ISSN: 2710-0170

Research on joint training mechanism of inter-provincial and inter-university vehicle engineering graduate students under the concept of innovation, coordination and open sharing

Jingyue Wang[1], Junnian Wang[2], Jianming Ding[3], Wenjun Luo[4]

[1] School of Automobile and Transportation, Shenyang Ligong University, Shenyang, 110159, China;

[2]National Key Laboratory of Automotive Chassis Integration and Bionics, Jilin University, Changchun 130025, China;

[3] State Key Laboratory of Rail Transit Vehicle System, Southwest Jiaotong University, Chengdu 610031, China;

[4]State Key Laboratory of Mechanical Transmissions for Advanced Equipment, Chongqing University ,Chongqing, 400044, China.

Abstract

In view of the demand of automobile for innovative high-quality talents, this paper analyzes the advantages of the joint training mechanism, briefly describes the current status of the training mechanism for graduate students in vehicle engineering, and analyzes its shortcomings. Based on the concept of innovation, coordination and open sharing, this paper studies the joint training mechanism of inter-provincial and inter-university vehicle engineering graduate students from the aspects of sharing mechanism, exchange and coordination mechanism, government regulation mechanism and talent evaluation mechanism, and continuously improves the joint training mechanism through continuous feedback and modification, which is conducive to the training of high-level vehicle engineering graduate students.

Keywords

Innovation coordination; Open sharing; Vehicle engineering graduate students; Joint training.

1. Introduction

With the rapid development of science and technology in our country, the demand for high-level innovative talents is increasing, and it is urgent to improve the education quality of postgraduate students. The concept of innovation, coordination, openness and sharing takes innovation as the new driving force, coordination as the new idea, openness as the new opportunity, and sharing as the new goal, so as to solve the current problems facing the development of education and improve the quality of education. Based on the concept of innovation coordination and open sharing, the joint training of graduate students is promoted through inter-provincial and inter-university cooperation, so as to change the traditional training mode of talents, so as to realize the exploration of new ways to cultivate innovative talents.

The training of vehicle engineering graduate students is the main way to train talents in the automobile industry. The design and manufacture of automobiles involve knowledge of various disciplines, and China's automobile industry is changing to new energy vehicles, which requires vehicle engineering graduate students to have knowledge reserves in various fields. Therefore, based on the concept of innovative coordination and open sharing, the provincial and inter-

ISSN: 2710-0170

university joint training of vehicle engineering graduate students is the main way to train innovative composite vehicle technical talents, so as to meet the needs of China's automobile development. In this paper, under the concept of innovation coordination, open sharing, the joint training mechanism of vehicle engineering graduate students is studied to provide help for improving the innovation ability and independent research ability of vehicle engineering graduate students.

2. Advantages of joint training mechanism

Joint training mechanism is a new educational concept, mainly through the cooperation between multiple schools, institutions or organizations, to provide students with interdisciplinary learning and training opportunities. In order to improve the comprehensive ability of innovative talents, the Outline of the National Medium - and Long-Term Education Reform and Development Plan (2010-2020) proposes a variety of joint training methods for postgraduate education[2]. Through joint training, cooperation between different schools or institutions is promoted, and academic exchanges are carried out to improve the quality of teaching and scientific research. At the same time, it promotes interdisciplinary cooperation, so that students can learn under the guidance of experts in different subject fields, and cultivates students' comprehensive ability and innovation ability, which is more suitable for the talent cultivation of vehicle engineering majors involving a wide range of subject fields. The advantage of the joint training mechanism is that it can realize resource sharing and common development, and can provide a variety of academic and practical resources through joint training, so as to provide students with a richer and more comprehensive learning experience.

