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ЖАҢЫ САПАТТАГЫ ӨНДҮРҮМДҮҮ КҮЧТӨР ҮЧҮН КАДРЛАРДЫ ДАЯРДОО: КЫТАЙДЫН БАТЫШ БӨЛҮГҮНДӨГҮ ЖОГОРКУ ОКУУ ЖАЙЛАРЫНДА ӨНӨР ЖАЙ МЕНЕН БИЛИМ БЕРҮҮНҮ ИНТЕГРАЦИЯЛООНУН ЖОЛДОРУ (ТҮНДҮК-БАТЫШ ПЕДАГОГИКАЛЫК УНИВЕРСИТЕТИНИН МИСАЛЫНДА)

ПОДГОТОВКА КАДРОВ ДЛЯ НОВЫХ КАЧЕСТВЕННЫХ ПРОИЗВОДИТЕЛЬНЫХ СИЛ: ПУТИ ИНТЕГРАЦИИ ПРОМЫШЛЕННОСТИ И ОБРАЗОВАНИЯ В УНИВЕРСИТЕТАХ ЗАПАДНОГО КИТАЯ (НА ПРИМЕРЕ СЕВЕРО-ЗАПАДНОГО ПЕДАГОГИЧЕСКОГО УНИВЕРСИТЕТА)

CULTIVATING TALENT FOR NEW QUALITY PRODUCTIVE FORCES: PATHWAYS TO INDUSTRY–EDUCATION INTEGRATION AT UNIVERSITIES IN WESTERN CHINA: A CASE STUDY OF NORTHWEST NORMAL UNIVERSITY

Кыскача мүнөздөмө: Жаңы, жогорку сапаттагы өндүрүштүк күчтөрдүн тездик менен калыптанышынын шартында химия жана химиялык инженерия боюнча магистр жана докторанттарды даярдоо системасы бир катар актуалдуу көйгөйлөргө туш болууда, анын ичинде изилдөө багыты менен өндүрүштүк муктаждыктардын ортосундагы дал келбестик, катуу тартиптик чектөөлөр жана изилдөө жыйынтыктарын практикага жетиштүү түрдө киргизүү. Бул макалада Түндүк-Батыш педагогикалык университетинин химиялык инженерия жана химиялык технология факультетинин мисалында магистр жана докторанттарды даярдоону аймактык өнөр жайлык трансформация процесстерине шайкеш келтирүү, университеттердин, изилдөө уюмдарынын жана өнөр жай ишканаларынын ортосундагы кызматташтыкты тереңдетүү жана окутуунун сапатын баалоо механизмдерин өркүндөтүү менен байланышкан практикалык көйгөйлөр талданат. Анализдин негизинде баалуулук көрсөтмөлөрүнө, билимдин мазмунун кайра курууга, билим берүү платформаларын интеграциялоого жана уюштуруу механизмдеринин синергиясына негизделген биргелешкен кадрларды даярдоонун төрт компоненттүү

(төрт өлчөмдүү) модели сунушталат. Модель студенттерде илим жана технология аркылуу коомго кызмат кылуунун кесиптик миссиясын калыптандырат, алдыңкы илимий тармактарга жана өндүрүштүк муктаждыктарга багытталган дисциплиналар аралык билим берүү программасын түзөт, виртуалдык жана реалдуу дүйнөдөгү окуу платформаларын бириктирген интеграцияланган билим берүү чөйрөсүн иштеп чыгат жана көп деңгээлдүү баалоо жана сапатты камсыздоо системасын өркүндөтөт. Бул моделди ишке ашыруу жогорку деңгээлдеги илимий маданиятка жана инженердик жана практикалык компетенттүүлүккө ээ болгон жогорку квалификациялуу химиялык инженерия адистерин даярдоого багытталган, ошону менен Кытайдын батыш аймактарында туруктуу социалдык-экономикалык өнүгүүнү камсыз кылуу үчүн зарыл болгон адамдык жана интеллектуалдык ресурстарга салым кошот.

