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Research on the Joint Training Model for Graduate Students in Applied, Research-Oriented, and Skill-Oriented Universities

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Abstract: The joint training model for graduate students in applied, research-oriented, and skill-oriented universities can rely on clarifying the roles and responsibilities of each party, jointly developing plans that align with the objectives of cultivating diverse talents, and establishing a solid foundation for training efforts. In practice, it can integrate the faculty strengths of the three types of universities, create a reasonably structured and professionally complementary mentor team system, share various resources from teaching, research, and practice platforms, build standardized practical innovation bases, optimize the curriculum structure, deeply integrate the core educational contents of the three types of universities, establish a scientific and comprehensive evaluation system, implement classified assessments according to different training orientations, ensure that the training quality meets requirements, improve various cooperative safeguard systems, standardize the cooperation process, resolve various issues that arise during the cooperation operation, promote the sustained and stable development of tripartite cooperation, and enhance the quality of graduate student training.

Keywords: Applied universities; Research-oriented universities; Skill-oriented universities; Graduate students; Joint training

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1. Introduction

The classified development of higher education is a primary approach to improving structural layout and enhancing educational outcomes in the process of building an education powerhouse. The functional differentiation and coordinated development of research-oriented, applied, and skill-oriented universities serve as crucial support for forming a modern higher education system. Graduate education represents an important link in cultivating high-level talents, and the creation and innovation of its training model must precisely align with the classified positioning of universities to meet the demands of national strategies, industrial transformations, and social development. Promoting resource sharing, leveraging complementary strengths, and interconnecting mechanisms in graduate training among different types of universities can make the supply of high-level talents more targeted and demand-driven, thereby enhancing the overall quality and level of graduate education.

2. Clarify roles and responsibilities and collaboratively develop training plans

The classified development of universities provides direction for restructuring the graduate education system. Institutions with different educational orientations play distinct roles in talent cultivation, scientific research, and social services, forming a complementary functional landscape. Joint graduate training should rely on classified characteristics to clarify the main responsibilities and training boundaries, and through collaborative design of training plans, achieve resource integration and strength fusion, ensuring the systematic and adaptive nature of high-level talent cultivation and promoting the translation of classified development concepts into training practices [1].

First, collaboratively conduct demonstration and target decomposition of training plans. Research-oriented universities emphasize the provision of basic theories and innovative methods, establishing standards for cultivating graduate students' theoretical foundations, scientific research thinking, and original innovation capabilities. Applied universities focus on technology transfer and engineering practice, defining core requirements for technology application, project implementation, and problem-solving. Skill-oriented universities rely on training platforms and industrial standards to strengthen the cultivation of operational skills, job adaptability, and process execution capabilities. Based on the overall training objectives, the three parties divide stage tasks into a cohesive training framework. Second, jointly develop a curriculum system and teaching content. Research-oriented universities offer courses on basic theories and cutting-edge research methods, emphasizing academic norms and scientific research training; applied universities add courses on engineering design and technology development, strengthening case teaching and project implementation; skill-oriented universities incorporate industrial training courses and technical assessment modules. The three parties share curriculum resources and mutually recognize credits, forming an integrated curriculum structure that combines theory, application, and skills. Third, establish interdisciplinary joint training teams and implement a dual-mentor or multi-mentor responsibility system. Mentors from research-oriented universities guide academic research and thesis writing, mentors from applied universities guide technology development and commercialization, and mentors from skill-oriented universities guide practical operations and process training. Regular mentor seminars are held to unify training requirements and evaluation standards. Fourth, jointly design practical components and assessment mechanisms. Leveraging the research platforms of research-oriented universities, conversion bases of applied universities, and training centers of skill-oriented universities, arrange research training, engineering practice, and job training in stages. The assessment process comprehensively evaluates theoretical knowledge, application capabilities, and skill proficiency, with all three parties jointly participating in process evaluation and result recognition to ensure that training quality matches the positioning. Fifth, establish a regular communication mechanism, form a joint training working group, regularly align on training progress, coordinate resource provision, optimize implementation processes, and dynamically adjust plans according to disciplinary development and industrial demands to ensure the sustained and stable operation of joint training.

The essence of collaborative advancement by multiple entities lies in precise positioning, integrating advantageous resources, and establishing a robust implementation mechanism, using standardized processes and management to ensure the efficient implementation of the joint training model.

