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The Application of the Industry-University-Research Joint Teaching Mode in Cultivating the Psychological Resilience of Postgraduate Students

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Abstract: *The industry-university-research joint training model is a new training system for shaping applied talents at present. It can further improve the completeness of biotechnology students' access to resources and enhance their innovative driving force in research. However, this model requires students to have strong emotional regulation ability and cognitive flexibility to adapt to the rapidly changing cognitive system, but some students have insufficient adaptability. Based on this, this paper analyzes the psychological resilience mechanism of postgraduate students under the joint training model of industry-university-research, and proposes effective adjustment countermeasures to help students quickly adapt to new challenges and improve their own application quality.*

Keywords: *Integration of Industry, Academia and Research Psychological Resilience Adaptation Mechanism*

1. Introduction

With the rapid iteration of engineering technology, the traditional talent cultivation model is also difficult to meet the current market demand for compound talents. The joint cultivation of industry, academia and research can effectively solve the bottleneck of students' technology transformation. However, due to the high requirements for students' comprehensive quality in the joint cultivation of industry, academia and research, some students are facing considerable psychological pressure.

2. Concept definition

2.1 The connotation of the Industry-university-research Joint Training Model

Under the background of the deep integration of contemporary higher education and the science and technology industry, the joint training model of industry-university-research can effectively break through disciplinary boundaries, expand industry development, and form a new paradigm of education[1]. Essentially, the joint teaching of industry, academia and research integrates the resources of educational institutions, research institutes and enterprises, forming an ecosystem of collaborative education. This model can effectively leverage the advantages of the biotechnology practice field, expand in theoretical depth, and promote the market transformation of research results, forming a closed loop of talent cultivation covering the entire chain. The core of this talent cultivation model is to form an effective and multi-level associated joint system. In this practice-oriented talent cultivation mechanism, students can more effectively carry out daily learning and training based on problem-solving logic. Academic research and enterprise R&D can be relatively consistent, providing students with more abundant resources. In this talent cultivation model, students can obtain support for laboratory equipment, experimental databases and production technologies, avoiding the situation of information silos in the traditional talent education model. This is also conducive to students constantly improving their theoretical literacy and transforming the research oriented towards papers into the research oriented towards applications. The joint training model in the domestic field has demonstrated a relatively complete organizational system and formed a relatively perfect framework in terms of structure. The college provides a systematic knowledge system and standardized training. Biotechnology enterprises are responsible for connecting market demands with universities and related

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industries to obtain talent support and transform demands into actual products and technical support. This talent cultivation model can not only form a more complete knowledge supply channel, but also fundamentally change the drawback of the traditional current talent cultivation model where theory is disconnected from practice[2].

2.2 Psychological Resilience of Postgraduate students

The psychological resilience of postgraduate students refers to the dynamic psychological adaptation system formed by individuals in response to scientific research pressure and environmental challenges. Essentially, it is the ability of postgraduate students to maintain individual mental stability and growth transformation under stressful situations. This psychological trait can help postgraduate students regulate their emotions and cognition, form social adaptation to academic adversity, and complete internal protection. For postgraduate students under the industry-university-research joint training model, they are more frequently confronted with a series of stressful stimuli such as experimental failures, paper rejections, and unfavorable practical conversions. The psychological resilience mechanism can help postgraduate students maintain psychological balance in the face of setbacks, form a transformation of thinking patterns, and integrate external resources more effectively. Psychological resilience also reflects an individual's ability to actively acquire and effectively utilize resources from mentors, enterprises, and society. This is also the fundamental support system for the psychological resilience of postgraduate students. Under the overall background of the joint training of industry, academia and research, the psychological resilience of postgraduate students can effectively promote them to reduce cognitive loss, maintain stable work efficiency, and flexibly switch roles from the academic field to the industrial field. Most importantly, psychological resilience is the foundation of postgraduate students' innovation ability. Good psychological resilience can maintain postgraduate students' risk tolerance and open thinking ability, and is more conducive to their transformation of original scientific research achievements into actual commercial products that can be commercialized[3]. Especially when confronted with highly uncertain challenges, postgraduate students with greater psychological resilience can effectively break through the fixed patterns of traditional thinking and unleash powerful breakthrough potential. Adapt to the role conflict problems caused by multiculturalism and differences in the goals of industry, academia and research.

2.3 The influence of the industry-university-research joint training model in engineering on the psychological resilience of postgraduate students

Positive impact: The industry-university-research joint training model for engineering can provide postgraduate students with more abundant Practical operation and research resources. Relying on the laboratory platform and technical equipment jointly built by the university and enterprises, postgraduate students can obtain more comprehensive hardware support. This situation can enhance the psychological resilience of postgraduate students regarding their future career development prospects and help improve their psychological flexibility. Such substantive research conditions can not only reduce the instrumental obstacles in the learning and development process of postgraduate students, but also create a practical environment close to the front line of the industry, which is conducive to the cognitive reconstruction of postgraduate students. The joint teaching model of industry, academia and research can also help postgraduate students choose topics more specifically, break through the limitations of a pure academic perspective, redefine disciplinary issues under the dual dimensions of Industrial demand and market value, change their way of thinking, and enhance their potential for the transformation of scientific research achievements. Under the background of the joint education of industry, academia and research, social resource paths are more coordinated. Postgraduate students can obtain a diversified knowledge network, a collaborative relationship network formed by mentors, peers and relevant responsible personnel from enterprises. It can provide opportunities for the professional development of postgraduate students, and the platform can also help postgraduate students gain a certain sense of psychological security when facing challenges[4].

