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Teaching innovation in internal control courses integrating ideological education and game theory

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This study aims to propose an innovative teaching model for Internal Control courses, integrating course ideology and game theory perspectives to enhance learning engagement. The developed model—termed "Integration, Co-learning, Co-empathy"—comprises three phases: initial design, mid-term application, and final assessment. Integration constructs a cohesive knowledge structure; Collaborative Learning boosts students' practical skills; empathy strengthens emotional literacy and fosters a positive teacher-student relationship. By merging ideological and political education concepts with game theory principles, the research optimizes course design and teaching strategies. It offers insights into the continuous development of Internal Control courses in accounting programs, providing practical recommendations for university-level curriculum reform. Ultimately, it targets improved educational effectiveness and promotion of comprehensive learning.

KEYWORDS

game theory, teaching model, internal control, higher education, ideological and political teaching

1 Introduction

In Guidelines for the Construction of Ideological and Political Education in Higher Education Curriculum released by China's Ministry of Education in 2020, it is clearly stated that core task of curriculum construction is to comprehensively enhance talent cultivation capabilities, advocate for coordinated promotion of institutional mechanisms for curriculum ideological and political education construction, and ensure comprehensive development and deep implementation of educational work. In order to thoroughly implement Great Ideological and Political Course ideal, Chinese Ministry of Education and ten other departments issued Work Plan for Comprehensively Promoting the Construction of Great Ideological and Political Course in 2022. And in 2024, China emphasizes that the construction of ideological and political courses may be firmly guided by ideology of socialism with Chinese characteristics in the new era, fully follow educational policy, implement the fundamental task of cultivating morality and talents, build a curriculum system with the ideology of socialism with Chinese characteristics as the core content, and ensure that education and teaching keep pace with the times. But at the same time, we have noticed that some higher education institutions in China have been influenced

to varying degrees by Western educational concepts. While enhancing educational capital, technology, and professional logic, there have also been some phenomena of weakening or even dissolving the political logic and functions of education, and even breeding certain decentralized, de authoritarian, and politicized thinking and ideas [1, 2]. In view of above, how to effectively implement ideological and political education in courses has become a focus of attention and theoretical research in higher education institutions.

This paper found that as of the latest literature update to December 2024, the total number of research papers on theme of ideological and political education in courses in China reach 58,100, and there are 392 related studies on ideological and political education in undergraduate colleges, of which about 3,590 are related to finance and economics majors. The above literature mainly include the following two aspects: exploring the practical path of curriculum ideological and political education based on understanding of its connotation, mainly exploring the comprehensive deepening of construction and implementation of curriculum ideological and political education in multiple dimensions such as educational objectives, content design, classroom practice, educational participants, educational strategies, implementation environment, and emphasizing mainstream value guidance in knowledge transmission. In terms of conducting relevant research based on the implementation subject of ideological and political education in the curriculum, specific exploration of the path of ideological and political education is mainly carried out from aspects of building a three-dimensional teaching team for ideological and political education, building a platform for ideological and political resources, promoting construction of demonstration courses for ideological and political education, and improving evaluation and assessment system for ideological and political education, in order to efficiently complete fundamental task of cultivating moral character [3, 4].

The course of Internal Control, as a professional course for undergraduate students majoring in finance and economics, is a deepening and expansion of accounting, auditing, and financial management disciplines. The primary objective of this course is to guide students in understanding the strategic role of internal control in modern corporate governance, emphasizing that it is not merely a compliance requirement but also a crucial tool for enhancing organizational operational efficiency, safeguarding asset security, and achieving strategic goals. The instructional approach emphasizes interdisciplinary integration, combining accounting oversight, risk management, and corporate governance theories to cultivate students' ability to analyze internal control deficiencies in enterprises from a holistic perspective and propose optimization solutions. This approach not only facilitates students' enhanced development of social responsibility awareness and knowledge translation capabilities but also enables them to better apply their acquired knowledge in increasingly complex market environments. Additionally, based on characteristics and disciplinary advantages of the course itself, relevant corporate financial fraud cases, audit risks, and legal regulations can all become ideological and political materials, laying a solid foundation for future economic management positions [2, 5].