Аннотация. В условиях ускоренного формирования новых качественных производительных сил система подготовки магистрантов и аспирантов по направлениям химии и химической инженерии сталкивается с рядом актуальных проблем, включая несоответствие исследовательской направленности потребностям промышленности, жесткие дисциплинарные границы и недостаточную эффективность внедрения результатов научных исследований в практику. На примере химико-химико-технологического факультета Северо-Западного педагогического университета в статье анализируются практические проблемы, связанные с согласованием подготовки магистрантов и аспирантов с процессами региональной промышленной трансформации, углублением сотрудничества между университетами, научно-исследовательскими организациями и промышленными предприятиями, а также совершенствованием механизмов оценки качества подготовки. На основе проведенного анализа предложена четырехкомпонентная (четырехмерная) модель совместной подготовки кадров, основанная на ценностных ориентирах, реконструкции содержания знаний, интеграции образовательных платформ и синергии организационных механизмов. Модель предусматривает формирование у обучающихся профессиональной миссии служения обществу посредством науки и технологий, создание междисциплинарной образовательной программы, ориентированной на передовые научные направления и потребности промышленности, развитие интегрированной образовательной среды, объединяющей виртуальные и реальные платформы обучения, а также совершенствование многоуровневой системы оценки и обеспечения качества подготовки. Реализация данной модели направлена на подготовку высококвалифицированных специалистов в области химической инженерии, обладающих высоким уровнем научной культуры и инженерно-практических компетенций, что способствует кадровому и интеллектуальному обеспечению устойчивого социально-экономического развития западных регионов Китая.

Abstract: Faced with the accelerated formation of new quality productive forces, graduate education in chemistry and chemical engineering faces several pressing challenges, including a disconnect between research orientation and industrial demand, rigid disciplinary boundaries, and insufficient transformation of research outcomes. Taking the College of Chemistry and Chemical Engineering of Northwest Normal University as a case study, this paper analyzes practical problems in aligning graduate cultivation with regional industrial transformation, deepening industry-university-research collaboration, and improving evaluation mechanisms. On this basis, the college has developed a four-dimensional driving model of collaborative cultivation centered around value guidance, knowledge reconstruction, platform linkage, and mechanism synergy. By shaping the mission identity of serving the country through science and technology, building a frontier-industry-cross-disciplinary curriculum system, consolidating a virtual-real integrated education platform, and improving diversified evaluation and quality-assurance mechanisms, the model aims to cultivate outstanding chemical engineering talent with both scientific literacy and engineering practice ability, hence providing robust talent support and intellectual resources for high-quality development in western China.

Негизги сөздөр: жаңы жогорку сапаттагы өндүргүч күчтөр; Батыш Кытайдын университеттери; магистратура жана аспиранттар; билим берүүнү, илимди жана өндүрүштү интеграциялоонун негизинде кадрларды биргелешип даярдоо; кадрларды даярдоонун төрт өлчөмдүү модели.

Ключевые слова: новые качественные производительные силы; университеты Западного Китая; магистранты и аспиранты; совместная подготовка кадров на основе интеграции образования, науки и производства; четырехмерная модель подготовки кадров.

Keywords: new quality productive forces; western universities; graduate students; industry-university-research collaborative cultivation; four-dimensional driving model

1. Introduction: New Quality Productive Forces Call for a Paradigm Shift in Chemistry and Chemical Engineering Graduate Cultivation

In September 2023, during his inspection tour in Heilongjiang Province, General Secretary Xi Jinping first put forward the concept of "new quality productive forces." In December 2023, the Central Economic Work Conference further elaborated the requirements for developing new quality productive forces. In January 2024, at the 11th collective study session of the Political Bureau of the CPC Central Committee, General Secretary Xi Jinping gave a comprehensive and systematic exposition of the concept and made major strategic arrangements [1]. In March 2024, the Government Work Report included "vigorously advancing the construction of a modern industrial system and accelerating the development of new quality productive forces" as the top priority among the ten major government tasks for 2024 [2]. These developments indicate that new quality productive forces have become a core strategic category guiding China's high-quality development.

New quality productive forces are driven by technological innovation and break away from traditional models of economic growth. They are characterized by high technology, high efficiency, and high quality. As a central science, chemistry and chemical engineering provide an essential foundation for strategic emerging industries such as new materials, new energy, biomedicine, and environmental governance. These disciplines are directly connected to key dimensions of new quality productive forces, including revolutionary technological breakthroughs, innovative allocation of production factors, and deep industrial transformation and upgrading. For the College of Chemistry and Chemical Engineering of Northwest Normal University, this context presents a historical opportunity to leverage disciplinary strengths in western China's energy and chemical industries, ecological environment, and new materials. It also brings about an urgent challenge for the construction of a high-level, innovative, and application-oriented graduate training system.

