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University-industry integration in North-West China: a case study

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DRAFT

LIST OF CONTENTS

Introduction 2

Background 2

Relevant aspects of China's UII policies and practices 3
Regional development and UII 3
Education for innovation and entrepreneurship 6
Collaborative education projects supporting UII 6
UII and governance reform 7
Research performance assessment reform supporting UII 9
Curricula and industry standards: a new wave of China's UII policy 10
A new stage of development 11

Relevant regional characteristics in the North-West area 12
Regional development patterns 13
State-led development of education in North-West China 16
Culture diversity UIC development model 18

Exploring UII in three North-West regions 20

Xinjiang 21

Gansu 27

Shaanxi 44

Summary and conclusions 64

Comparing the North-West region with the two regions explored earlier 64

Comparing the three North-West provinces 65

Contribution to better understand UII 67

Possible European applications 70

References 72

Annexes 78

Annex 1 – Bilingual case study program description 78

Annex 2 – Travel schedule 86

Annex 3 – List of visited institutions 86

Introduction

This case study has been prepared in the framework of the project titled "*University-industry integration policies and practices in China - potential applications in Hungary*" (WIU/MCC project).[1] It is based on a fact-finding mission conducted to Xinjiang, Gansu and Shaanxi provinces[2] between the 23th of May and 13th of June 2026 by the authors.[3] This is the third case study of the above mentioned project (the first one was focusing on the Shenzhen and the Greater Bay Area and the second on Chongqing and Chengdu economic area).[4]

The aim of this case study – similarly to the two previous ones – is to enrich our knowledge about China's policies and practices related to university-industry integration (UII) and to provide input to the final report that will analyse how skills-development oriented UII policy measures and programs enhance the modernisation of university education in China. As previously, the target audience of this document is the Hungarian (and possibly European) higher education development community, including both national policy-makers and institutional level leaders.[5] It might, however, bring some original insights also to Chinese, and can be a useful reading for international readers interested in university-industry cooperation.

The study starts with a general chapter presenting background information on China's policies related to UII and on the explored regions. This is followed by a chapter presenting our findings in the three North-West provinces of China. The last chapter presents our summary conclusions. At the end of the text the reader finds a detailed list of references, and annexes containing relevant information about the fact finding mission.

Background

In this section, we examine some key elements of the social, political, and economic context in which China's university-industry integration (UII) policies and practices have taken shape in general at national level and in particular in the North-West region of China. Similarly to the previous case studies, in this text we primarily use the term UII to refer to the distinctive Chinese model of deep, systemic cooperation that encompasses governance, curriculum, and pedagogy. In some instances, the term UIC (university-industry cooperation) is also employed, typically when referring to the broader, more general phenomenon of collaboration between higher education institutions (HEIs) and industry. While "cooperation" suggests a more

[1] This project, funded by the Hungarian government, is hosted and implemented by Wekerle International University (WIU) in cooperation with Mathias Corvinus College (MCC). See for the project concept the document titled "*University-industry integration policies and practices in China - potential applications in Hungary - Project proposal - (2024. November)*".

[2] Although we use the general term „province", it is important to note that administratively, Xinjiang is not a „province"[省 - sheng]. It is one of China's five „autonomous regions" having the same administrative rank as a provinces (provincial-level region). Its official name is Xinjiang Uyghur Autonomous Region [新疆维吾尔自治区].

[3] See "*Annex 1 – Bilingual case study program description"*. The technical details of the fact-finding mission have been summarized in a separate short report (see Gábor Halász – Min Huang: „Report on the third case study fact-finding mission to China (May 23 to June 13, 2026)". This report contains a full list of people met and institutions visited in the provinces of Xinjiang, Gansu and Shaanxi. The travel schedule and the list of visited institutions can be found in *Annex 2 – Travel schedule* and *Annex 3 – List of visited institutions.*

4 See Halász Gábor – Min Huang (2025b).

[5] It is important to note that some of the websites we make references in this study are accessible only from within China.

conventional and often transactional relationship, "integration" denotes a more embedded and transformative approach that characterizes China's policy innovations in this domain.

