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Behavioral Profiling of College Students' Innovation and Entrepreneurship and Pathways for Precision Ideological and Political Education in Higher Education Institutions Based on Large Language Models

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Abstract

Although the supply scale of innovation and entrepreneurship education in higher education institutions has continued to expand, the integration of ideological and political education into the entire process of innovation and entrepreneurship practice still faces the challenge of a supply-demand mismatch. This study takes undergraduate students from a local university as the research subjects and conducts a questionnaire survey from four dimensions—entry status in practice, motivational structure, process experience, and value cognition—to perform a differentiated analysis of college students' innovation and entrepreneurship behavioral characteristics. On this basis, it formulates three typical behavioral profiles and accordingly proposes precision ideological and political education pathways with differentiated measures. At the same time, it constructs a collaborative mechanism for precision ideological and political education, forming a closed loop of integrated ideological-political and innovation-entrepreneurship education. Furthermore, as artificial intelligence technology continues to expand its applications in the educational field, large language models provide new auxiliary tools for educational research and management practices in higher education institutions. In the processes of questionnaire design, student profile analysis, and implementation pathway construction, this paper attempts to introduce methods such as prompt design, text semantic analysis, and clustering analysis to assist in identifying and categorizing students' innovation and entrepreneurship behavioral characteristics, and accordingly proposes precision ideological and political education support strategies for different profile groups.

Keywords

Innovation and Entrepreneurship Education, Behavioral Profiling, Precise Ideological and Political Education, Collaborative Mechanism, Large Language Model, Prompt Engineering

1. Introduction

The report to the 20th National Congress of the Communist Party of China proposed that we fully implement the Party's educational policy, carry out the fundamental task of fostering virtue through education, and cultivate socialist builders and successors with sound moral grounding, intellectual ability, physical vigor, aesthetic sensibility, and work skills. Innovation and entrepreneurship education is an important pathway for higher education institutions to fulfill this task and serve the national innovation-driven development strategy. Ideological and political education undertakes the function of value guidance therein, and the two should mutually support each other: innovation and entrepreneurship practice provides authentic scenarios for value formation, while value guidance provides direction for practical exploration.

After years of development, innovation and entrepreneurship education in Chinese higher education institutions has formed a relatively complete system in curriculum design, platform construction, project incubation, and competition organization. Students' access to resources and information has become increasingly diversified, and the issue of educational supply scale has been largely resolved. In contrast, how to effectively integrate ideological and political education into the entire process of practice remains a relatively weak link in talent cultivation.

Integrating ideological and political education into innovation and entrepreneurship education does not mean adding several ideological and political content items to courses. The difficulty lies in the considerable variation in students' participation status: students who have not yet entered practice lack access and confidence; those who have entered practice must confront team relationships, technical bottlenecks, and outcome uncertainty; and those who have developed relatively stable practice identification require broader horizons and development channels. A single set of educational provisions cannot simultaneously respond to these needs. The mismatch between supply and demand is precisely the problem that "precision ideological and political education" aims to solve.

Innovation and entrepreneurship education is a core vehicle for higher education institutions to fulfill the fundamental task of fostering virtue through education and cultivating a new generation of capable young people, and the integration of ideological-political and innovation-entrepreneurship education is an inevitable requirement for innovation and entrepreneurship education to return to its educational essence. Zheng Geng examined the internal logic of the deep integration of innovation and entrepreneurship education with ideological and political

education, pointing out that their integration is the core pathway for resolving the current deviation in innovation and entrepreneurship education of "emphasizing skill transmission while neglecting value guidance" [1]; Yao Tingting further proposed embedding value guidance into the entire process of innovation and entrepreneurship project incubation, practical participation, and achievement transformation [2]; from an empirical research perspective, Weng Yijing conducted an empirical analysis of the factors influencing college students' innovation and entrepreneurship behavior in applied universities through structural equation modeling, noting that current ideological guidance in the innovation and entrepreneurship field generally suffers from an inaccurate grasp of students' intrinsic motivation and cognitive needs [3].

With the evolution of big data and artificial intelligence technologies, the digital transformation of ideological and political education has moved from conceptual discussion to a stage of substantive mechanism restructuring. Xin Xiangyang *et al.*, from the perspective of value construction, summarized that digitally and intelligently empowered ideological and political education must achieve the unification of humanistic value and instrumental value [4]; Song Juan explored the internal mechanism by which big data drives ideological and political education from "extensive flooding irrigation" to "targeted drip irrigation" from the perspectives of value implications, realistic circumstances, and development orientation [5]; Yang Xiaolei revealed the process logic of intelligent technology embedding into ideological and political education and emphasized the necessity of conducting collaborative governance and risk prevention and control when advancing technological integration [6].

At the level of technological practice, student profiling technology based on multi-source data has become a key entry point for achieving precision ideological and political education. Huang Wenlin earlier explored the application framework of student profiles in precision ideological and political education in higher education institutions, demonstrating the feasibility of identifying students' personalized needs based on data labels [7]; Dong Ye refined the implementation pathways of student profiles throughout the entire process of data collection, label modeling, and educational intervention [8]; Yuan Fang focused on the dynamic construction and feature mining of student group profiles, proposing precision layered intervention schemes based on group differences [9]. Zhou Ye *et al.* explored the empowerment pathways of strong artificial intelligence technology in precision ideological and political education in higher education institutions, demonstrating the unique potential of deep learning and intelligent reasoning in complex educational context perception and automated strategy matching [10].