3. Integrate faculty resources to build a joint supervisor team system

Against the backdrop of "classified advancement of university reforms", faculty members at different types of universities possess distinct advantages in nurturing students. Integrating diverse faculty resources and establishing a collaborative supervisor team system is a means to enhance the quality of graduate education. By leveraging complementary faculty strengths, collaborative responsibilities, and interconnected mechanisms, the goal of organically integrating academic guidance, applied instruction, and skills training can be achieved, providing stable faculty support for joint cultivation programs [2].

The first step involves establishing a stratified and categorized supervisor team structure based on the educational

missions and faculty expertise of the three types of universities. Supervisors from research-oriented universities primarily guide basic research and academic innovation, those from applied universities focus on technology transfer and engineering practice, and those from skills-oriented universities specialize in practical skills training and occupational norms. Specific responsibilities in course instruction, research guidance, and practical training are clearly defined, forming a collaborative supervisor work pattern with distinct roles and responsibilities. The second step is to create a cross-institutional faculty hiring and sharing mechanism, incorporating qualified faculty from the three universities into a joint supervisor pool. By granting open access to supervisor selection, graduate students can choose advisors from different universities based on their educational needs, facilitating the free flow of high-quality faculty across different types of universities. The third step involves conducting joint supervisor training and capability enhancement activities, regularly organizing collective discussions among supervisors from the three universities on cultivation plans, course content, and guidance methods. This fosters the organic integration of academic thinking, applied concepts, and skills orientation, enhancing the collaborative educational awareness and comprehensive guidance capabilities of the supervisor teams. The fourth step is to refine the supervisor team assessment and incentive mechanisms, using joint guidance workload, educational outcomes, and graduate achievements as bases for performance evaluations and professional title evaluations and appointments of faculty from the three universities. Special incentive measures are implemented to boost the enthusiasm and sustainability of supervisors' participation in joint cultivation programs. The fifth step involves incorporating technical experts and highly skilled professionals from industry and enterprises into the supervisor teams, supplementing practical resources from the frontlines of industry. This facilitates in-depth cooperation between university faculty and industry professionals, forming a comprehensive chain of academic, applied, and skills-oriented supervisors participating in talent cultivation.

The core of faculty integration lies in precise division of labor and interconnected mechanisms, relying on a stable collaborative supervisor team to ensure the effective implementation of holistic educational goals throughout the joint cultivation process.

4. Share platform resources to establish practical innovation bases

Resource integration and platform co-construction within the university classification system can break down resource barriers caused by differing educational missions, promoting the enhancement of graduate education quality through factor circulation and functional complementarity. By optimizing resource allocation and reconstructing practical scenarios, different types of universities can achieve synergistic enhancement in graduate education, strengthening the integrated cultivation of innovation and practical capabilities through platform-based operational mechanisms [3].

Firstly, leveraging the mechanism of regional higher education collaborative development, integrate the basic research platforms of research-oriented universities, the technology transfer platforms of applied universities, and the practical training platforms of skills-oriented universities to create a cross-type joint graduate cultivation resource-sharing system. Clarify platform access permissions, usage norms, and management responsibilities, incorporating resources such as large-scale scientific research instruments, experimental data, practical training stations, and industry linkage channels into a unified allocation scope. Research-oriented universities open key laboratories and research platforms to support basic theoretical exploration, applied universities open engineering technology centers and pilot-scale platforms to undertake technology validation and implementation, and skills-oriented universities open training bases and productive training scenarios for skills practice. The three types of platforms are segmented and fully connected according to cultivation stages, forming a complete cultivation chain from theoretical research to technology transfer and then to skills application. Secondly, collaborate with leading industry enterprises and industrial parks to jointly establish practical innovation bases. Set up targeted cultivation projects based on regional dominant and emerging industries, formulating integrated cultivation plans that include theoretical study, technology development, process optimization, and on-the-job practice. Jointly form supervisor teams, with research-oriented university supervisors responsible for theoretical guidance and research methodology training, applied university supervisors for technology transfer and project management, skills-oriented

university supervisors for operational norms and process control, and enterprise supervisors for introducing industry demands and practical standards. Conduct real-world training in the bases on project tackling, product development, and process improvement, establishing an evaluation mechanism that combines process-based and outcome-based assessments, directly linking practical innovation achievements with graduate academic evaluations and degree conferrals. Rely on the bases to carry out industry-university-research cooperation projects, promoting graduate participation in real industry tasks, enhancing their ability to solve complex problems and apply knowledge comprehensively, and ensuring precise alignment between the cultivation process and industry demands, innovation chains, and job requirements.