Traditional graduate cultivation often encounters a misalignment between research orientation and industrial demand, rigid disciplinary boundaries, and insufficient transformation of innovation outcomes. Under the requirements of new quality productive forces, graduate students' knowledge structures must shift from "deep but narrow" specialization to broad specialization combined with cross-disciplinary integration. Their competencies must evolve from experimental operation and thesis writing to solving complex engineering-scientific problems and driving industrial technological innovation. Value cultivation should also strengthen the mission of writing papers on the land of the motherland. The College of Chemistry and Chemical Engineering of Northwest Normal University has therefore studied and implemented the important expositions on developing new quality productive forces, fully implemented the decisions and deployments of the provincial party committee and government, taken service to the high-quality development of western China as its responsibility, and sought to build a four-dimensional cultivation system of value, knowledge, platform, and mechanism. This system aims to solve the disconnect between talent cultivation and industrial demand, cultivate outstanding chemical engineering talent with both scientific literacy and engineering practice capability, and explore a distinctive reform path.

2. Advantages and Challenges of Graduate Cultivation at the College of Chemistry and Chemical Engineering, Northwest Normal University

The College of Chemistry and Chemical Engineering of Northwest Normal University currently has two ministry-level scientific research platforms and seven provincial-level platforms. After decades of development, it has formed a high-level chemistry discipline cluster with chemistry at its core and with coordinated links to materials science and engineering as well as chemical engineering and technology. The college has developed four advantageous research groups in synthetic and medicinal chemistry, functional materials chemistry, chemical measurement science, and energy catalysis chemistry, together with two

distinctive research directions: water-resource security and water-environment protection in plateau confluence areas, and eco-functional polymer materials. Focusing on the petrochemical industry and western resources, the college serves ecological protection in the Yellow River Basin and industrial development in western China. During the 14th Five-Year Plan period, it completed 78 horizontal projects with total funding of RMB 29.3218 million, signed five industry-university-research cooperation agreements, achieved 41 transformations of scientific and technological achievements with total funding of RMB 7.9795 million, and obtained approval for two Regional Joint Fund key-support projects. Typical achievements include research and development of advanced rubber and plastic materials, high-value utilization of oil-shale semi-coke, and plateau-gully prevention and control technologies, all of which have provided strong support for the local economy, green development, and ecological governance.

The college has established long-term cooperative relationships with local backbone enterprises such as Jinchuan Group, Lanzhou Petrochemical, Qinghai Salt Lake, PetroChina Qingyang Petrochemical Branch, and Qingyang Ruihua Energy Co., Ltd., thereby laying a foundation for industry-university-research cooperation. As a science and engineering college within a normal university, it also benefits from the university's strengths in the humanities, social sciences, and basic sciences, including chemistry, mathematics, and physics. This academic environment provides fertile ground for cross-disciplinary innovation between chemical engineering and fields such as education, materials science, and environmental science, helping cultivate compound talent with broader perspectives and comprehensive qualities [3]. The college is committed to building a graduate training system that connects theory with practice. In student cultivation, it emphasizes a deep and systematic theoretical foundation, rigorous and cutting-edge research training, and a complete scientific research loop, thereby forming a composite core competitiveness that integrates scientific insight, technological innovation, and engineering implementation [3].

At the same time, several challenges remain. Existing graduate training objectives are not yet closely aligned with the specific needs of regional new quality productive forces, including industrial transformation in fine chemicals and extension of the new materials industrial chain under Gansu Province's Strong Industry initiative [4]. Industry-university-research cooperation often remains at a relatively superficial level, such as entrusted projects and student internships. A whole-process mechanism through which enterprises deeply participate in training-program design, curriculum construction, and joint guidance has not yet been fully established. The college also needs to strengthen its connections with large industrial enterprises, co-build high-level industrial technology platforms, and promote larger-scale transformation of scientific and technological achievements. The "last mile" from frontier basic research to enterprise application remains insufficiently smooth, and urgent bottleneck technologies from enterprises are not always transformed into frontier scientific questions for graduate research. Graduate evaluation is still dominated by academic publications, while engineering ability, practical problem-solving, technological innovation contributions, and transformation potential receive insufficient weight. This evaluation orientation, to some extent, limits students' enthusiasm for practical engagement.

3. A Four-Dimensional Industry-University-Research Collaborative Cultivation Model Oriented toward New Quality Productive Forces

In response to these challenges, and guided by Gansu Province's strategies of strengthening science and technology, industry, provincial capitals, county areas, and transportation, the college proposes a systematic graduate training reform paradigm integrating value guidance, knowledge reconstruction, platform linkage, and mechanism synergy. The goal is to inject new momentum into discipline development and talent cultivation.

