changes of real-world rural projects bring uncertainties to teaching organization. Tasks originate from real-world village demands, while practical village conditions may change: for instance, temporary infrastructure construction, cultural-tourism-project adjustments or shifts in villagers' demands.

Fourth, interdisciplinary-competence assessment rubrics cannot be finalized in one attempt. High-order capabilities such as interdisciplinary-knowledge-integration and interest-balance judgment differ from quantifiable skills such as mapping and questionnaire surveys. Although a whole-process diversified-assessment system has been built, interdisciplinary-thinking performance is evaluated comprehensively. Assessment rubrics need continuous revision and improvement based on students' performance and industrial-experts' feedback in each round of teaching, and permanent fixed assessment standards cannot be established.

5.3. Discussion on Optimization Countermeasures

Targeting the above-mentioned practical challenges, optimization paths are proposed from four dimensions: faculty management, teaching-design, task flexibility and assessment iteration.

First, improve the teaching-research mechanism for multi-disciplinary teams to reduce collaborative resistance. Adopt a hybrid online-offline collective-lesson-preparation mechanism; non-on-site seminars are prioritized online. Fixed time nodes are set for joint site surveys and revision of teaching task-books before each practical teaching cycle. Distinguish links requiring full-participation and segmented-participation: multi-disciplinary teachers are required to attend core nodes (task release, discipline-boundary workshops, final review), while on-site teaching in other phases adopts rotating-on-duty teachers to relieve pressure for full-participation of all teachers. Meanwhile, teaching-research meeting minutes are archived to reduce curriculum dependence on individual instructors.

Second, give full play to discipline-boundary workshops to cultivate students' interdisciplinary thinking in layers. Brief case demonstrations are added in the early phase of the course to show how different disciplines conduct dialogues through mature rural-planning cases and build intuitive cognition for students.

Each group is required to adopt methodologies from no less than two disciplines. Teachers conduct key checks in mid-term assessment to detect simple-material-patchwork phenomena and provide timely guidance. Rotating-role division of labor is stipulated within groups to reduce capability differentiation and free-riding, ensuring every student participates in investigation, analysis and scheme seminars.

Third, construct a flexible-task system to adapt to dynamic changes of real-world projects. Thematic tasks are divided into core compulsory tasks and dynamic optional tasks. Core compulsory tasks guarantee basic curriculum objectives; dynamic optional tasks can be added or deleted flexibly according to the latest demands of the village committee to form buffer space for teaching-content adjustment. When village practical conditions change, optional tasks are adjusted preferentially to guarantee the overall teaching cycle.

Fourth, establish an iterative-update mechanism for assessment rubrics. After each round of teaching, multi-disciplinary teachers and industrial experts hold review meetings. Deficiencies of existing assessment indicators are analyzed based on internship journals, group deliverables and internship reports. Weight and scoring details are adjusted dynamically. Feedback from industrial experts and the village committee is incorporated into rubric-revision grounds to continuously improve the whole-process diversified-assessment-and-evaluation system.

5.4. Innovations of the Curriculum Model

Compared with existing practical-teaching reforms for human geography and urban-rural-planning majors, this curriculum does not merely add disciplinary knowledge to original internship courses. Instead, it realizes systematic reconstruction covering teaching teams, teaching content, teaching methodologies, assessment system and operation mechanisms, with three core innovations.

First, a four-dimensional integrated-knowledge framework of "urban-rural planning-GIS-tourism management-cultural-heritage conservation" is constructed. Discipline-boundary workshops are adopted to confront conflicts among disciplinary standpoints, and disciplinary intersection points and constraint boundaries are clarified. The common pain point of superficial integration yet substantive patchwork in interdisciplinary teaching is mitigated at the teaching-design level (Zhou et al., 2025). Most interdisciplinary practical courses only emphasize accumulation of disciplinary knowledge and avoid conflicts among disciplinary standpoints. This curriculum converts disciplinary-standpoint tensions into teaching resources and trains students to seek feasible solutions under multiple constraints, which better conforms to real-world industrial practice scenarios.