2 Current dilemma of ideological and political construction in course of internal control

In today's digital economy era centered around Big Intelligence Mobile Cloud IoT Zone, internal control will develop in five directions: vertical deepening, horizontal integration, means enhancement, emphasis on effectiveness, and innovative methods. In this situation, the complex and ever-changing forms of risks, especially the increase in digital risks such as data security and online fraud, require the curriculum to include systematic teaching of digital risk identification, assessment, and response strategies to ensure that students can effectively cope with new challenges in their future work [6].

2.1 Difficulty in integration of course content and ideological and political elements

The course Internal Control is selected and offered based on talent cultivation plans and requirements of undergraduate finance and economics majors in universities. It has a relatively mature teaching syllabus and knowledge structure. The difficulty of embedding ideological and political elements lies in: Firstly, the course Internal Control involves enterprise risk management, financial control, auditing, and other fields, and has strong professionalism and technicality. Ideological and political elements such as core values of Chinese socialism, moral ethics, etc. are relatively abstract. Forcing external implantation of ideological and political education resources and elements will lead to a lack of harmony between internal control courses and ideological and political education elements. Secondly, neglecting to explore ideological and political education value contained in internal control from perspective of curriculum construction, and simply listing ideological education in teaching objectives and designs, is not conducive to the deep integration and organic embedding. Once again, neglecting the integration of internal control and ideological and political education, lacking a clear understanding of significance and goals of curriculum ideological and political construction, failing to clarify its internal logical connection with ideological and political education, and also failing to form a synergistic effect with ideological and political courses will all have negative effect on the effectiveness of curriculum ideological and political education [7].

2.2 Lack of ideological and political literacy of teachers and learning ability of students

The teachers who teach the course Internal Control mostly come from professional fields such as accounting, financial management, and auditing. Their educational backgrounds mainly focus on professional knowledge and skills. Although some teachers have high level of knowledge in their professional fields, their training and experience in ideological and political education are relatively insufficient. Moreover, the curriculum and teaching contents in this field rarely involve ideological and political education, which may lead to a lack of skills and methods to naturally integrate ideological

and political elements into professional courses, resulting in poor integration effects. Meanwhile, in the teacher evaluation and incentive mechanisms of many universities, insufficient emphasis is placed on the integration of ideological and political education into courses. The lack of clear evaluation criteria and incentive measures leads to teachers' inadequate input and motivation in the construction of such integration, thus affecting the enhancement of their ideological and political teaching capabilities [8]. Due to differences in learning abilities among college students, their acceptance of ideological and political education courses varies from person to person. On the one hand, the main purpose of students majoring in finance and economics studying internal control-related courses is to master relevant professional skills, identify financial risks, and pay relatively low attention to ideological and political contents. Each student varies in terms of comprehensive qualities such as autonomous learning ability, moral character, and awareness of career planning. Students who lack learning initiative find it difficult to fully understand normal teaching content. If students are unwilling to accept or have insufficient abilities and interests in this area, they will be unable to feel the ideological and political elements permeating them due to insufficient thinking or poor understanding ability, and consequently, it becomes impossible to achieve the effect of infiltrative education [9, 10]. Therefore, this study introduces the evolutionary game model into the exploration of ideological and political education, aiming to quantify the interactions and feedback between teachers and students [17]. By revealing the inherent logical contradictions in their behaviors, we seek to develop institutional solutions. Moreover, the dynamic monitoring emphasized by game equilibrium aligns seamlessly with the "subtle infiltration" principle advocated in ideological education, further informing the methodological framework proposed in this paper.

2.3 Unbalancing game between guidance of teacher and learning ability of student

In the current landscape of internal control education, a segment of educators persists in employing a traditional, unidirectional knowledge-imparting approach, which may oversight the cultivation of students' proactive inquiry and practical application abilities. Due to the lack of immersion in authentic business scenarios, students struggle to correlate the abstract internal control frameworks with real-world issues, resulting in insufficient engagement and superficial case analysis. The root of this imbalance lies in the traditional teaching model's misalignment with digital learning needs, insufficient attention to diverse learning conditions, and the absence of differentiated instructional design. Constrained by weak foundational knowledge or inadequate self-motivation, students find it challenging to engage effectively in courses characterized by "high theoretical intensity and strong practical demands," ultimately leading to a disconnection between teaching objectives and learning outcomes. Therefore, we posit that both teachers and students, as independent entities, operate within the bounds of bounded rationality in the educational context [11].