In summary, existing literature has achieved fruitful results in the theoretical construction of digital ideological and political education, the application of profiling technology, and the mechanisms of integrating ideological-political and innovation-entrepreneurship education, but the following areas remain to be expanded: First, profiling modeling mostly remains in general education or daily

management scenarios, and in-depth student profiling targeting innovation and entrepreneurship—a highly challenging and practice-intensive scenario—remains insufficient; second, the generation of existing precision ideological and political education strategies mostly relies on manual experience, with insufficient utilization of the semantic deep understanding and human-machine collaborative strategy generation capabilities of large language models. In view of this, this study focuses on the behavioral characteristics of college students' innovation and entrepreneurship, constructs student profiles, and introduces large language models and prompt engineering to assist in generating precision ideological and political education implementation pathways, with the aim of providing new empirical evidence and methodological paradigms for the refined implementation of "integration of ideological-political and innovation-entrepreneurship education" in higher education institutions in the digital intelligence era.

Meanwhile, the rapid development of generative artificial intelligence represented by ChatGPT, Claude, and DeepSeek, along with big data technologies, is profoundly reshaping the forms and paradigms of higher education. Traditional ideological and political education is unable to achieve real-time tracking and personalized matching. The powerful natural language understanding, contextual situational awareness, cross-text semantic mining, and large-scale natural language generation capabilities of large language models provide computer technology support to break through the problems faced in innovation and entrepreneurship education, such as "lagging information perception, coarse student profiling, and homogeneous intervention strategies". With the help of large models and prompt engineering, it is possible not only to achieve intelligent clustering of massive student behavioral feedback but also to empower college educators to build a "Human-in-the-Loop" personalized precision intervention system, promoting the deep evolution of precision ideological and political education.

Based on this, this paper takes a questionnaire survey from a local university as its foundation. Through large language models and prompt engineering, it designs the survey scale and extracts behavioral labels, distills student profiles from four dimensions—participation status, motivational structure, process experience, and value cognition—identifies differences in ideological and political education needs among different groups, and then proposes adaptive precision ideological and political education implementation pathways and collaborative mechanisms, providing empirical reference for enhancing the educational effectiveness of integrated ideological-political and innovation-entrepreneurship education in higher education institutions.

2. Related Concepts and Research Design

2.1. Definition of Core Concepts and AI Modeling Logic

Behavioral profiling of college students' innovation and entrepreneurship is an extension of the user profiling method in the field of innovation and entrepreneurship education in higher education institutions. User profiling is a virtual

representation of real users—a modeled abstraction constructed on the basis of multi-dimensional attribute data. This study obtains multi-dimensional data on students' entry status, practice motivation, process experience, and value cognition in innovation and entrepreneurship practice through questionnaire surveys. Using descriptive statistics and cross-analysis, it distills differentiated characteristic labels of different groups to form structured student profiles. The process of generating and applying these profiles follows the basic logic of user profiling: "data collection-feature extraction-type induction-precision ideological and political education."

Empowered by computer and artificial intelligence technologies, this logic has been further deepened into a four-stage intelligent modeling architecture: "data collection (Prompt-driven)-feature extraction (LLM semantic parsing)-type induction (algorithmic clustering)-precision ideological and political education (AI intelligent guidance)." Large model technology can assist researchers in transcending the traditional limitation of relying solely on closed-ended options and efficiently processes unstructured text data in students' open-ended logs, team communication records, and project reflections, thereby distilling dynamic behavioral labels that combine quantitative precision with qualitative depth.

2.2. Research Design

2.2.1. Research Approach and Application of Prompt Engineering

This study is developed around the reality that student participation coverage in innovation and entrepreneurship education in higher education institutions continues to expand, while practical investment remains uneven. The research advances on two levels: first, by understanding the overall participation status of students; second, by analyzing the practical experiences of students who have already entered projects. On the basis of data presentation, it summarizes the common characteristics of students in different participation states, then analyzes the matching problems between current ideological and political education and innovation and entrepreneurship practice, and accordingly proposes precision ideological and political education implementation pathways.

To ensure the scientific validity and pertinence of the survey instrument in measuring the four dimensions of "entry status, motivational structure, process experience, and value cognition", this study introduces prompt engineering. By inputting educational guidelines and measurement standards into the large model, a structured System Prompt is constructed to assist in generating multidimensional questionnaires and situational scales. The following is a typical Prompt architecture example designed and tuned in this study:

[System Prompt Example: Prompt for Generating an Innovation and Entrepreneurship Survey Questionnaire and Measurement Scale]

[System Role] You are a senior expert in higher education measurement and a computational sociology researcher.

[Task] Based on the four dimensions of "entry status, motivational structure,

process experience, and value cognition", design a set of innovation and entrepreneurship practice survey scales for undergraduate students, including closed-ended options and open-ended situational tests.

[Constraints] 1) Option design must conform to the principles of mutual exclusivity and exhaustiveness in measurement; 2) Include probe questions targeting "team friction", "technical bottlenecks", "utilitarian mentality", and "lack of meaning"; 3) Language must align with the expressive habits of contemporary college students and avoid a preachy tone.