(1) Value Guidance: Shaping the Mission Identity of Serving the Country through Science and Technology and Contributing to Industry

Throughout professional course teaching and scientific research practice, the college will systematically promote the deep integration of ideological and political education with professional education. By means of integration of the scientist spirit in the new era, including patriotism, innovation, dedication, collaboration, pragmatism and education, and connect this spirit with important strategic needs, such as carbon peaking and

carbon neutrality, the Western Development Strategy, water-environment security, and energy security, the college is capable of shouldering the responsibilities to serve national strategies, improve people's living standards, and advance technological progress. The above-mentioned integration is supposed to be implemented in classroom and experimental teaching, company practice and scientific research training, during which students are guided to reinforce ideals and beliefs, define their missions and improve their sense of responsibility and acquire professional knowledge [5].

The college is to improve a mechanism of dual-mentor and industry-academia integrated cultivation. In this mechanism industrial practitioners and prominent alumni can be assigned industry mentors, and the Shuyuan Forum can be held in a regular time. In this way the college can play the kernel roles and present contemporary responsibilities of chemistry and chemical engineering professionals to serve national strategies, at the same time, break through critical core technologies, and cultivate new quality productive forces. All these schemes can help graduate students form the belief to make contribution to science and technology, and revitalize the country through industry. Students can formulate integrative motivation to apply what they learn in practice and achieve their value in society.

(2) Knowledge Reconstruction: Constructing a Frontier-Industry-Cross-Disciplinary Curriculum System

The college will establish a three-in-one graduate curriculum system that incorporates frontier foundations, industrial application, and cross-disciplinary innovation according to the needs of the national innovation-driven development strategy and Gansu Province's Five Strengths actions [6].

Modular clusters will be designed and a New Quality Productive Forces Frontier Module should include areas including advanced battery materials, low-carbon catalysis technology, and intelligent chemical sensing. This Module should be beneficial for courses such as Artificial Intelligence and Chemistry and Fundamentals of Bioinformatics, thus promoting interdisciplinary problem-solving and innovation.

The college will deepen industry-education integration through establishing a direct industry-classroom channel in practical teaching. The practical technical problems in key Gansu enterprises and forefront industrial topics can become learning objectives for kernel graduate course and can be carried out by the combined supervision of university and enterprise mentors, which can combine theoretical learning with industrial practice. It empowers graduate students to understand the mission of chemical engineering technology in serving local development and solve real problems, thereby providing talent support for high-quality development in western China.

(3) Platform Linkage: Consolidating a Virtual-Real Integrated and Full-Chain Collaborative Education Platform

The college intends to jointly apply for and build a national key laboratory with leading and specialized "little giant" enterprises, and high-level domestic research institutes. This platform will act as an important carrier for forefront basic research, key core technology breakthroughs, and high-level talent cultivation. It will become a core base for graduate students to carry out long-term, systematic research projects and major engineering practice. This dual-leader system involving university academic supervisors and industrial technology experts can empower the college to improve the organization of scientific research and the overall effectiveness of the innovation system, thus supporting high-level scientific and technological self-reliance.

In addition, the integrated education mechanism will be deepened by embedding industrial practice throughout graduate training and constructing a progressive cognition-practice-innovation education chain. Higher-grade students can engage in resident enterprise R&D and dissertation research, while lower-grade students can participate in industrial cognition internships and course practice projects. This full-cycle industrial immersion model will enhance deep alignment between talent cultivation and industrial demand and offer solid talent support for the construction of a modern industrial system.

(4) Mechanism Synergy: Constructing a Guarantee Mechanism for Incentive Synergy, Value Co-Creation, and Iterative Optimization

The college will establish an institutional guarantee system for university-enterprise cooperative innovation and the graduate evaluation mechanism should also be deepened. Both industrial innovation and

traditional academic achievements should be given equal importance, which can help establish varied measurements with the laws of talent cultivation in the new era and guide students to bring about innovative research according to industrial needs [7].

This cooperative assessment system should be composed of members of the college academic committee, industry experts, technical committees of partner enterprises, and graduate representatives. These members can review and evaluate training objectives, the effects of practical teaching and curriculum-system structure in a regular time, which can be recured for continuous positive effects and refine the industry-university-research training system. This kind of mechanism is beneficial for talent cultivation alignment with national strategic needs and the forefront of industrial development.