Second, real-project-oriented teaching targeting rural practical demands is fully implemented to realize the trinity of teaching, practice and social-service. Teaching tasks originate directly from practical demands of the Cultural-Tourism Development Planning Proposal of Daolingjian Village. Students' outputs are sub-

mitted to the village committee for decision-making reference. The closed-loop of "simulated topics-assignment-archive" for practical teaching is broken, building bridges between university talent-cultivation and local rural-revitalization and cultural-heritage-revitalization practice.

Third, a whole-process assessment system with multi-stakeholder participation and a cross-major co-construction-and-sharing operation mechanism are built. Evaluators are no longer limited to on-campus teachers; industrial and grassroots practitioners participate in achievement assessment. The mechanism includes case-database co-construction, mutual-appointment of interdisciplinary supervisors and teaching reuse of excellent practical outputs, providing replicable institutional paradigms for sustainable operation of similar interdisciplinary courses.

6. Conclusion and Prospect

6.1. Main Conclusions

Against the background of territorial-spatial-planning reform, rural revitalization and World Cultural Heritage revitalization, rural issues show highly compound characteristics. The planning industry has growing demands for compound applied talents equipped with interdisciplinary horizons and real-world-problem-solving competence (Li et al., 2016). As an irreplaceable link in talent-cultivation for human geography and urban-rural-planning majors, field-practice teaching undertakes the mission of connecting theoretical knowledge and industrial practice. Nevertheless, traditional practical-teaching modes reveal multiple practical drawbacks. Taking the interdisciplinary practical course Investigation and Analysis of Urban-Rural Elements of Beijing Union University as a case, this paper adopts case-study and action-research methods and conducts systematic research on project-driven interdisciplinary practical-curriculum construction. The whole curriculum-construction workflow is sorted out, and the following conclusions are drawn.

First, traditional practical teaching for urban-rural planning is constrained by multiple practical bottlenecks. For multi-attribute villages such as Daolingjian Village, a single-disciplinary urban-rural-planning perspective cannot balance multiple demands of ecological governance, cultural-heritage conservation, cultural-tourism-industry development and villagers' livelihood improvement. Many interdisciplinary-teaching reforms remain at the level of simple disciplinary-knowledge patchwork without analysis and negotiation of disciplinary intersection points and boundaries. Trained by idealized simulated topics, students show insufficient capabilities for solving real-world rural problems. Without institutionalized cross-major co-construction-and-sharing mechanisms, curriculum operation heavily relies on individual teachers, which hinders long-term iteration and promotion. All these factors restrict the quality improvement of compound-planning-talent cultivation.

Second, interdisciplinary project-based practical courses targeting real-world rural projects require systematic whole-chain design and cannot be realized

merely by adding partial teaching content. It is necessary to build multi-professional collaborative teaching teams and establish the whole-process collaboration mechanism covering design-implementation-evaluation. The curriculum philosophy of real-problem-orientation, in-depth integration and competence improvement shall be established. Teaching content shall be constructed through discipline-boundary workshops and thematic-task systems. Diversified teaching methodologies including project-based teaching, role-playing simulation and digital-technology empowerment shall be adopted. Meanwhile, scientific-research support from university-level teaching-research projects and university-local & university-enterprise cooperation shall provide dual support for practice. Only with coordinated matching of teams, philosophies, content, methodologies and external support can genuine interdisciplinary in-depth integration be realized and avoid superficial reform.

Third, the whole-process diversified-assessment system and institutionalized co-construction-and-sharing mechanism are institutional guarantees for sustainable operation of interdisciplinary courses. This course sets process-oriented assessment and summative assessment each at 50%. High-order capabilities such as interdisciplinary-knowledge-integration, complex-problem-solving and teamwork are incorporated into evaluation dimensions. Multiple materials including attendance, mid-term deliverables, group outputs, internship journals and individual internship reports are considered, with participation of industrial and village-committee practitioners in evaluation. Phased curriculum-construction promotes co-construction of teaching-case resources, mutual-training of teaching staff and teaching reuse of practical outputs, laying an institutional foundation for continuous curriculum iteration.