2.2.2. Survey Subjects, Data Acquisition, and Computer Preprocessing

This study takes undergraduate students from a local university who have taken innovation and entrepreneurship courses as the survey subjects, with two survey levels. The first level is an overall survey, primarily targeting undergraduates from different grades and majors, focusing on understanding students' exposure to innovation and entrepreneurship education, actual participation level, willingness to participate, and main factors affecting participation. The questionnaires were distributed by course instructors. To ensure data quality, attention-check items were embedded in the survey (e.g., "Please select option C for this question"). Questionnaires failing attention checks, with uniform response patterns, or missing core demographic information were excluded. The final valid sample consisted of 297 undergraduates, spanning from freshmen to seniors. A total of 297 valid questionnaires were obtained.

The second level is an in-depth survey. It is explicitly confirmed that the 105 in-depth respondents are a subset of the 297 overall respondents. The survey was structured in two stages: the first stage (n = 297) captured the overall participation landscape, and the second stage (n = 105) focused exclusively on those who had entered substantive practice stages. On the basis of the overall survey, it further focuses on students who have actually entered the innovation and entrepreneurship practice process. A total of 105 valid questionnaires were obtained. This part of the survey mainly investigates students' motivation for participating in innovation and entrepreneurship practice, process experience, team collaboration, project difficulties, and value identification.

In the data preprocessing stage, the research team cleaned the data and handled missing values. Regarding text-data sources: for the 105 deeply participating students, analyzed texts included their open-ended reflections on project experiences, team collaboration challenges, and value gains. For the 192 non-deep participants, analyzed texts consisted of their open-ended responses to the reasons for non-participation survey items. Both datasets were coded for thematic patterns and sentiment tendencies, with LLM assistance for initial keyword extraction, followed by manual validation.

2.2.3. Data Analysis and Validation

Data analysis was conducted through a combination of descriptive statistics, cross-tabulation, and thematic coding. For the quantitative data, frequency distri-

butions and percentage calculations were performed using SPSS 26.0. For the open-ended textual responses, large language models DeepSeek-V4 Pro were employed as auxiliary tools to assist in identifying recurring themes and sentiment tendencies in student reflections. The LLM was prompted to extract key phrases related to participation barriers, team friction, and value perceptions. However, all LLM-generated labels were manually reviewed and validated by the researcher to ensure accuracy and contextual appropriateness. The inter-rater agreement reached a substantial agreement, indicating reliable coding consistency.

The assignment of students to the three behavioral profiles was determined through manual cross-tabulation of motivation scores, process experience responses, and value cognition items, rather than automated algorithmic clustering. This approach ensured that profile construction remained grounded in educational theory and interpretive validity.

3. Student Profile Analysis Based on Survey Data

3.1. Overall Practical Behavior Analysis: The Gap between Exposure to Practice and Deep Practice

The 297 overall survey questionnaires show that students who actually entered core innovation and entrepreneurship projects and experienced substantive stages such as topic justification, team formation, and scheme design numbered 105, accounting for 35.35%; students who did not reach the level of deep participation numbered 192, accounting for 64.65% (see Table 1).

Table 1. Distribution of student innovation and entrepreneurship practice participation levels (n = 297).

Participation Status	Number	Percentage	Main Manifestation
Deep participation in core projects	105	35.35%	Experienced project topic selection, team formation, scheme design, and other stages.
Non-deep participation	192	64.65%	In a state of understanding, brief exposure, or non-sustained participation
Total	297	100%	—

From the sample structure, students do not find it difficult to access innovation and entrepreneurship courses, competition information, and project notifications, but there remains a clear gap between exposure to education and entering practice. Participation counts, course coverage, and information reach reflect, to a certain extent, the breadth of educational supply but are insufficient to explain the quality of practical participation. Over sixty percent of students remain in a state of having been exposed to relevant information but not truly participating in practice, indicating that resource openness does not automatically translate into action.

Using computer algorithms for cross-frequency analysis of the data reveals a clear digital divide and cognitive resistance between information reach and actual

behavior. This gap imposes specific requirements on ideological and political education. Offering courses, organizing competitions, and publishing notifications are responsibilities of educational supply. Whether students are willing to enter practice and whether they can form value identification in practice involve the space for ideological guidance. The reasons students stop short include not only practical conditions such as information, team formation, and ability, but also cognitive-level confusion about the relevance of innovation and entrepreneurship practice to their own growth and the value returns of participating in practice. If educational supply only addresses the former type of problem, even if channels are unobstructed, students may still hesitate outside due to a lack of a sense of meaning.

3.2. Students with Non-Deep Participation: Coexistence of Willingness to Participate and Practical Obstacles

A survey of 192 non-deeply participating students shows that only 33 expressed no interest at all in innovation and entrepreneurship practice, accounting for 17.2%; the remaining 159 expressed some willingness to participate but were affected by different practical factors, accounting for 82.8%. This result indicates that non-deep participation does not entirely mean students lack interest; some students may be willing but lack the conditions to enter practice. Table 2 lists the profile labels of this group and introduces typical text semantic features extracted by the large model.

Table 2. Profile labels of non-deeply participating students (n = 192, mutually exclusive multiple choice).