The teaching process of teacher-student is a gradual adjustment process, which is also a long-term evolutionary game process. In the game process, both teachers and students continuously adjust and improve strategies until they evolve into stable strategies. There are two main behavioral strategies for teachers: teaching seriously and not teaching seriously. Teachers who teach seriously often meet with students to discuss issues and interact with them promptly to impart knowledge and clarify doubts. However, teachers who do not teach earnestly usually adopt a laissez-faire management approach towards students, showing indifference to various aspects of students' study and life. Students' behavioral strategies can also be manifested in two ways: serious learning and not serious learning. Serious students can actively explore problems; Students who are not serious are unwilling to invest a lot of time and energy in their studies. Therefore, this article defines the behavioral strategy space of teachers (E) and students (L) as (serious, not serious), abbreviated as (S, N). The research hypotheses are as follows.

1) In the scenario where neither the teacher nor the student exerts earnest efforts, their respective payoffs are denoted as V_E and V_L, with the conditions that $V_E > 0$ and $V_L > 0$;
2) When the teacher is dedicated to teaching while the student is inattentive in learning, the teacher's payoff is calculated as $(1+\alpha_0)V_E - C_E$. Here, $\alpha_0(\alpha_0 > 0)$ represents the coefficient of payoff increment when the teacher is earnest, and C_E stands for the effort cost incurred by the teacher when choosing to teach earnestly, where $C_E > 0$. In this case, although only the teacher is making efforts, the student reaps the benefits brought about by the teacher's earnest teaching, which gives rise to the student's free-riding behavior. At this moment, the student's payoff is π_L,and it holds that $\pi_L > V_L$;
3) In the situation where only the student studies earnestly but the teacher is negligent in teaching, the student's payoff is $(1+\beta_0)V_L - C_L$, where $\beta_0 > 0$is the coefficient of payoff increment when the student is earnest, and C_L is the effort cost invested by the student when choosing to study earnestly, with $C_L > 0$.When only the student is putting in efforts, the teacher shares the benefits brought by the student's earnestness, such as the teacher being included as a co-author in students' innovation training projects and papers. This constitutes the teacher's free-riding behavior. At this time, the teacher's payoff is π_E, $\pi_E > V_E$;
4) When both the teacher and the student are committed to their roles, their payoffs are $(1+\alpha_1)V_E - C_E$ and $(1+\beta_1)V_L - C_L$, where α_1 is the coefficient of payoff increment for the teacher when both parties are earnest, and it satisfies $\alpha_1 > \alpha_0 > 0$; β_1 is the coefficient of payoff increment for the student when both are earnest, and $\beta_1 > \beta_0 > 0$. Based on all above, a benefit matrix for the teacher-student game can be established, as shown in Table 1:

3 Analysis of evolutionary trend of the teacher-student game

3.1 The equilibrium points of evolutionary process

Assume that the probability of a teacher adopting a serious teaching strategy is x (where $0 \le x \le 1$), and the probability of adopting a careless teaching strategy is $1-x$. Similarly, assume that the probability of students adopting a serious learning strategy is

y (where $0 \le y \le 1$), and the probability of adopting a non-serious learning strategy is $1 - y$.

For teachers, the expected benefits of choosing to teach seriously or carelessly are, defined in Equations 1–3:

$$U_1 S = y\left[\left(1+\alpha_1\right) V_E - C_E\right] + (1-y)\left[\left(1+\alpha_0\right) V_E - C_E\right] \quad (1)$$

$$U_1 n = y\pi_E + (1-y)\, V_E \quad (2)$$

The average expected return for teachers is:

$$U_1 = xU_1 S + (1-x)\, U_1 n \quad (3)$$

For students, the expected benefits of choosing serious or careless learning strategies are defined in Equations 4–6:

$$U_2 S = x\left[\left(1+\beta_1\right) V_L - C_L\right] + (1-x)\left[\left(1+\beta_0\right) V_L - C_L\right] \quad (4)$$