All the above-mentioned four-dimensional driving model is shown in Table 1.

Table 1. The Four-Dimensional Driving Model for Industry-Education Integration

Dimension	Core Logic	Representative Measures
Value Guidance	Mission identity	Embed professional ethics, national strategic needs, and the scientist spirit into teaching, research, and enterprise practice.
Knowledge Reconstruction	Curricular renewal	Build modules on frontier science, industrial innovation, enterprise management, and interdisciplinary integration.
Platform Linkage	Full-chain collaboration	Connect laboratories, enterprise demand databases, virtual simulation, remote R&D, and resident enterprise research.
Mechanism Synergy	Sustainable governance	Improve IP sharing, achievement transformation, mentor appointment, quality evaluation, and iterative assurance mechanisms.

4. Conclusion

The development of new quality productive forces is fundamentally based on science and education and critically depends on talent. As an important base for chemistry and chemical engineering talent cultivation and scientific research in western China, the transformation and upgrading of the graduate industry-university-research cultivation model at the College of Chemistry and Chemical Engineering of Northwest Normal University is crucial not only to the college's own high-quality development, but also to the cultivation of the core engine of new quality productive forces: high-quality innovative talent teams in strategic emerging fields such as new materials and new energy.

Through the systematic implementation of the four-dimensional driving reform, with value guidance as the core, knowledge reconstruction as the foundation, platform linkage as the carrier, and mechanism synergy as the guarantee, the college will strive to break down institutional and mechanistic barriers to industry-university-research integration. It will promote the transformation of disciplinary advantages and research accumulation into educational advantages and innovation momentum, and it will explore a new path for cultivating outstanding chemical engineering talent with the distinctive features of a normal university and the development needs of western China. In doing so, the college can continue to contribute indispensable chemical wisdom and innovative strength to writing a new chapter in the Chinese-style modernization practice of Gansu and to serving the comprehensive revitalization of western China.

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А.ОСМОНОВДУН «ЭШИМКАНДЫН ТЕРЕГИ» ПОЭМАСЫН IX КЛАССТА ЗАМАНБАП ТЕХНОЛОГИЯЛАР АРКЫЛУУ АНАЛИЗДӨӨ ЖАНА ИНТЕРПРЕТАЦИЯЛОО МЕТОДДОРУ

МЕТОДЫ АНАЛИЗА И ИНТЕРПРЕТАЦИИ ПОЭМЫ А. ОСМОНОВА «ТОПОЛЬ ЭШИМКАНА» В IX КЛАССЕ С ИСПОЛЬЗОВАНИЕМ СОВРЕМЕННЫХ ТЕХНОЛОГИЙ

METHODS OF ANALYSIS AND INTERPRETATION OF A. OSMONOV'S POEM "THE POPLAR OF ESHIMKAN" IN THE 9TH GRADE USING MODERN TECHNOLOGIES

Кыскача мүнөздөмө: Бул илимий макалада А.Осмоновдун "Эшимкандын тереги" поэмасын IX класстын окуучуларына заманбап технологиялар аркылуу талдоо жана интерпре-тациялоонун инновациялык методдору изилденет. Изилдөөнүн актуалдуулугу билим берүү процессинде санариптик каражаттардын ролунун өсүшү жана адабий чыгармаларды окутуунун сапатын жогорулатуу зарылдыгы менен аныкталат. Макалада поэманын идеялык-тематикалык мазмуну, көркөмдүк өзгөчөлүктөрү педагогикалык аспектиде анализдөөгө алын-ган. Ошондой эле окутууда колдонулуучу интерактивдүү доскалар, онлайн платформалар, мультимедиалык ресурстар сыяктуу заманбап технологиялардын түрлөрү классифи-кацияланып, алардын окутуу процессиндеги педагогикалык мүмкүнчүлүктөрү жана артыкчылыктары аныкталган. Иштин негизги бөлүгүндө поэманы талдоо жана интер-претациялоонун конкреттүү методдору (виртуалдык экскурсиялар, интерактивдүү оюндар, мультимедиалык презентацияларды түзүү ж.б.) иштелип чыгып, алардын дидактикалык натыйжалуулугу бааланган. Жыйынтыгында, алынган билимдердин негизинде практикалык сунуштар иштелип чыгып, аларды билим берүү процессине киргизүү жолдору көрсөтүлгөн. Изилдөөнүн натыйжалары адабият сабагында