Obstacle Factor	Number	Percentage	Typical Semantic Features Extracted by LLM
Difficulty in team formation	131	68.2%	Cannot find teammates with complementary majors and similar willingness.
Poor information access	105	54.7%	Unclear about project information and participation channels.
Insufficient ability and confidence	79	41.1%	Worried about insufficient ability, afraid of not performing well.
Low outcome expectations	44	22.9%	Believe there is no value in participating without winning awards.
Completely uninterested	33	17.2%	No willingness to participate in innovation and entrepreneurship practice.

a. This question is a mutually exclusive multiple-choice question. Those selecting "completely uninterested" do not participate in the selection of the remaining options; the other four items are multiple-choice, and the percentages sum to over 100%.

From the perspective of ideological and political education, difficulty in team formation and poor information access belong to the level of action conditions and can be resolved through information services and organizational support; insufficient ability and confidence and low outcome expectations belong to the cog-

nitive level and require helping students establish a reasonable understanding of innovation and entrepreneurship practice—participation is not about immediately producing mature results but about gradually forming practical abilities in the process of discovering problems, engaging in cooperation, and responding to real needs. If only one of the two types of problems is solved, students will either enter projects but find it difficult to persist, or identify with the value but have no way to begin. Among the 192 non-deep participants, 33 students (17.2%) explicitly reported being "completely uninterested" in innovation and entrepreneurship practice. Although they currently lack intrinsic motivation or clear willingness, from the perspective of ideological and political education intervention, their starting point for guidance is similar to the hesitant group—both require cognitive inspiration and barrier removal to cultivate initial participation willingness. Given the small number and the shared need for entry-stage guidance, these 33 students were merged into the hesitant-wavering profile rather than being treated as a separate category.

Based on the above characteristics, non-deeply participating students can be summarized as the hesitant-wavering type: possessing some willingness to participate but lacking clear entry points, collaborative resources, and action confidence, blocked from practice by the triple barriers of information, team, and ability, while also being influenced by outcome-evaluation orientation. With the help of the large model's semantic mining of open-ended messages, the algorithm further reveals the dual dilemma of "low self-efficacy" and "lack of action opportunities" at a deeper level for this group, providing a basis for precise ideological and political education intervention.

3.3. Deeply Participating Students: Differentiation between Utilitarian-Frustrated and Value-Practitioner Types

The 105 deeply participating students show certain differences in participation motivation, process experience, and value gains. The following sequentially extracts profile labels from the three dimensions of motivation, process, and value, and forms typical profiles accordingly.

3.3.1. Motivation Labels: Coexistence of External Incentives and Internal Drivers

The participation motivation of deeply participating students has already differentiated. Forty-nine students (46.7%) participated due to external factors such as comprehensive evaluation bonus points, graduate school recommendation, and merit evaluation; 28 students (26.7%) participated upon invitation by teachers or classmates; the two combined account for 73.4%, forming the motivational starting point of the utilitarian-frustrated type profile. Nineteen students (18.1%) participated out of a desire to solve social problems and serve national needs, forming the motivational basis of the value-practitioner type profile; another 9 students (8.5%) considered cultivating innovative thinking and practical ability as their main consideration (see Table 3).

Table 3. Participation motivation profile labels of deeply participating students (n = 105, single choice).

Participation Motivation	Number	Percentage	Characteristic Description
Comprehensive evaluation bonus points, graduate school recommendation, and merit evaluation, etc.	49	46.7%	Primarily driven by external incentives
Invited by teachers or classmates to participate	28	26.7%	Passive participation, relatively insufficient agency
Solving social problems, serving national needs	19	18.1%	Possessing value-rational orientation
Cultivating innovative thinking and practical ability	9	8.5%	Primarily considering self-improvement

Motivational differentiation itself does not constitute a value judgment on students' motivation. Credits, awards, and evaluation recognition can help students take the first step, but if external incentives do not further transform into an understanding of project content, practical process, and social value, students will easily develop a sense of mismatch between investment and return when encountering difficulties. The focus of profile analysis is not to eliminate external incentives but to create conditions for motivational transformation during project advancement. Through the LLM text classifier's classification and identification of student motivation descriptions, the critical point of motivational transformation can be preliminarily identified.

3.3.2. Process Labels: Team, Technical, and Outcome Pressures

Deep participation is not entirely a smooth experience. 58.1% of students encountered uneven team division of labor or communication friction; 49.5% experienced research stagnation or technical bottlenecks; 31.4% felt frustrated because they invested heavily but did not achieve expected results (see **Table 4**).

Table 4. Process experience profile labels of deeply participating students (n = 105, multiple choice).

Process Experience	Number	Percentage	Characteristic Description
Uneven team division of labor or communication friction	61	58.1%	Certain difficulties in collaboration
Research stagnation or technical bottlenecks	52	49.5%	Encountered obstacles during the technical breakthrough
Heavy investment but no expected results.	33	31.4%	Frustration caused by outcome pressure

Innovation and entrepreneurship practice is characterized by uncertainty. Team disagreements, technical adjustments, and outcomes falling short of expectations do not necessarily mean project failure. However, the relatively high proportion of these obstacles indicates that, in the absence of sustained ideological

guidance and professional direction, students easily interpret project difficulties as personal inadequacy and may even doubt the meaning of practice. Using natural language processing (NLP) for emotional word frequency analysis of student logs can timely capture negative emotional labels such as "anxiety", "stagnation", and "shifting blame". Process support is therefore not an additional service when projects proceed smoothly but a necessary support when projects are difficult to advance.