The realization of resource coordination and mechanism synergy should be grounded in classified positioning, strengthening functional complementarity, relying on platform co-construction to ensure resource implementation, and using standardized management as support to enhance cultivation efficiency.

5. Optimize curriculum systems to integrate three types of educational content

Curriculum system reconstruction should be guided by the educational goals of the three types of universities, organically integrating theoretical depth, applied transformation, and skills practice. By integrating content, connecting modules, and designing gradients, a comprehensive curriculum structure covering knowledge construction, technology application, and skills implementation should be created, ensuring the systematicness and adaptability of joint cultivation and supporting the realization of cultivation goals for compound high-level talents [4].

Firstly, create a stratified and progressive modular curriculum system, disassembling and reorganizing the basic theory courses of research-oriented universities, technology development courses of applied universities, and process operation courses of skills-oriented universities into basic theory modules, technological innovation modules, and skills training modules. The basic theory module, led by research-oriented universities, focuses on principle explanation and methodology training, strengthening the cultivation of original innovative thinking. The technological innovation module, dominated by applied universities, centers on scheme design, technology transfer, and project implementation, enhancing technological problem-solving and engineering practice capabilities. The skills training module, undertaken by skills-oriented universities, uses equipment operation, process norms, and job procedures as real-world training content, solidifying technical and skill foundations. The modules are sequentially connected according to cultivation stages, forming a complete learning path from theory to technology and then to skills. Secondly, establish a cross-institutional course selection and credit recognition system, formulating unified course standards and credit recognition methods. Open high-quality online and offline specialized courses from the three types of universities for joint cultivation graduate students to freely choose. Develop cross-type integrated courses that combine basic research, technology application, and skills operation into a single course teaching. Design course content around real industry problems, adopting a teaching method that combines theoretical instruction, project discussion, and on-site operation. Courses are jointly taught by faculty from the three universities and industry experts, promoting the simultaneous advancement of knowledge transfer, capability cultivation, and literacy enhancement. Thirdly, establish a curriculum dynamic update mechanism, closely following national strategic demands and industry technology iteration trends. Regularly conduct industry demand surveys and technological development assessments, updating curriculum modules and teaching content based on frontier technology changes and job capability requirements. Incorporate the frontiers of basic research, new paradigms of technology transfer, and new standards of skills operation into the curriculum system, ensuring the forward-looking and applicability of course content and promoting the resonance between the curriculum system and the orientation of classified higher education development and industry upgrade demands.

The optimization of the curriculum system should take cultivation goals as the central organizing principle for course design, relying on inter-university collaboration to drive teaching implementation and using dynamic updates to maintain the long-term matching of the curriculum system.

6. Improve evaluation mechanisms to classify and assess cultivation quality

The classified development system of universities provides institutional support for joint graduate cultivation. Different types of universities with varying educational missions have differentiated logics in talent cultivation goals, capability orientations, and evaluation dimensions. Joint cultivation should rely on the classified development framework to create a fitting evaluation system, taking cultivation goal fit, capability attainment, and contribution matching as the core, establishing a diversified and collaborative quality assessment mechanism, and ensuring close alignment between the cultivation process and evaluation standards and the educational missions of various universities [5].

Relying on the basic research platforms of research-oriented universities, the technology transfer systems of applied universities, and the practical training resources of skills-oriented universities, create an integrated joint cultivation evaluation carrier. On the one hand, establish classified assessment indicators according to the entire process of graduate cultivation. For research-oriented participants, focus on assessing basic research capabilities, academic innovation achievements, and mastery of research methodologies. For applied participants, primarily evaluate technology scheme design, speed of technology implementation, and level of technological problem-solving. For skills-oriented participants, emphasize examining proficiency in practical skills, job fit, and technology inheritance. Indicator weights are adjusted in a timely manner according to the educational missions of the three types of universities to prevent a single evaluation standard from covering multiple cultivation needs. On the other hand, create an inter-university collaborative evaluation organization, with the three types of universities respectively assigning teaching, research, and practical training supervisors in corresponding fields to form a joint evaluation team. Conduct process-based assessments and summative evaluations in stages according to the cultivation plan. Process-based assessments cover various parts such as course learning, research practice, and technical training, using methods such as staged achievement reports, practical skill tests, and research progress evaluations to grasp cultivation quality at any time. Summative evaluations include academic output, technology transfer achievements, and job practice performance, forming a comprehensive evaluation report encompassing academic value, application value, and skills value. Meanwhile, incorporate external entities such as industry enterprises and industrial parks into the evaluation system, collecting feedback information on talent-job fit and technology application effectiveness to enrich the feedback and improvement mechanism of evaluation results. Based on evaluation conclusions, refine cultivation plans, adjust resource allocation, and regulate supervisor ratios, achieving closed-loop linkage between evaluation and cultivation and ensuring that the quality of joint cultivation meets classified development needs.