Relevant aspects of China's UII policies and practices

China's UII policies and institutional practices have been presented earlier in detail in our project-document entitled "*University-industry integration policies and practices in China: exploring policy documents and literature*" (see Halász– Huang, 2025a), in the two earlier case studies, as well as in related publications by the authors (Huang, & Halász, 2024; Halász & Huang, 2025b). Here we provide a short summary of the general national policy background focusing only on those elements which are either particularly relevant in the context of this study on North-West China or not yet analysed in our earlier writings.

Regional development and UII

As already presented in our earlier studies, a key moment of the emergence of China's UII policy was the adoption of the policy document entitled "*Deepening the Integration of Industry and Education*" in 2017 by the State Council (State Council, 2017). It is important to stress, however, that the process of UII started earlier than the adoption of the 2017 national policy document. Prior to this several initiatives aiming at deepening university-industry cooperation could already be observed at local level, especially in the most dynamic and prosperous provinces of China. For example, in Guangdong province, the Dongguan University of Technology, a pioneer institution, from the very beginning of the 2100s was already „consistently exploring innovative talent cultivation models (…) developing university-industry integration models for talent development, establishing nine industrial colleges" (Zhuang & Peng, 2026). This is one the outstanding examples showing that bottom-up initiatives, especially in the most rapidly developing industrial zones of China, preceded the enacting of the mainstream national policy (Ma, 2024).

Local experimentations with connecting education – especially (but not exclusively) secondary and higher technical and vocational education (TVET) – with industry were encouraged by a major shift China's national economic development strategy, emerging in the early 2010s, and they were realised in a new national institutional policy framework created in line with this strategy. The author of a key publication described this shift it as follows:

> "China's 'economic miracle' of the past four decades has been largely based on the low-skilled, labour-intensive manufacturing sector boosting export revenues. This developmental strategy has been challenged in recent years, however, owing to slowing economic growth, rising labour costs and conflicts, and a shortage of skilled workers. The World Bank has encouraged the Chinese government to restructure and upgrade its industries to avoid a middle-income trap. Global post-war developmental experiences have indicated that vocational workforce skills are crucial for sustainable economic growth and international competitiveness in both developed and emerging market economies. Upskilling the workforce has thus become a crucial aspect of China's recent economic restructuring efforts" (Zhang, 2021).

This author explicitly mentions the World Bank as one of the external sources influencing the development of the new national development strategy. This is particularly relevant in the North-West context since in less development areas several major development interventions have been realised in the framework of programs coordinated by this organisation. In fact, cross-national learning might has contributed significantly to the development of the new national modernisation strategy, and international development organisations. This is

symbolised by a strategic policy report published in the early 2010s, entitled "*China 2030*" (The World Bank & DRC of State Council, 2013).

This report was based on a high-level joint strategic exercise between the Chinese government and the World Bank, in which the international organisation was not advising China from outside but pursued a collaborative strategic reflection with the top level Chinese experts on China's future innovation-driven and knowledge-intensive development model. This reflected that from the early 2000s Chinese policymakers increasingly believed that growth model based on cheap labour, export-led manufacturing and investment-heavy growth was reaching its limits and there was growing concern about inequalities, environmental degradation, middle-income trap risks, innovation weakness, low productivity, weak domestic consumption and institutional rigidities. The report argued that China needed a new development model that would be innovation-driven, skills-intensive, more knowledge-based, more service-oriented and also greener which required institutional transformations. Although not yet framed explicitly in terms of university-industry integration, the report strongly emphasized human capital development, educational modernization, innovation capacity, and stronger links between knowledge production and economic transformation. Many later Chinese UII-related reforms can be interpreted as institutional mechanisms through which this broader modernization vision gradually became operationalized.