$$U_2 n = x\pi_L + (1-x)\, V_L \quad (5)$$

The average expected return for students is:

$$U_2 = yU_2 S + (1-y)\, U_2 n \quad (6)$$

According to the replication dynamics of evolutionary game theory (Equation 8), the replication dynamic equation for teacher A are demonstrated in Equations 7, 8:

$$\dot{x} = \frac{dx}{dt} = x\left(U_1^d - U_1\right) = x(1-x)\left[\alpha_0 V_E - C_E - \left(\pi_E - \left(\alpha_1 - \alpha_0 + 1\right) V_E\right) y\right] \quad (7)$$

Similarly, the replication dynamic equation for student B's strategy is:

$$\dot{y} = \frac{dy}{dt} = y\left(U_2^d - U_2\right) = y(1-y)\left[\beta_0 V_L - C_L - \left(\pi_L - \left(\beta_1 - \beta_0 + 1\right) V_L\right) x\right] \quad (8)$$

The equilibrium points of these replication dynamic equations are asymptotically and locally stable, and the equilibrium point is an evolutionarily stable strategy (ESS).

Given that:

$$S_1 = \frac{\pi_E + C_E - V_E}{V_E}, \quad S_2 = \frac{\pi_L + C_L - V_L}{V_L}$$

the following conclusions can be drawn.

1. When $0 < \alpha_0 < \frac{C_E}{V_E}$, $\alpha_0 < \alpha_1 < S_1$, and $0 < \beta_0 < \frac{C_L}{V_L}$, $\beta_0 < \beta_1 < S_2$:

In this case, whether one party is serious or both are serious, the increase in benefits from being serious is relatively small, but the effort cost is high. Thus (0.0) is the stable point, (0.1) and (1.0) are saddle points, and (1.1) is the unstable point. At this point, both teachers and students are not serious, making this an evolutionary stable strategy.

2. When $0 < \alpha_0 < \frac{C_E}{V_E}$, $\alpha_0 < \alpha_1 < S_1$, and $\frac{C_L}{V_L} < \beta_0 < \beta_1 < S_2$:

In this case, the benefits students gain from studying diligently are greater than their effort cost but less than their free-riding benefits. However, the benefits that teachers can provide to students from teaching seriously are less than the cost they incur. Consequently, teachers will not teach seriously, and students will not free-ride. Thus, (0.1) is the stable point, meaning that if teachers do not teach diligently, students will study diligently. This is the stable evolutionary strategy.

3. When $\frac{C_L}{V_L} < \alpha_0 < \alpha_1 < S_1$ and $0 < \beta_0 < \frac{C_L}{V_L}$, $\beta_0 < \beta_1 < S_2$:

The benefits of a teacher's diligent teaching are greater than the cost but less than their free-riding benefits. On the other hand, the benefits of a student's diligent learning are less than the effort they put in. If a student does not study seriously, the teacher has no free-riding to exploit. (1.0) is the evolutionary stable point, where the teacher teaches diligently while the student does not study seriously. This is the evolutionary stable strategy of the system.

4. When $\frac{C_E}{V_E} < \alpha_0 < \alpha_1 < S_1$ and $\frac{C_L}{V_L} < \beta_0 < \beta_1 < S_2$:

The benefits from serious teaching and learning for both teachers and students are greater than the cost they pay, but less than the benefits from free-riding. In this case (0.1) and (1.0) are stable points. This indicates that one party (either the teacher or the student) will always be free-riding, i.e., one party is serious while the other is not. The specific equilibrium reached depends on the initial state of the system.

5. When $S_1 < \alpha_0 < \alpha_1$ and $S_2 < \beta_0 < \beta_1$:

The benefits obtained from serious investment by both parties are greater than the benefits obtained from free-riding when one party is not serious while the other is serious. In this case, (1.1) is the evolutionary stable point, where both the teacher and students are committed to the evolutionary stable strategy of the system.