Fourth, practical teaching proves that the project-based practical-teaching mode with real-world rural-project carriers can effectively improve students' interdisciplinary comprehensive capabilities. Students' practical outputs can provide references for local-rural development and realize mutual benefits of talent-cultivation and social-service. The curriculum-construction path can serve as referable practical samples for reform of similar field-practice courses for human geography and urban-rural-planning and geography-related majors in domestic universities.

6.2. Limitations of the Curriculum

Despite certain practical achievements of curriculum reform, constrained by objective conditions, several limitations still exist.

First, the sample-size of practical teaching is limited. As a centralized practical course, the number of participating students in each cohort is limited. Analysis of teaching effects mainly relies on qualitative analysis of internship journals, report materials and external feedback. Large-sample-size data support is absent, and the universality of teaching effects needs to be further verified through more rounds of teaching practice.

Second, evaluation of students' high-order interdisciplinary competence is dominated by qualitative judgment, lacking standardized quantitative-assessment tools. At present, rubrics are adopted for grading, which can distinguish general levels of students' interdisciplinary practice, yet quantitative-measurement scales for interdisciplinary-thinking and knowledge-integration competence have not been developed. Precise quantitative comparison of competence changes across cohorts cannot be realized.

Third, the operation cost of interdisciplinary-teaching teams is relatively high. Curriculum reform requires massive time-and-energy investment from multi-professional teachers and industrial experts, which sets high requirements for university faculty conditions and teaching-research-system support. It is practically difficult for universities with limited faculty resources to fully copy the whole set of modes. Institutions learning from this case shall make choices according to local faculty and external-resource conditions.

Fourth, real-project-oriented teaching relies on external-cooperation conditions. Teaching effects are highly dependent on continuous cooperation with the Daolingjian Village Committee, the Ming Tombs Administration Center and cultural-tourism enterprises. Changes in university-local and university-enterprise-cooperation relations will exert direct influences on real-project-oriented teaching, so the curriculum shows certain dependence on external-cooperation partners.

6.3. Future Prospects

Considering existing limitations of the curriculum, follow-up curriculum-construction will be promoted from multiple directions including teaching-resource development, sample-size expansion, assessment-tool improvement, mechanism-construction and achievement-promotion.

First, continuously iterate and optimize curriculum-teaching resources. Revise the teaching syllabus combining feedback from each round of teaching practice, adjust thematic tasks and topics for discipline-boundary workshops; develop materialized teaching resources including interdisciplinary-knowledge-graphs, GIS practical-training handbooks and collections of excellent students' practical outputs, and consolidate cases, tasks and assessment rubrics produced in curriculum-construction to reduce curriculum dependence on individual teachers' personal experience.

Second, gradually expand practical-teaching sample-size. On the premise of guaranteeing teaching quality, accumulate teaching-practice data of more student cohorts and enrich the student-practice-case database. Continuously consolidate university-local and university-enterprise co-construction mechanisms, maintain cooperative relations with Daolingjian Village, the Ming Tombs Administration Center and cultural-tourism enterprises, and explore practical-practice sites of similar heritage-surrounding villages to enrich curriculum-practice carriers.

Third, explore quantitative-assessment tools for measuring students' achieve-

ment of interdisciplinary-competence. Based on existing qualitative-evaluation experience, attempt to develop evaluation scales for interdisciplinary-practical competence, decompose indicators for interdisciplinary-thinking, knowledge-integration, complex-problem-solving and teamwork competence, and realize the combination of qualitative evaluation and quantitative measurement to achieve more scientific and accurate measurement of teaching effects.

Fourth, consolidate curriculum deliverables and promote external popularization. Sort out complete curriculum-construction archives including collective-lesson-preparation records, teaching-research-meeting minutes, students' deliverables and external-feedback materials. Share curriculum-construction experience through teaching-research conferences and teaching-reform papers. When conditions permit, apply for university-level and municipal-level teaching-achievement awards to radiate curriculum-construction experience and provide references for practical-teaching reform for geography-and-planning-related majors.

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Conflicts of Interest

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

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