The transition from the earlier model of university-industry cooperation (UIC) toward the emerging model of university-industry integration (UII) in China can be understood particularly clearly through a comparison between the strategic visions represented by the 2012 "*China 2030*" report and the 2015 "*Made in China 2025*" (State Council, 2015a) strategy, often mentioned in the UII literature as a key policy document. While both documents emphasize innovation, human capital, and stronger relationships between education and the economy, they reflect significantly different understandings of the role of universities, industry, and the state in the modernization process.

The earlier China 2030 report reflected the logic of global knowledge-economy discourse and innovation-system thinking that dominated the early 2010s. In this framework, universities were primarily understood as increasingly autonomous, globally connected, entrepreneurial knowledge institutions supporting China's transition toward an innovation-driven economy. Cooperation between universities and industry was interpreted mainly as a mechanism for improving innovation capacity, knowledge transfer, employability, research commercialization, and labour-market responsiveness. The underlying developmental vision remained strongly connected to globalization, market-oriented reform, institutional modernization, and international policy learning. Human capital development was framed largely through concepts such as creativity, entrepreneurship, adaptability, and innovation capability. Although the report emphasized stronger links between education and the economy, these links were still conceptualized mainly in terms of cooperation between relatively distinct institutional spheres.

The later "Made in China 2025" strategy represented a major shift in both developmental logic and educational governance. Instead of viewing university-industry relations mainly through the lens of innovation and market modernization, the new strategy increasingly embedded education within a broader framework of national industrial upgrading, technological sovereignty, and strategic state coordination. Universities were no longer imagined primarily as autonomous innovation actors, but increasingly as components of a coordinated national industrial and technological system. Their role became directly connected to the development of strategic sectors such as advanced manufacturing, robotics, artificial intelligence, intelligent

production, new materials, and digital industry. In this context, industry ceased to be merely an external partner of universities and increasingly became a co-organizer of educational transformation itself.

This shift fundamentally changed the nature of university-industry relations. The earlier model of UIC typically involved project-based collaboration, technology transfer, internships, entrepreneurship support, or externally oriented partnerships between otherwise separate institutions. In the emerging UII model, by contrast, the boundaries between education and production become increasingly blurred. Enterprises participate directly in curriculum design, teaching processes, assessment systems, laboratory construction, teacher training, and institutional governance. Industrial logic increasingly shapes the organization of majors, curricula, teaching materials, practical training systems, and competency frameworks. New institutional forms such as industrial colleges, modern apprenticeship systems, enterprise-led training bases, co-teaching arrangements, and "dual-qualified" teachers illustrate this deeper integration.

The transition also reflects a major pedagogical transformation. In the earlier cooperation-oriented framework, practical training and innovation activities often supplemented otherwise largely theory-centred educational structures. In the emerging integration-oriented framework, however, practical environments, work processes, industrial scenarios, and technological applications increasingly become constitutive elements of learning itself. This is closely connected to the broader shift from "knowledge transfer" toward "comprehensive ability improvement" emphasized in recent Chinese vocational and higher education reforms. As a result, pedagogical approaches such as project-based learning, scenario-based teaching, simulation environments, interdisciplinary problem solving, and enterprise-based experiential learning gain systemic importance.

Another important difference concerns governance philosophy. The earlier "China 2030" framework still reflected substantial trust in market-oriented reform, institutional liberalization, and integration into global systems of innovation and development. The later UII-oriented model emerging after "Made in China 2025" places much stronger emphasis on strategic coordination by the developmental state. University-industry integration increasingly functions not merely as an educational reform or innovation policy, but simultaneously as industrial policy, regional development policy, talent strategy, technological modernization policy, and national competitiveness strategy. This gives contemporary Chinese UII a much more systemic and ecosystem-oriented character than earlier forms of university-industry cooperation.