3.2 Evolutionary game of student education with punishment mechanism

From the above analysis, it is clear that under different conditions, the game will evolve toward different equilibrium points, and the resulting stable strategies will vary. In some cases, one of the parties—either the teacher or the student—will always hope for free-riding behavior, leading to outcomes where neither party is serious, or only one party is serious, particularly when the benefits of free-riding are substantial. As a result, it is essential to implement mechanisms that can suppress free-riding behavior.

To ensure the game evolves toward the ideal solution, where both parties adopt a serious strategy, we introduce a punishment mechanism. Specifically, during the interaction between teachers and students, if one party is serious while the other is not, the non-serious party will be penalized. Let the teacher's punishment loss be K_E and the student's punishment loss be K_L. In this case, the benefit matrix for the game between teachers and students changes, as shown in Table 2.

The necessary and sufficient conditions for the (serious, serious) strategy to be the only Evolutionarily Stable Strategy (ESS) are:

$$K_E > \pi_E - (1+\alpha_1)\, V_E + C_E \quad (11)$$

$$K_L > \pi_L - \left(1+\beta_1\right) V_L + C_L \quad (12)$$

TABLE 1 The benefit matrix of teachers and students.

Teacher/Student	Study seriously (S)	Not study seriously (N)
Teaching Seriously (S)	$(1+\alpha_1)V_E - C_E, (1+\beta_1)V_L - C_L$	$(1+\alpha_0)V_E - C_E, \pi_L$
Not Teaching Seriously (N)	$\pi_E, (1+\beta_0)V_L - C_L$	V_E, V_L

TABLE 2 The benefit matrix of teachers and students.

Teacher/Student	Seriously study (S)	Not seriously study (N)
Seriously Teaching (S)	$(1+\alpha_1)V_E - C_E, (1+\beta_1)V_L - C_L$	$(1+\alpha_0)V_E - C_E, \pi_L - K_L$
Not Teaching Seriously (N)	$\pi_E - K_E, (1+\beta_0)V_L - C_L$	V_E, V_L

where π_E and π_L represent the free-riding benefits for teachers and students, respectively, $(1+\alpha_1)V_E$ and $(1+\beta_1)V_L$ represent the benefits generated by serious behavior from both teachers and students, and C_E and C_L are the costs associated with the serious efforts of the teacher and student, respectively.

Therefore, to ensure that the stable strategy in this game involves both the teacher and the student adopting a serious strategy, the relationship between the penalty losses incurred by the non-serious parties, the free-riding benefits, the benefits from serious behavior, and the costs of serious efforts must satisfy the conditions laid out in Equations 11, 12.

4 Teaching optimization of internal control: based on dual perspectives of ideological and political education and game theory

4.1 Optimize ideological and political teaching objectives of internal control course

Firstly, the ideological and political teaching objectives of the course should be clearly defined in curriculum outline and teaching plan, incorporating socialist core values, professional ethics, social responsibility, and other contents into teaching objectives to ensure that the ideological and political education of the course has a clear direction and specific requirements. As a core course that integrates accounting and auditing, the course of Internal Control not only involves creating an internal control environment and accurately identifying and analyzing enterprise risks, but also includes the formulation and implementation of risk response strategies [12]. The core goal is to equip students with theoretical framework and methodology of internal control, in order to cultivate their ability to analyze, evaluate, design, and solve various problems in enterprise management practice.

Secondly, in curriculum design, ideological and political elements should be organically integrated into specific teaching content: (1) integration of social responsibility and values. When explaining internal control and risk management in enterprises, emphasis is placed on values such as integrity, a sense of responsibility, and social fairness and justice. By constructing teaching cases, the moral and ethical issues, social responsibility issues, and other ideological and political content in internal control of enterprises can be concretized to help students understand and think in practical situations. (2) Strengthening legal thinking and beliefs. Help students learn and understand laws and regulations such as Accounting Professional Ethics and Financial Regulations and Economic Law, educate students to always remember the importance of strictly following financial rules and regulations, cultivate students' professional ethics, and establish correct worldviews, outlooks on life, and values.

4.2 Optimize ideological and political teaching paths of internal control course

The basic requirements and teaching objectives of ideological and political construction in the course of Internal Control are to provide students with comprehensive theoretical knowledge and practical skills, and cultivate compound talents that meet the development needs in the new era. This study innovatively constructs an internal control course teaching model that integrates theory and practice, classroom and social learning, and ideological and political theory and professional ethics empathy around the three dimensions of Integration, Co-learning and Co-empathy (as shown in Figure 1).