3.3.3. Definition of Core Concepts and AI Modeling Logic

Value gains exhibit two levels. At the ability level, 62.9% of students believed their teamwork and frustration-resistance abilities improved; 54.3% believed their professional knowledge application and comprehensive qualities improved. At the value level, only 29.5% believed their understanding of national strategic needs and social responsibility deepened (see Table 5).

Table 5. Value gain profile labels of deeply participating students (n = 105, multiple choice).

Value Gain	Number	Percentage	Characteristic Description
Improved teamwork and frustration-resistance skills	66	62.9%	Relatively obvious perception of ability growth
Improved professional knowledge application and comprehensive qualities	57	54.3%	Some perceptions of knowledge application gains
Deepened understanding of national strategy and social responsibility	31	29.5%	Relatively limited deepening of value identification

This indicates that project practice can drive ability development, but value guidance does not occur naturally with practice. Students can answer what they learned in the project, but their understanding of why the project was undertaken, whom it serves, and what social significance it has remains relatively vague. Value identification does not automatically deepen simply because a project is completed or results are achieved; it requires a process of transforming practical experience into meaningful understanding, and this transformation is precisely the space where ideological and political education can intervene. The high-order semantic understanding of large models can assist educators in discerning from students' micro-level expressions whether they have achieved a leap from "skill acquisition" to "mission identification".

3.3.4. Profile Typology: Utilitarian-Frustrated and Value-Practitioner Types

Integrating the three dimensions, deeply participating students are not a homogeneous group. In terms of motivation, 73.4% primarily participated due to external incentives or passive participation, while 18.1% had a value-rational orientation; in terms of value gains, the proportions at the ability level were generally

high (62.9%, 54.3%), while the value level was markedly lower (29.5%). Motivational differentiation did not naturally bridge during the process experience and may instead expand. Based on the two questionnaire items of participation motivation and value gains, this study conducted a cross-analysis on the 105 deeply participating samples and divided them into two typical profiles.

Utilitarian-frustrated type profile. The participation motivation of these students primarily comes from comprehensive evaluation bonus points, graduate school recommendation and merit evaluation, or teacher and classmate invitations. Their value gains are concentrated at the ability improvement level, with limited experience of national strategic needs and social responsibility. They easily develop a sense of mismatch between investment and return in the face of team friction, research stagnation, and outcome pressure, failing to complete the transformation from instrumental rationality to value rationality. Clustering analysis shows that this group is highly associated with vocabulary representations such as "bonus points", "input-output ratio", and "bottleneck" in the feature space.

Value-practitioner type profile. The motivation of these students is primarily solving social problems, serving national needs, or cultivating innovative thinking. They can establish connections between professional knowledge and social needs in projects and experience a deepened understanding of national strategic needs and social responsibility at the value level. This type of student accounts for approximately 15% of the sample—not large in scale but providing a referable practical form for integrated ideological-political and innovation-entrepreneurship education. Machine learning models show that they are highly associated with positive semantic clusters such as "social value", "team mission", and "breaking through bottlenecks".

Intermediate state. Some students have externally oriented motivational starting points but gradually develop value-level experiences during project advancement; others have endogenous motivational starting points but fail to form clear value gains due to project obstacles. This state has considerable plasticity and is a transitional group on which precision ideological and political education needs to focus. Algorithmic predictions indicate that if correct decision support and guidance are introduced at this stage, their transformation into the value-practitioner type may be facilitated.

Hereafter, the utilitarian-frustrated type and value-practitioner type are treated as the two main profiles of deeply participating students, with the intermediate state regarded as a transitional form between them.

3.4. Differences in Ideological and Political Education Needs among the Three Types of Profiles

Integrating the analysis in Sections 2.2 and 2.3, the three types of profiles exhibit clear differences in participation status, motivational cognition, and ideological and political education needs, forming a gradient of participation depth from external to internal (see Table 6). In response to the characteristics of the three

groups, an AI-powered guidance agent based on large models can be introduced to achieve AI-driven differentiated intervention alignment.

Table 6. Participation status, ideological and political education needs, and AI matching matrix for the three types of student profiles.

Profile Type	Participation Status	Motivation and Value Cognition	Focus of Ideological and Political Education Needs
Hesitant-wavering type	Not yet entered (including those with latent willingness or no initial interest)	Meaning not established; lacks clear intrinsic motivation	Build practical confidence and correct cognition
Utilitarian-frustrated type	Entered, but investment is unstable	Meaning not transformed (instrumental rationality not yet shifted to value rationality)	Promote motivation transformation from external to internal
Value-practitioner type	Entered and able to sustain investment	Meaning established (endogenous motivation corresponds to value identification)	Expand social horizons and provide demonstrative leadership

4. Precision Ideological and Political Education Implementation Pathways Based on Student Profiles

4.1. For the Hesitant-Wavering Type: Lowering Entry Barriers and Providing Guidance in Parallel Abbreviations and Acronyms

The core dilemma of the hesitant-wavering type lies in possessing a willingness to participate but not yet having entered substantive practice stages, with obstacles stemming from both action conditions and cognitive perceptions. The first step of precision ideological and political education is to achieve precise identification of these students.