2.1. Realize resource sharing

Resource sharing is a significant advantage of the joint training mechanism, which plays an important role in interdisciplinary cooperation, knowledge acquisition and practical experience. Through provincial and inter-university joint training, resource sharing is realized, so that students can make full use of academic resources such as libraries and laboratory facilities, and make up for the shortage of scientific research resources in some universities. In addition, students can also conduct scientific research and practical operations in different laboratories, master a variety of advanced experimental technologies and instruments, enhance practical ability, so that postgraduates have more adequate scientific research conditions for academic research. At the same time, resource sharing can bring interdisciplinary cooperation and exchange. Graduate students can participate in teaching courses, seminars and lectures provided by different schools or institutions, listen to the explanations of experts from different fields, deepen academic understanding and expand disciplinary horizons, and graduate students can exchange academic views and ideas between different schools or institutions to expand disciplinary horizons. Promote the formation and development of interdisciplinary thinking. Students also have access to mentors from multiple institutions for personalized academic guidance and career planning advice. Joint training usually coexists with multiple parties, which can provide diversified practice platforms for graduate students, such as enterprises, research institutions, etc., to help them gain rich practical experience and improve employment competitiveness. Joint training provides students with rich and varied learning experience and development opportunities, promotes their all-round growth and development, and is conducive to the cultivation of high-level composite talents.

2.2. Promote common development

In the process of joint training, colleges and universities cooperate with other universities, enterprises, research institutes and other joint training units, transfer graduate students to the joint training units, rely on their project resources to provide practical opportunities for

ISSN: 2710-0170

graduate students, and at the same time, they can carry out academic exchanges, and under the guidance of different tutors, research projects, exchange experience and resources, stimulate innovative thinking, and jointly promote the development of disciplines. At the same time, the dilemma of limited scientific research projects, insufficient scientific research funds and lack of hardware and software facilities in ordinary universities can be effectively improved[3]. At the same time, through project cooperation, training units continue to attract talents with potential in colleges and universities for scientific research, so that training units can constantly inject fresh blood, provide a large number of research-oriented talents for the unit, alleviate the problem of heavy workload caused by the lack of talents in training units, and reserve talents for themselves in cooperation. The joint development of the joint training mechanism promotes academic exchange and cooperation, provides rich teaching resources, promotes interdisciplinary learning and capacity development, and provides a wide range of practical opportunities. Inter-university teachers can jointly develop courses and research projects, exchange experience and resources, stimulate innovative thinking, jointly promote the development of disciplines, and improve the quality and quantity of postgraduate research papers. Joint training units can effectively solve the problem of insufficient research talents and promote the research of projects. This model can effectively promote the common development of both parties and achieve a win-win situation.

3. Current situation and problems of joint training of graduate students in vehicle engineering

In recent years, various colleges and universities in China have conducted research on the cultivation of postgraduates. The main way of training is joint training through inter-university or inter-provincial cooperation, and good results have been achieved. Zhang Jing et al.[4] studied school-enterprise joint training and built a "three-subject" talent joint training model with the same goals, shared tasks and shared resources. Xu Yaqi et al.[5] studied the profit distribution and internal incentive system in joint training. Liu Jubao et al.[6] promoted the stable development of joint training mainly by exerting the leading role of the government. Cao Yutao[7] promoted the combination of teaching, scientific research and production through the implementation of the dual tutorial system, so as to realize the joint training of graduate students. Zhang Ang et al.[8] studied the sustainable development of the joint training of graduate students. Since the vehicle engineering graduate students involve knowledge in many fields in the process of scientific research, the interests of many parties will be involved in the process of joint training, so there will be the following problems in the process of joint training.

3.1. The sharing mechanism is not perfect

The imperfect sharing mechanism is the primary problem facing the joint training of vehicle engineering graduate students. In the process of inter-university and inter-provincial cooperation, colleges and universities have reached a consensus on resource sharing, but in the specific implementation process, due to the imperfect setting of sharing mechanism and the influence of profit distribution and risk bearing, joint training units cannot obtain high-quality information and resources in time, resulting in the failure to establish effective cooperative relations between colleges and universities. The result is a waste of resources and low efficiency in the process of joint training. At the same time, the imperfection of the sharing mechanism will also cause the delay in the adjustment of the curriculum and teaching methods in the process of joint training, which will affect the sustainable development of joint training and the overall training effect.