The key to improving evaluation mechanisms is to create a clear-classified, diverse-standard, and collaborative assessment system, highlighting the educational characteristics and nurturing advantages of various universities, thereby achieving the comprehensive improvement and precise supply of high-level talent cultivation quality.

7. Improve the support system to promote long-term cooperative operations

The deep integration of classified development and joint cultivation among universities requires support from a systematic support system. By delineating rights and responsibilities, coordinating resources, aligning mechanisms, and making dynamic adjustments, a stable and sustainable collaborative operation mechanism can be established. This mechanism defines the responsibilities and resource investment standards for each entity, forming a system of institutional constraints and incentives throughout the entire cultivation process to ensure the orderly and efficient advancement of joint cultivation.

Firstly, a tripartite management system with clear responsibilities and collaborative division of labor should be established. Research-oriented universities will coordinate basic research resources and academic norm management, application-oriented universities will build technology transfer platforms and engage in industrial alignment, and skill-oriented universities will provide training venues and formulate skill standards. The three parties will sign long-term cooperation agreements, specifying details such as funding ratios, mentor dispatch standards, credit recognition criteria, and the allocation of outcomes and intellectual property rights, thereby establishing a fixed procedure for exchange and

cooperation. Secondly, a classified resource coordination and support system should be created. Leveraging the research platforms, laboratories, and academic mentor teams of research-oriented universities, graduate students will receive basic research training and academic guidance. Relying on the industrial cooperation bases and engineering technology centers of application-oriented universities, graduate students will be supported in conducting technology research and development and pilot-scale production of outcomes. Utilizing the training workshops, skill certification centers, and industry technician resources of skill-oriented universities, graduate students will strengthen their practical skills training and job adaptability cultivation. An inter-university faculty mutual hiring system will be established, absorbing three types of universities' academic mentors, engineering mentors, and skill mentors to form a joint guidance team, implementing segmented and modular joint guidance. Furthermore, a stable funding and condition support system should be established. By integrating financial special project support, university-enterprise cooperation funds, and inter-university matching funds, a joint cultivation special fund will be set up for platform construction, mentor allowances, practical training, and the conduct of scientific research projects. Differentiated allocation will be carried out based on the positioning and contribution of the three types of universities. Sharing channels for hardware resources such as library materials, experimental equipment, and training venues will be opened up to enable cross-university use and unified management. Finally, a dynamic institutional optimization mechanism should be established. Regular monitoring and evaluation of the cooperation operation status and cultivation implementation effectiveness will be conducted. In accordance with the needs of university classification reform and industrial development requirements, cooperation content, guarantee measures, and management criteria will be updated in a timely manner to ensure that the support system closely aligns with the joint cultivation model and talent cultivation objectives, promoting the transition of tripartite cooperation from short-term project-based to long-term stable operations.

Improving the support system relies on institutional innovation to break down inter-university barriers, creating a multi-party collaborative and continuously stable operational ecosystem that provides strong support for the long-term development of the joint cultivation model for graduate students from application-oriented, research-oriented, and skill-oriented universities.

8. Conclusion

In summary, the establishment of a joint cultivation model for graduate students from research-oriented, application-oriented, and skill-oriented universities should take the classified development of higher education as its logical premise and inter-university collaboration, resource integration, and mechanism alignment as its main paths. Relying on the collaborative design of cultivation plans, the joint construction and sharing of mentor teams, the coordinated utilization of platform resources, the optimization and integration of curriculum systems, the classified adaptation of evaluation mechanisms, and the systematic improvement of support systems, the efficient coupling and functional complementarity of diverse educational elements can be achieved. This will promote the structural optimization and quality improvement of graduate education, meeting the requirements for building an educational powerhouse, cultivating high-level talents, and reforming the classification of higher education.

Disclosure statement

The authors declare no conflict of interest.

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