Firstly, classroom and social integration achieve close integration between teaching content and social reality through the approach of external mentors entering the classroom and internal students entering the enterprise. To better carry out internal control ideological and political education, on the one hand, excellent industry experts or external mentors can be invited to the classroom to share practical work experience and the latest industry trends with students, so that students can foresee the possibilities of their future careers in theoretical learning. On the other hand, students can be encouraged to "go out" and be guided to independently analyze and discuss the problems faced by enterprises in management by organizing them to conduct on-site inspections and research on the front line of enterprises. They can also try to design solutions, such as identifying risks and challenges that the development

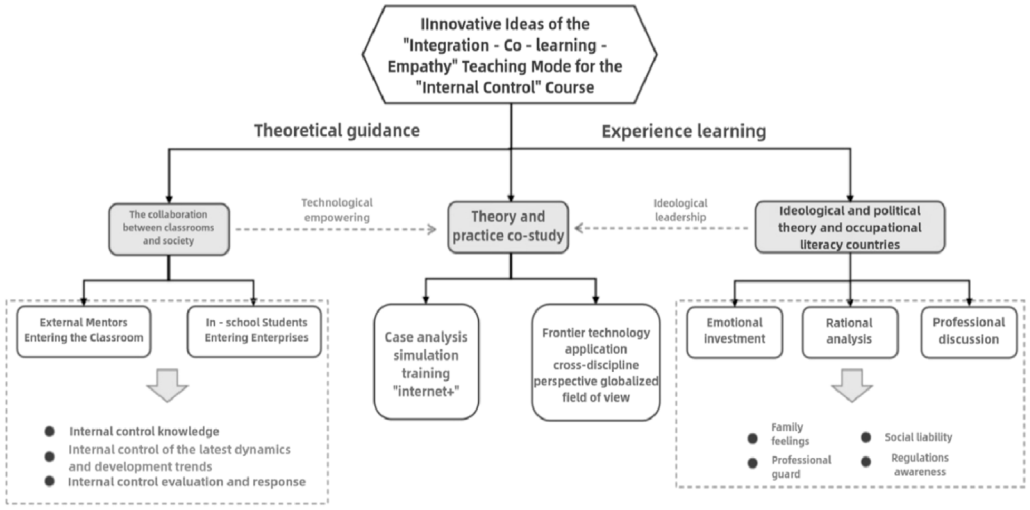

FIGURE 1
Innovative ideas for integration-learning-empathy teaching model of internal control.

of digital economy brings to internal control of enterprises, and how enterprises should take corresponding measures. This will help students develop independent and critical thinking abilities [13, 14].

Secondly, in the link of theory and practice learning together, this course not only focuses on building a three-dimensional and dynamic learning ecosystem for students by combining abstract theoretical knowledge with vivid practical experience through diversified teaching methods, such as case analysis, simulation training, participation in Internet plus innovation and entrepreneurship competition, etc. This study also encourages interdisciplinary learning, such as inviting experts from fields such as law, psychology, and information technology to give cross-border lectures, guiding students to examine internal control and risk management issues from a multidisciplinary perspective, and building a comprehensive and in-depth understanding framework [15].

Finally, in the teaching process of Empathy between Ideological and Political Theory and Professional Literacy, this study adopts the model of "emotional investment + rational analysis + professional discussion" to naturally integrate ideological and political education into the curriculum content. At the level of emotional investment, teachers, as knowledge transmitters, guides, and listeners, encourage students to actively participate in the classroom, become the main body of learning process, and stimulate students' inner potential and emotional resonance. At the level of rational analysis, the curriculum design should cleverly integrate core values such as patriotism, integrity, and law-abiding, guiding students to use critical thinking to conduct rational analysis and evaluation of internal control mechanisms. Through group discussions, case seminars, and other forms, students may deepen their professional knowledge through interactive communication, while internalizing the core values of ideological and political education in their hearts and externalizing them in their actions [16].