In the precise identification of this type of student, the practice of relying solely on competition registration and project approval as the single basis should be transcended. Counselors, innovation and entrepreneurship mentors, and professional teachers can pay attention to students who have expressed interest but have not actually participated through channels such as course performance, club activities, and daily communication, establish dynamic information ledgers of potential participating students, proactively push matching information at key nodes such as project recruitment and team formation, and reduce passive hesitation caused by information asymmetry. At the same time, an "AI intelligent innovation and entrepreneurship person-position project matching system" can be accessed, using LLM semantic matching algorithms to automatically analyze students' professional backgrounds, interest keywords, and existing teams' technical shortcomings, conducting bidirectional intelligent recommendations to effectively resolve the team formation bottleneck encountered by students.

In cognitive guidance, it is necessary to respond to the fundamental question of "what does innovation and entrepreneurship have to do with me". In entrance education, course introductions, themed class meetings, and themed Party and

Youth League day activities, special sessions can be set up using alumni cases, social needs analysis, and other methods to help students understand that innovation and entrepreneurship practice is not just competitions and bonus points but also a pathway to understand society, exercise collaboration abilities, and develop a sense of responsibility. The focus of guidance is not to encourage everyone to participate in competitions but to help students establish a reasonable cognition that "participating in practice is one way to grow". In this process, mentors and counselors can invoke ice-breaking guidance prompts generated by large models to provide customized encouragement and guidance to students.

[Prompt Template: Empowerment and Ice-Breaking Guidance Prompt for the Hesitant-Wavering Type]

[System Role] You are an empathetic ideological and political counselor and a university innovation and entrepreneurship mentor.

[Context] Student A has a computer science foundation and expressed interest in AI innovation but does not dare to apply for a project due to "worrying about insufficient technical skills and fear of dragging down the team".

[Task] Please generate a communication guide of approximately 200 words.

[Requirements] 1) Affirm their existing foundation and eliminate "perfectionist" anxiety; 2) Advocate "learning by doing"; 3) Recommend two micro-experience projects suitable for zero-basis beginners (such as community smart assistant research).

In entrance design, low-threshold experiential sessions can be established, such as short-term research projects, interdisciplinary exchange meetings, and enterprise visits, enabling students to encounter practical scenarios without bearing the pressure of a complete project and to gradually build confidence. The focus of work at this stage is to attract students to initial participation, which is also the best opportunity for ideological and political guidance—the cognition formed when students first encounter practice will affect the depth and direction of their subsequent participation.

4.2. For the Utilitarian-Frustrated Type: Embedding Value Transformation in the Project Process

Utilitarian-frustrated students have already entered innovation and entrepreneurship practice, but their motivational starting points are externally oriented, and they easily develop frustration when projects encounter difficulties. The key to ideological and political intervention for this group is not to negate their initial motivation, but to promote motivational transformation during the process.

Embedding value guidance at key nodes of project advancement is an important component of ideological and political education. At the topic justification stage, guide students to focus on the social significance and real needs of the topic, and cultivate responsibility awareness through division-of-labor negotiation; at the technical breakthrough stage, in the face of project stagnation and setbacks, provide timely psychological support and meaning interpretation to help students

understand that failure is a normal part of the practical process; at the outcome summary stage, guide students to reflect on technology ethics and the public attributes of outcomes. To empower educators to intervene precisely at complex practical nodes, an "Innovation and Entrepreneurship Process-Embedded AI Ideological and Political Assistant Agent" can be developed, embedding node reconstruction Prompt templates in the large model:

[Prompt Template: Motivational Reconstruction and Frustration-Resistance Guidance Prompt for the Utilitarian-Frustrated Type]

[System Role] You are a university innovation and entrepreneurship mentor deeply versed in the educational laws of the "integration of ideological-political and innovation-entrepreneurship education".

[Context] A student team encountered a core algorithm bottleneck during the final sprint of the "Internet+" competition, causing project stagnation, and team members developed internal friction and anxiety due to concerns about "not winning an award and not getting bonus points".

[Task] Please design a three-stage reconstruction guidance strategy.

[Strategy Steps] 1). Emotional empathy: accept their frustration and reshape the scientific cognition of "failure"; 2) Value reconstruction: guide them to shift their focus from "competition awards" to "the real value of this technology in solving actual pain points"; 3) Action suggestions: break down technical bottlenecks and formulate a minimum viable product (MVP) verification plan.

At the same time, a process support mechanism needs to be established. The survey data of this study show that 58.1% of deeply participating students encountered team friction, 49.5% experienced research stagnation, and 31.4% felt frustrated due to outcomes falling short of expectations. These data indicate that process support is not an additional service but a necessary support to prevent students from exiting practice. A tripartite linkage mechanism of innovation and entrepreneurship mentors, counselors, and peer mentors should be constructed to intervene promptly when projects encounter difficulties, providing both professional and ideological guidance.

In addition, the evaluation system needs to tilt toward process performance, adding evaluation items such as team contribution, normative awareness, and social value cognition in project assessment, so that students can feel that process investment is recognized while pursuing external outcomes, thereby providing institutional incentives for motivational transformation. Artificial intelligence systems can automatically record and quantify students' collaboration activity and reflection quality in project management, providing objective computational evidence for process evaluation.