ISSN: 2710-0170

3.2. The communication and coordination mechanism needs to be strengthened

In the process of inter-provincial and inter-university cooperation, colleges and universities have little understanding of each other, and due to the influence of interest relations, colleges and universities lack effective cooperation willingness and consensus in the joint training project, and they have reservations about cooperation and communication, which makes it difficult for colleges and universities to share information and communicate in a timely manner, resulting in the limited progress of the joint training project. The lack of effective communication and coordination mechanism is difficult to solve these differences, which affects the quality and effect of joint training projects. Vehicle engineering involves many disciplines and requires the participation of many parties in order to achieve the goal of comprehensively training students. However, due to the lack of cross-departmental and cross-field communication and cooperation mechanisms, it is often difficult for relevant departments or disciplines to cooperate effectively, resulting in the one-sidedness and limitations of joint training projects.

3.3. The government regulation mechanism is insufficient

At present, government departments have relatively few management and supervision responsibilities in the field of higher education, and lack unified planning and guidance in the process of inter-provincial and inter-university joint training of colleges and universities. There are often great differences among colleges and universities in the curriculum setting, teaching quality standards, academic evaluation system and other aspects of joint training projects, resulting in non-standard and inconsistent joint training projects. It affects the overall training quality and level. Joint training projects need to involve the cooperation of multiple universities and departments, which involves a large cost and investment. However, at present, the government's financial support and policy inclination for such projects are limited, which is difficult to meet the needs of the projects, restricting the development and promotion of the projects. There is a lack of corresponding supporting policies for the resource sharing principle, performance evaluation mechanism, intellectual property protection and benefit distribution of the joint training of vehicle engineering graduate students. Moreover, no special joint training management coordination organization has been established, and no social intermediary service agencies have been introduced, resulting in scattered and inefficient joint training work.

3.4. The talent evaluation mechanism is not comprehensive enough

At present, the evaluation of postgraduates mainly focuses on academic achievements and research ability, while the evaluation of practical ability and teamwork ability is relatively rare. However, as a graduate student in the field of vehicle engineering, in addition to having solid professional knowledge and scientific research ability, they should also have some comprehensive qualities such as practical ability, teamwork ability and innovation ability. The incompleteness of the current evaluation system leads to the one-sidedness and limitation of the evaluation of the comprehensive quality of postgraduates, which is difficult to reflect the real level and potential of postgraduates comprehensively and objectively. The evaluation of graduate students often relies too much on indicators such as the number of academic papers and impact factors, and ignores the comprehensive consideration of graduate students' actual ability and potential. In addition, the evaluation method is relatively simple, lack of diversification and flexibility, can not fully and accurately evaluate the comprehensive quality of graduate students. The field of vehicle engineering pays attention to the cultivation of practical ability, but the current evaluation system seldom considers the status and role of

ISSN: 2710-0170

practical experience in the evaluation, which leads to the deficiency of practical ability evaluation.

4. Research on training mechanism of vehicle engineering graduate students

Under the concept of innovation coordination and open sharing, the inter-provincial and inter-university joint training of vehicle engineering graduate students is mainly driven by cooperation and sharing to stimulate the enthusiasm and initiative of inter-provincial and inter-university colleges and universities, to improve the career development ability of graduate students by practice and innovation, and to promote the collaborative innovation of double tutors by joint research. Management coordination in the process of cooperation is a complex and systematic project, involving the inter-provincial, inter-university universities and students, so it is necessary to build an active and efficient management coordination mechanism from the aspects of organization mode, power and responsibility system, information platform and so on. Inter-provincial and inter-university joint training of postgraduate talents is in urgent need of establishing a quality assurance mechanism that is compatible with the training objectives and the development needs of the industry and shared by the university and the university, so as to solve the problems of fewer vehicle engineering research students participating in real research topics, fewer high-level topics and projects, and lower utilization rate of high-quality resources.