4.3 Optimization of undergraduate training mechanism and teacher performance system based on game theory perspective

To enhance the synergy between undergraduate education and faculty performance systems, this study, based on the analytical results of an evolutionary game model, proposes specific pathways from the perspectives of incentive mechanism design and penalty mechanism improvement. These pathways aim to address the "free-rider" dilemma in the game between teachers and students and promote a virtuous cycle of teaching and learning.

Firstly, positive gaming between teachers and students should be encouraged within the undergraduate education mechanism. During the learning process, some students may exhibit short-sighted behavior by passively coping with their academics with minimal time and effort, solely to obtain graduation certificates and degrees. They tend to invest their time and energy in off-campus internships that provide immediate economic returns. While such behavior may yield short-term benefits, it restricts their future development potential in the long run. Therefore, it is crucial to link the long-term value of research and practical achievements by incorporating innovative training projects, case competition outcomes, and other projects related to further education and employment into the credit system. This enhances their long-term benefit coefficient β_1. Additionally, inviting external mentors or entrepreneurs to participate in curriculum design quantifies the practical value of long-term benefits $(1+\beta_1)V_L$ and reduces students' free-rider gains π_S. Furthermore, a teacher incentive mechanism should be established by incorporating the quality of student training into faculty promotion criteria, clarifying the long-term benefits $\alpha_1 V_E$ of teachers' dedicated teaching. This encourages teachers to develop training plans based on students' qualities, academic strengths, personal interests, and life plans, thereby achieving an organic unity

between teachers' and students' academic and career development goals.

Secondly, the penalty mechanism should be improved by increasing penalties K_E and K_L for teachers and students who do not take their responsibilities seriously. At the student level, a dual-track system of "process assessment and outcome evaluation" needs to be established. Gradient penalties should be imposed on free-rider behaviors such as plagiarism and passive participation in group tasks. First-time offenders should have their course participation scores deducted, while repeat offenders should be disqualified from evaluations and receive notations in their integrity files, ensuring that $K_L > \pi_L - (1+\beta_1)V_L + C_L$. At the teacher level, many universities currently adopt performance evaluation systems similar to workload points, focusing on counting academic papers and research projects published by teachers. This fails to reflect the specific effectiveness of teaching in the evaluation process. Therefore, it is necessary to reform current teacher performance and student training systems by establishing elimination mechanisms for teaching teams and accountability systems for student management. Quantitative indicators should be set for behaviors such as perfunctory teaching and neglecting the integration of ideology and politics in courses. Combined with peer reviews, retraining in teaching abilities should be conducted, and those who fail to meet the standards should be suspended from teaching, ensuring that $K_E > \pi_E - (1+\alpha_1)V_E + C_E$. Through multi-level dynamic monitoring, the game between teachers and students can be shifted from a zero-sum competition to a stable equilibrium of win-win cooperation.

5 Conclusion

This research constructs an "Integration, Co-learning and Co-empathy" teaching model. Through pre-design, mid-implementation, and post-assessment, integration constructs the knowledge system, co-learning cultivates comprehensive capabilities, and co-empathy internalizes emotional qualities. It also builds a teacher-student game-theoretic relationship. Based on the Grand Ideological and Political Course concept and game theory, and integrating the features of finance and accounting majors, this paper conducts top-level design, optimizes teaching methods and content, and innovates comprehensively. These efforts offer countermeasures and references for effectively developing and optimizing the Grand Ideological and Political Course in university finance and accounting majors.

In future practical and theoretical work, we need accelerate the construction of a curriculum and textbook system centered on Socialism with Chinese Characteristics for a New Era. It is imperative to embed dynamic feedback loops within knowledge dissemination, such as real-time classroom data analytics and two-way evaluation of social practice, to establish quantifiable reward-penalty mechanisms that deter free-riding behaviors while synergistically reconstructing the teacher-student trust dynamic through emotional empathy and rational analysis. Furthermore, building upon the "Grand Course of Socialist Ideology" concept, we can promote the transition from tactical gaming to value co-creation by developing university-enterprise collaborative case databases and cross-disciplinary workshops. This innovative paradigm provides ideological and political education in accounting specialties with both theoretical profundity and practical adaptability. Foster synergy in ideological and political course construction and contribute financial and economic expertise to cultivating well-rounded socialist successors.