Negative impact: The joint teaching model of industry, academia and research will also bring unique psychological adaptation challenges to postgraduate students. On the one hand, postgraduate students need to face frequent role conflicts and cannot fully focus on a single academic and business goal. Some students will get trapped in this internal tension and conflict and be unable to clarify their role positioning. Graduate students are responsible for both the innovativeness of their theses and the feasibility of their products, and they are also prone to getting stuck in value judgments. Some students will show relatively obvious anxiety under the continuous pressure of decision-making. On the other

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hand, postgraduate students in different institutions and organizations also have to frequently adapt to the differences in organizational culture and the different rhythms of working modes. At each stage, postgraduate students need to adjust their behavioral patterns and communication strategies to adapt to efficient theoretical exploration, enterprise product innovation research and development, enterprise product technology transformation. This adaptive load will cause additional consumption of the psychological resources of postgraduate students.

From the above analysis, it can be seen that the joint teaching model of industry, academia and research not only provides an opportunity for training to improve the psychological resilience of postgraduate students, but also brings them additional psychological burdens. The key lies in whether the existing training system can provide sufficient supporting design for postgraduate students to help them get through the buffer period, adapt to external pressure and enhance their psychological resilience.

3. Problems existing in the psychological resilience of Engineering Postgraduates under the joint training of industry, academia and research

3.1 The school authorities do not attach sufficient importance to the cultivation of psychological resilience among postgraduate students

Most engineering majors do not incorporate the cultivation of students' psychological resilience into the comprehensive curriculum system of students, and do not attach sufficient importance to students' psychological resilience. On the one hand, the existing curriculum training objectives merely take academic requirements as the measurement indicators, and most training programs do not select contents with psychological flexibility. Even if some universities have set up relevant courses, they exist sporadically in the form of elective courses or supplementary activities[5]. Existing universities often attach more importance to students' academic research achievements, the commercial transformation of academic achievements and students' trial data, without fully considering the importance of psychological factors in students' growth process. On the other hand, the resource allocation provided by universities is insufficient. Psychological counseling centers are often defined as a post-event solution, meaning that they only intervene in students' work and life as intervention institutions when students encounter psychological problems. However, universities do not use psychological counseling centers as a developmental education platform for students. The professional teaching staff allocation of the school psychological counseling center seriously insufficient. The special funds invested by the school are insufficient, and most of the funds are only used to intervene in students who have already developed psychological problems. This passive response method is not conducive to the cultivation of students' psychological resilience. In addition, under the joint training model of industry, academia and research, the education administrative department has not established relevant research centers to provide effective project support for students. This pattern of resource allocation essentially restricts the possibility of educational innovation and affects the cultivation of students' psychological resilience.

3.2 The support system provided by the industry-university-research collaboration organization is not systematic enough

At present, the industry-university-research joint training system carried out by many engineering majors is mainly based on universities. The connection among such multiple organizations is not close enough and the synergy is relatively loose, making it difficult to provide effective support for students' psychological resilience development. There is a lack of a stable communication mechanism and a unified management platform among universities, enterprises and research institutions. As a result, postgraduate students have to spend a lot of energy coordinating among different organizations. This continuous loose management will consume the cognitive resources of postgraduate students. Students are in a tense state of role transition for a long time. Without systematic guidance, postgraduate students have to explore the cultural differences and operational rules of different organizations by themselves, generating a strong sense of uncertainty and loss of control. The integrated cultivation of industry, academia and research carried out by most universities is in a fragmented state in the construction of the guiding index system. Academic supervisors and enterprises often act independently and have different opinions on the cultivation of postgraduates. This division of guiding concepts makes postgraduate students prone to fall into the predicament of double restraint. No matter which side's suggestions they follow, they may face the negation of the other side. This conflict of judgment

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will lead to a continuous decrease in the self-efficacy of postgraduate students. When there is a guidance vacuum and shirking of responsibility, graduate students will face a stronger sense of academic isolation. This issue also reflects that the current industry-university-research joint training of the engineering major often lacks clear problem-solving channels and effective rights protection mechanisms. When postgraduate students encounter cross-institutional conflicts or obstacles in obtaining resources, they often have nowhere to turn for help. This sense of helplessness will strengthen the external control tendency of the psychological resilience of postgraduate students and hinder the formation of their active adaptation strategies.