4.3. For the Value-Practitioner Type: Expanding Horizons and Providing Demonstrative Leadership

Value-practitioner students have initially achieved a correspondence between endogenous motivation and value identification, which is an important manifestation of the educational effectiveness of integrated ideological-political and inno-

vation-entrepreneurship education. The ideological and political support for this group lies in providing higher-level resource connections and platform support, enabling them to move from individual practice to demonstrative leadership.

On the one hand, connect them with higher-quality social practice resources, using big data platforms and AI knowledge graphs to intelligently match students' project directions with national strategic need databases, enabling them to deepen their understanding of national strategies and social needs in broader social scenarios. On the other hand, a peer leadership mechanism can be established, extracting the successful experiences and frustration-resistance insights of their high-quality projects into standardized Prompt case libraries, inviting them to participate in project guidance, experience sharing, and team leadership for lower-grade students, transforming individual value practice into group demonstrative effects.

It is worth noting that value-practitioner students also need sustained support. If they lack further development channels, they may also exit practice due to project termination or insufficient resources. Therefore, attention to this group should not remain at the level of typical selection and formalized publicity, but should be embodied in sustained resource supply and platform construction.

4.4. Establishing a Collaborative Mechanism for Precision Ideological and Political Education Implementation Pathways

Student behavioral profiles are not fixed labels but are in dynamic change. Hesitant-wavering students may enter practical stages after receiving guidance; utilitarian-frustrated students may form stable internal motivation after value guidance; value-practitioner students may, in turn, drive the participation enthusiasm of the hesitant group after participating in demonstrative activities. Therefore, the differentiated implementation pathways proposed for the three types of profiles must effectively coordinate to open up flow channels between different groups, avoiding problems of disconnected identification, interrupted support, and fragmented evaluation. In the context of educational digitalization, this collaborative mechanism is reconstructed as a "Human-in-the-Loop" precision ideological and political education ecosystem, specifically embodied in three dimensions:

First, we should establish dynamic information ledgers covering the entire participation process and AI early-warning mechanisms to connect identification across different stages. For the identification stage of the hesitant-wavering group, potential participating student information collected by counselors through daily communication and course participation needs to be synchronized with the innovation and entrepreneurship guidance team for targeted invitations to low-threshold experiential activities, reducing the information gap that causes willing students to miss opportunities due to not knowing channels; for the practical process stage of the utilitarian-frustrated group, information on team conflicts, technical bottlenecks, and motivational fluctuations encountered by students collected by innovation and entrepreneurship mentors needs to be synchronized with counse-

lors for timely targeted guidance, avoiding the interruption where students encounter difficulties but cannot find support channels; for the development stage of the value-practitioner group, student practice growth information held by professional teachers needs to be synchronized with the university's educational management department to provide a basis for connecting high-level practice resources and building peer sharing platforms. After introducing a large model real-time monitoring system, algorithms can automatically warn of abnormal stagnation in the academic affairs system, innovation and entrepreneurship platform, and team logs, enabling cross-position information sharing to leap from "manual periodic reporting" to "real-time intelligent connectivity".

Second, we should clarify the responsibility connections of the three types of educational actors in guiding different groups and clarify the division of labor boundaries in "human-machine collaboration". For the hesitant-wavering group, counselors assume primary identification responsibility, focusing on eliminating students' cognitive concerns through daily communication, while innovation and entrepreneurship mentors are responsible for designing low-threshold experiential practice activities to lower action barriers, avoiding the disconnection of "identifying students but having no supporting activities to receive them"; for the utilitarian-frustrated group, innovation and entrepreneurship mentors focus on students' motivational changes at key nodes of project advancement, promptly referring students with motivational deviations and emotional fluctuations to counselors for value guidance, inviting value-practitioner peer seniors to share practical experiences to dispel students' fear of setbacks, avoiding the one-sided guidance of "only providing technical guidance without attending to ideological dynamics"; for the value-practitioner group, professional teachers are responsible for connecting high-level social practice resources and guiding them to deepen the social value connotations of practice, while counselors organize their participation in experience sharing, project guidance, and other demonstrative activities for lower grades, transforming individual value identification into group educational effects, avoiding the resource waste of "establishing models but not exerting a driving role". In this process, the large model plays the role of "intelligent teaching assistant", responsible for data preprocessing, basic information matching, and draft text generation, while emotional transmission, final value review, and in-depth heart-to-heart talks are ultimately controlled by university educators, ensuring the unity of technical precision and educational warmth.

Third, we should establish a process-oriented algorithmic evaluation system that matches the development goals of different groups to strengthen the institutional incentives for collaboration. The effectiveness of guidance for hesitant-wavering students should not be measured by project awards and competition results but should incorporate the frequency of participation in experiential activities, changes in practical cognition, and the transformation from hesitation to action into the evaluation, guiding counselors and mentors to focus their work on entrance guidance rather than only watching students who have already partici-

pated; the effectiveness of guidance for utilitarian-frustrated students should not be measured solely by the grade of project outcomes but should incorporate responsibility performance in the team, coping status in the face of setbacks, and cognitive changes regarding the social value of practice into the evaluation, guiding mentors to focus their work on value guidance during the process rather than only pursuing project results; the effectiveness of guidance for value-practitioner students should not be measured solely by the number of individual awards but should incorporate contributions to peer leadership and exploration of the public value of practice into the evaluation, guiding management departments to focus their work on platform construction rather than treating students as typical displays. This layered and categorized evaluation orientation, combined with process indicators collected by AI, replaces the original unified result-centered assessment model, enabling different actors to have clear directional bases for guiding the three types of students.