4.1. Research on sharing mechanism

Due to the system of each training university, the exchange and cooperation between each other is less, resulting in the idle and scattered and repeated education and scientific research resources. Therefore, the joint training of graduate students in the collaborative innovation environment must establish a resource sharing mechanism, take the cultivation of high-end talents as the core task, and build a cross-university resource sharing platform, so that universities can share experimental facilities, teaching resources and scientific research results. Through this platform, universities can share laboratory equipment, teaching materials and other resources, give full play to the maximum benefit of high-quality resources, and improve the quality of graduate training. Encourage the development of cross-university joint scientific research projects, through the sharing of project resources, jointly train universities to jointly overcome industry problems, improve research levels, and promote cooperation and exchanges between universities. Create a cross-school joint practice base to provide students with broader internship opportunities and practice platforms. At the same time, establish a joint teacher training mechanism, encourage colleges and universities to carry out teacher sharing, set up teacher exchange programs, let outstanding teachers teach across schools or cooperate to guide graduate students, so as to promote the implementation of dual or multi-tutor training system for vehicle engineering graduate students. Through the implementation of the above measures, it can effectively make up for the imbalance of resources between different universities, promote the comprehensive development of joint training of vehicle engineering graduate students, and provide strong support for training more high-level vehicle engineering talents.

4.2. Research on communication and coordination mechanism

In the process of joint training, the development of the training program should meet the needs of the joint training units, and each university should set up a special institution or organization to be responsible for the management and coordination of the joint training project of vehicle engineering graduate students, and unified planning, organization and supervision of the work. And strengthen the communication with the joint training units, formulate training programs

ISSN: 2710-0170

that meet the quality standards of graduate talent training, the objectives and requirements of joint training, and the objective needs of enterprises. Colleges and universities are encouraged to establish a normal communication system and carry out tutor selection and project research through communication and coordination. Promote the exchange of visits between teachers and students, promote the development of cooperative research projects, and enhance the substantive cooperation of joint training projects. Establish a cross-departmental and cross-field communication and collaboration platform to promote the communication and cooperation between teachers and students in different subject areas, and through continuous communication and exchange, tutors can fully understand the scientific research progress of students, so as to carry out targeted supervision and management. At the same time, in view of the interests of intellectual property rights, scientific research results and other issues, universities should play a leading role, actively communicate and coordinate to avoid contradictions, so as to improve the management efficiency and training quality of the project, and create good conditions for training more high-level vehicle engineering talents.

4.3. Research on policy safeguard mechanism

Government departments should strengthen the policy guidance and support for the graduate joint training program, formulate corresponding policies and measures, clarify the development direction and objectives of the program, and provide policy guarantee for the development of the program. At the same time, increase the financial support for joint training projects, formulate corresponding financial subsidy policies, encourage colleges and universities to strengthen cooperation and exchanges, and promote the healthy development of joint training projects. Through the setting of scholarships, the initiative of graduate students in the process of inter-provincial and inter-university cooperation is aroused. We will reform the teacher performance appraisal system and improve the treatment of teachers participating in inter-provincial and inter-university joint graduate training programs. Reform the evaluation and appointment system of university teachers, and take the responsibility of major inter-provincial and inter-university cooperative scientific research projects as an important indicator to support the evaluation and appointment. Formulate relevant laws and regulations on the transfer of new technologies and products produced by joint graduate education, clarify the property rights relationship of technological achievements, especially the principles of property rights and interest distribution of inter-provincial and inter-school schools, tutors and graduate students, and ensure the effective development of joint graduate education. Establish a unified management and supervision mechanism, strengthen the supervision and evaluation of joint training projects, standardize the operation and management of projects, and ensure the quality and effect of projects.