3.3 The evaluation systems of academic culture and industrial culture are incompatible

Academic culture places greater emphasis on the originality of knowledge and the depth of theories. Its evaluation cycle is relatively long, and the evaluation results lag behind the development of the market to a certain extent. The pursuit of academic culture often takes several years to verify the true value of a certain research, while industrial culture emphasizes the practicality of technology and the effectiveness of the market, and its evaluation criteria pay more attention to the short-term rate of return. This fundamental value conflict is prone to cause postgraduate students to often face contradictions in choosing directions in industry-university-research projects, whether to pursue academic breakthroughs or solve practical problems. This issue has a long-term impact on the professional identity development of postgraduate students. Under the model of joint training by industry, academia and research, postgraduate students often cannot receive unified evaluations. This situation where the growth of implicit abilities is difficult to be officially recognized will affect the development of postgraduate students' own professional identity. In a long-term environment lacking systematic support, postgraduate students may face the problem of multi-dimensional adaptability. At the cognitive level, postgraduate students may have value doubts and have negative evaluations of their own abilities. In terms of emotions, postgraduate students may experience persistent anxiety. At the behavioral level, students may show a tendency to avoid challenges and respond negatively.

4. Countermeasure Analysis for Cultivating the Psychological Resilience of Postgraduate Students

4.1 Strengthen institutional construction and resource guarantee

All universities should clearly incorporate the cultivation of psychological resilience into development plans when carrying out the joint talent cultivation of industry, academia and research. Among the overall goals of the postgraduate training program for biology engineering, the development of psychological resilience is incorporated into the indicator system for the assessment of supervisors, the early warning and intervention system for psychological crises is improved, and a regular evaluation mechanism for the development of psychological resilience is established. It is suggested to establish a special fund for cultivating psychological resilience and maintain a fixed proportion in the annual budget. The school should form a professional psychological education teaching team and regularly conduct training to enhance teaching capabilities. It should build an online and offline resource platform that integrates high-quality psychological resilience training courses both domestically and internationally. The school must give priority to psychological education projects in terms of experimental equipment, venue usage, and other resources, ensuring that hardware support is fully implemented. It should carry out a school-wide psychological resilience education publicity week to enhance awareness among teachers and students. Additionally, the school ought to establish an exemplary case library for psychological quality development, driving a positive campus atmosphere through typical demonstrations. The school should incorporate psychological resilience topics into routine activities such as academic salons and faculty training sessions. Furthermore, it must encourage interdisciplinary research, support applications for teaching and research projects on psychological resilience, and promote synergistic innovation between theory and practice.

4.2 Form a systematic support network for students

Colleges and universities should establish a cross-institutional collaborative mechanism for cultivating psychological resilience and formulate unified psychological support standards for industry-university-research cooperation.In the joint training agreement, psychological resilience indicators are included in the terms of the joint training agreement, and the respective mental health

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education responsibilities of universities, enterprises, and research institutes are clarified. A special joint coordination organization is established to regularly evaluate the changes in students' psychological state during the cross-environment adaptation process. A dual-mentor psychological counseling linkage mechanism is established, and academic mentors and industry mentors jointly participate in the evaluation of students' psychological development. Emphasis is placed on technology implementation, highlighting practical applications and academic integrity. A psychological support platform shared by industry, academia, and research is established to provide cross-school psychological counseling services. Special funds are set up to support students to participate in international academic exchange activities in the field of engineering and expand the boundaries of psychological adaptation. An industrial mentor resource library is established to select enterprise experts with psychological counseling capabilities to participate in the training process. Engineering ethics and mental health seminars are held regularly to promote the integration of multiple values. Psychological resilience training content is implanted in the enterprise practice link, combining equipment operation specifications with stress management skills. A psychological resilience development case sharing mechanism combining industry, academia, and research is established to increase overall attention through the dissemination of typical experiences.

4.3 Establish an integrated talent development evaluation index

The joint management organization of industry, academia and research should establish a core indicator system covering three dimensions: the value of basic research, the maturity of technology and commercial feasibility. The dimension of basic research focuses on examining scientific originality, theoretical breakthroughs and academic influence. The dimension of technology maturity assesses the feasibility of technology, the completeness of patent layout and the potential for achievement transformation; The business dimension measures the matching degree of market demand, the clarity of industrialization paths and the investment return cycle. It is recommended to establish a dynamic weight adjustment mechanism to automatically adjust the weight of each dimension according to the research stage. It is recommended to form a composite review committee composed of professors, industry experts, entrepreneurs, and investors. It is recommended to formulate differentiated project classification standards to distinguish between exploratory research, applied research, and product research. It is recommended to establish a dual-track review mechanism, with academic review focusing on innovation value judgment and commercial review focusing on market value assessment. Finally, the coordination team will conduct a comprehensive scoring and develop an intelligent evaluation assistance system to achieve visual comparative analysis of multi-dimensional data.

5. Conclusion

To sum up, students majoring in bioengineering are confronted with severe challenges in terms of psychological resilience under the joint talent cultivation model of industry, academia and research, but they also have broader opportunities to temper themselves. Universities, research institutions and enterprises all need to attach greater importance to the cultivation of students' psychological resilience. Students themselves should also enhance their understanding of their own psychological capital, constantly respond to external resources, improve their psychological resilience, strengthen proactive exploration, and enhance their active adaptation to the external environment, **and explore a path suitable for self-development under the joint talent cultivation model of industry, academia and research.

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