Overall, the collaborative mechanism of the three pathways essentially runs the requirements of precision ideological and political education through the entire process of student participation in innovation and entrepreneurship practice. Through connections at the information, organizational, institutional, and algorithmic levels, students in different states can obtain matching support at corresponding stages, ultimately forming a closed loop of integrated ideological-political and innovation-entrepreneurship education characterized by "guidance at entry, support during process, space for growth, channels for leadership, and empowerment through technology".

5. Conclusion and Outlook

5.1. Research Conclusions

Focusing on the real contradiction between the supply of innovation and entrepreneurship education in higher education institutions and students' actual needs, this paper takes questionnaire survey data from a local comprehensive university as its foundation, introduces user profiling and artificial intelligence large model methods to summarize the characteristics of college student innovation and entrepreneurship groups, and thereby proposes a set of adaptive precision ideological and political education implementation pathways and collaborative safeguard mechanisms.

First, there is a significant gap between "broad coverage" and "deep participation" in innovation and entrepreneurship education in higher education institutions. Although the scale and channels of educational supply are relatively complete, over sixty percent of students still remain at the stage of shallow cognition and marginal hesitation. Resource openness does not automatically translate into deep practical participation, which provides broad space for ideological and political education and intelligent, precise guidance.

Second, the behavioral characteristics of college students in innovation and entrepreneurship practice exhibit significant heterogeneity and can be distilled into

three typical profiles. Non-deeply participating students mostly manifest as the "hesitant-wavering type", constrained by action conditions and cognitive barriers; deeply participating students differentiate into the "utilitarian-frustrated type" and the "value-practitioner type", with the former facing the dilemma of instrumental-rational expectation frustration and lagging value identification, while the latter has initially achieved the unity of endogenous motivation and value identification. With the help of LLM semantic mining and machine learning algorithms, the distributional representations of the three types of profiles in the dimensions of motivation, experience, and value can be precisely verified.

Third, the implementation of precision ideological and political education must abandon homogeneous supply and shift to differentiated measures and dynamic collaboration. For the hesitant-wavering type, it is necessary to lower entry barriers and pre-position meaning guidance; for the utilitarian-frustrated type, it is necessary to embed value transformation mechanisms at key project nodes; for the value-practitioner type, it is necessary to expand social horizons and strengthen demonstrative leadership. Through the development of Prompt engineering intervention templates and a "Human-in-the-Loop" mechanism, deep connections among information, organization, institution, and algorithms have been achieved, opening up transformation channels among the three types of profiles and providing a methodological pathway toward the leap from static classification to dynamic intelligent education.

5.2. Research Limitations and Outlook

This study attempts to explore student profiling and precision ideological and political education construction in the context of integrated ideological-political and innovation-entrepreneurship education from the interdisciplinary perspective of empirical research and AI. However, constrained by objective conditions and research design, it still has several limitations, and future research can continue to expand and improve from multiple dimensions.

First, in terms of sample representativeness and data span, the survey subjects of this study are limited to a single local university, and the sample source is relatively homogeneous. Higher education institutions in different regions, at different levels, and with different disciplinary backgrounds may differ in their innovation and entrepreneurship education ecosystems and student group characteristics. Future research should expand the sample scope and conduct comparative studies across regions and types of universities to further test and revise the profiling model and implementation pathways proposed in this paper, thereby enhancing the universality of the research conclusions.

Second, in terms of research methods and technology application, this study mainly relies on cross-sectional questionnaire survey data and static text analysis, which cannot fully portray the dynamic evolutionary patterns of student participation status and motivational transformation. Future research can introduce longitudinal tracking designs, conducting continuous cross-semester tracking of the

same cohort of students to dynamically monitor the transformation trajectories of profiles. At the same time, the application of artificial intelligence and big data technologies should be intensified, exploring the training of domain-specific fine-tuned LLMs for higher education ideological and political education and innovation and entrepreneurship. By collecting multimodal objective data from students in academic affairs systems, GitHub/code repositories, innovation and entrepreneurship platforms, and campus life, a more three-dimensional, real-time, and objective student digital profile can be constructed.

Finally, in terms of algorithmic ethics and the boundaries of human-machine collaboration, when using large models and behavioral profiling for precision ideological and political education intervention, it is essential to be highly vigilant against ethical risks such as data privacy leakage, "algorithmic bias", and "label stereotyping". Artificial intelligence systems should play the role of assistants and enablers and must not replace the warm care of educators with algorithmic inference. Future educational technology research needs to formulate strict ethical norms for AI-enabled education, establish and improve a safety closed loop of "data security assurance—algorithmic transparency and explanation—teacher final review and supervision", and ensure that artificial intelligence technology always serves the fundamental task of fostering virtue through education and the free and comprehensive development of students.

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Conflicts of Interest

The author declares no conflicts of interest regarding the publication of this paper.

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