4.4. Research on talent evaluation mechanism

In the process of constructing inter-provincial and inter-university joint training mechanism under the concept of innovation coordination and open sharing, talent evaluation is an incentive mechanism. The establishment of this mechanism should avoid over-reliance on a single index and quantitative evaluation, and should comprehensively consider academic achievements, practical ability, teamwork ability and innovation ability, and evaluate the comprehensive quality of postgraduates in a comprehensive and objective way. We should pay more attention to and utilize the practical experience of graduate students. We should not only evaluate course scores, scientific research results, practice reports, project papers, academic exchanges and other methods as evaluation criteria, but also pay more attention to the comprehensive consideration of the practical ability and potential of graduate students, incorporate practical experience into the evaluation system, and give full play to its role and value in the evaluation. At the same time, enterprises cooperating with universities should not only refer to the current actual benefits of scientific research results, but also consider the

ISSN: 2710-0170

future development of automobiles from the perspective of future development, and take the future development prospects of scientific research results as evaluation indicators, so as to promote the cultivation of innovative talents with a long-term vision.

According to the above training mechanism, colleges and universities should also continuously supervise and investigate the implementation of the joint training mechanism, find out the existing problems through the deviation between the actual implementation and the expected training objectives, and conduct consultation through the communication and coordination mechanism to formulate improvement measures in time, so as to promote the effective implementation of the training mechanism and constantly optimize the training mechanism. Cultivate innovative products that meet the needs of automobile production and development.

5. Conclusion

Under the concept of innovation coordination and open sharing, the training of graduate students mainly lies in the sharing of resources. Under this theory, the joint training of graduate students in vehicle engineering can realize the complementarity of resources among universities, promote the enthusiasm of students in scientific research among different universities, learn from each other through exchange and learning, form a good environment for innovation, and provide help for the training of innovative talents. This paper studies the inter-provincial and inter-university joint training mechanism, through the sharing mechanism, communication and coordination mechanism, government guarantee mechanism and talent evaluation mechanism, and through continuous feedback and correction in the implementation process, so as to form an effective joint training mechanism for vehicle engineering graduate students and promote the training of innovative talents in vehicle engineering. Inject new vitality into the development of related fields.

Acknowledgements

This work was financially supported by Project of Liaoning Province Graduate Education Teaching Reform Project (LNYJG2023074), Liaoning Province Education Science 14th Five Year Plan Project (JG21DB453), and Liaoning Province Regular Undergraduate Higher Education Inter school Cooperation Project (Graduate Joint Training)(202119).

References

[1] Wang W, Yu J. Leading the new development of vocational education with five development concepts, Xinjiang Vocational Education Research, (2020) No. 11, p.1-6.

[2] Yang S, Wang L, Zhao Y, et al. Research on the mechanism of joint graduate training between universities and industry experts, China Electric Power Education, (2023) No. 11, p.75-76.

[3] Kang Y, Cui Y, Li Y. Discussion on the innovation mechanism of joint training of graduate students between agricultural research institutes and universities, Science and Technology Horizon, (2023) No. 18, p.55-58.

[4] Zhang J, Li H, Ma X. Model and operation mechanism of university-enterprise joint training of graduate students in Translation and Translation, Academic Degrees and Graduate Education, (2023) No. 8, p.7-12.

[5] Xu Y, He S. Research on joint training mechanism of graduate students under collaborative innovation environment, Intelligence, (2018) No. 18, p.135.

[6] LIU J, Sun M, Wang J. Research on the mechanism of industry-University-research joint Graduate Training in Heilongjiang Province from the perspective of Collaborative innovation, Heilongjiang Education (Theory and Practice), (2020) No. 8, p.10-12.

ISSN: 2710-0170

[7] Cao Y. A practical exploration of the dual tutorial system of graduate joint training base based on collaborative innovation, Theoretical Research and Practice of Innovation and Entrepreneurship, (2023), No. 24, p.143-145.

[8] Zhang A, Zhang G, Jiang B. Research on graduate training model of industry-University-research collaborative innovation, China Modern Educational Equipment, (2024), No. 1, p.173-175.