Data availability statement

The original contributions presented in the study are included in the article/supplementary material, further inquiries can be directed to the corresponding author.

Author contributions

DX: Data curation, Formal Analysis, Methodology, Writing – original draft, Writing – review and editing. KO: Writing – review and editing.

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Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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The author(s) declare that no Generative AI was used in the creation of this manuscript.

Publisher's note

References

1. Hao D. The problem orientation, logical mechanism, and construction mechanism of curriculum ideology and politics. *Higher Edu Res* (2021) 42:85–91.

2. Wang Y. Goal consistency: theoretical perspective on integrating ideological and political education into university subject teaching. *Tsinghua Univ Edu Res* (2023) 44:73–87. doi:10.14138/j.1001-4519.2023.02.007315

3. Dong B. On the essence and connotation of course ideology and politics. *Finance Account Commun* (2022) 21–6. doi:10.16144/j.cnki.issn1002-8072.2022.12.002

4. Wang X. The connotation, characteristics, difficulties, and coping strategies of ideological and political education in the new era curriculum. *J Xinjiang Normal Univ (Philosophy Soc Sci Edition)* (2020) 41:50–8. doi:10.14100/j.cnki.65-1039/g4.20191125.001

5. Liu W, Li H. The construction of ideological and political education in economics courses: logical starting point, value shaping, and practical path. *Foreign Econ Trade* (2023) 115–8.

6. Chen D, Hu Q. Research on corporate governance in the digital economy era: paradigm innovation and practice frontiers. *Manag World* (2022) 38:213–40. doi:10.19744/j.cnki.11-1235/f.2022.0088

7. Zhang A. A brief analysis of difficulties and focus of curriculum ideological and political construction. *Sch Party Building Ideological Edu* (2022) 41–3. doi:10.19865/j.cnki.xxdj.2022.20.011

8. Gao D, Zong A. From ideological and political courses to curriculum ideological and political education: constructing a curriculum system for ideological and political education in universities from a strategic perspective. *China Higher Edu* (2017) 43–6.

9. Wang Q, Wang S. Ideological and political guidance-technological empowerment-diversified innovation: practical exploration of curriculum education-taking the course of 'internal control and risk management' as an example. *J Cent South Univ Nationalities (Humanities Soc Sci Edition)* (2022) 42:156–63. doi:10.19898/j.cnki.42-1704/C.2022.0719

10. Wang X, Hua Y. The core purpose, hierarchical extension, and expected results of the construction of the 'great ideological and political course. *Ideological Theor Edu* (2024) 75–80. doi:10.16075/j.cnki.cn31-1220/g4.2024.05.008

11. Wang Z, Kan B. Time and space in the digital transformation of education:values,games and reconfigurations. *Contemp Edu Sci* (2023) 63–71. doi:10.3969/j.issn.1672-2221.2023.04.008

12. Liu H, Shi Y, Jing X. The rational connotation and implementation path of curriculum ideological and political construction. *Teach Chin Universities* (2019) 59–62. doi:10.16284/j.cnki.cn37-1401/c.2023.03.017

13. Zhang C, Liu W. Interpretation and strategy analysis of ideological and political space in professional courses in colleges and universities. *J Liaocheng Univ Soc Sci Edition* (2023) 91–100. doi:10.16580/j.sxlljydk.2019.10.026

14. He Y, Yu ZX. New era advancing college education "course" of the construction of the four dimensions. *J Ideol Theor Edu Trib* (2021) 132–136. doi:10.16580/j.sxlljydk.2021.02.022

15. Pfister JA. Managing organizational culture for effective internal control: from practice to theory. *Account Res* (2011) 20:771–4. doi:10.1007/978-3-7908-2340-0

16. Gu F, Shen H. Internal control in the digital age: development and prospects - review of the 2019 academic annual meeting of the internal control professional committee of the Chinese accounting society. *Account Res* (2019) 2.

17. Wang P, Bu H, Liu B. Red culture and internal control of enterprises: impact effect and empirical test. *Stat Decis making* (2023) 39:173–7. doi:10.13546/j.cnki.tjyjc.2023.22.031