From this perspective, the shift from UIC to UII in China can be interpreted not simply as an intensification of cooperation between universities and enterprises, but as part of a broader transformation in which educational institutions become increasingly embedded within strategically coordinated socio-technical ecosystems linking talent development, industrial upgrading, innovation systems, and regional modernization. This shift is naturally easier in regions where industry is dominated by knowledge-intensive, dynamic companies already operating highly developed internal human resource development system and there are several innovative and dynamic HEIs open to interact with such companies than in regions where industry is still dominated by less dynamic and more state-led companies, and universities might show more traditional academic patterns such as Gansu and Xinjiang. The North-West China case study allows us to study deeper the challenges this shift represents.

Education for innovation and entrepreneurship

As one of the specific focuses of this case study is to explore the role of UII in transforming pedagogy and promoting curriculum reform in higher education – including the transformation of learning environments and the way teaching and learning is organised in higher education – another key policy initiative, preceding the 2017 State Council decision, is worth being presented here. Almost parallel with the "Made in China 2025" strategy a key policy document on *innovation and entrepreneurship education* was issued in the middle of the 2010s (State Council, 2015b).

Although it is not focusing on UII, the promotion of education for innovation and entrepreneurship has had direct implications also for UII. It envisaged measures and actions to „…enrich the curriculum, innovate teaching methods, strengthen teachers, improve assistance, promote the close integration of teaching, scientific research and practice, break through the weak links of talent training, and enhance students' innovative spirit, entrepreneurial awareness and innovation and entrepreneurship ability." As one of the condition of this "close integration of higher education with science and technology, economy and society" was mentioned and "the establishment of a new mechanism for collaborative education of schools and enterprises" was proposed. This policy initiative, promoting a radical transformation of teaching practices can be interpreted as a precursor of subsequent UII policies. It has been moving higher education away from purely disciplinary knowledge transmission towards a model in which universities are expected to cultivate innovation capacity, entrepreneurial awareness, practical problem-solving, and employability, creating a climate in which UII could become not only an industry oriented employment or human resource development policy, but also a teaching reform agenda.

This way the 2015 State Council decision on innovation and entrepreneurship education reform prepared the ground for later UII policies by redefining higher education as a practice-oriented, innovation-supporting and ecosystem-embedded institution. It introduced many of the pedagogical and organizational elements that later became central to UII: demand-oriented program adjustment, collaborative education mechanisms, external practice bases, industry mentors, incubators, and the integration of professional learning with real-world innovation and entrepreneurship activities. Its significance lies in shifting the reform agenda from knowledge transmission toward competence formation, thereby making later industry–education integration policies both pedagogically and institutionally plausible.

Collaborative education projects supporting UII

A key implementation instrument of the innovation and entrepreneurship education reform imitative has been the Ministry of Education's "*Industry-University Cooperation Collaborative Education Project*" initiated almost simultaneously with the 2015 State Council initiative. According to a Baidu article, in this project framework, by 2018 the initiatives of "a total of 952 universities and 288 enterprises have been approved, and 7.52 billion yuan of enterprise support funds have been obtained".[6] One of the reasons why these initiatives, preceding the 2017 "Opinions", deserve special attention is that they targeted the whole higher education

[6] Ministry of Education Industry-University Cooperation Collaborative Education Project [教育部产学合作协同育人项目] (https://baike.baidu.com/item/%E6%95%99%E8%82%B2%E9%83%A8%E4%BA%A7%E5%AD%A6%E5%90%88%E4%BD%9C%E5%8D%8F%E5%90%8C%E8%82%B2%E4%BA%BA%E9%A1%B9%E7%9B%AE/23203228#reference-3).

sector, including elite research universities. This is important because observers often look at UII as a phenomenon connected mostly with applied universities but the industry-university cooperation collaborative education projects, promoting education for innovation and entrepreneurship have also attracted research oriented universities.[7] In the framework of our third case study this is particularly relevant as one of the focuses of our this is on exploring the differences and similarities of UII-related practices in these two categories of universities.

UII and governance reform

The 2017 "Opinions" on deepening UII and the subsequent implementation measures elevated UII to the status of a high level national policy priority, creating a rich repertoire of innovative policy tools to support implementation. The emerging implementation approach has followed a highly decentralised model supporting organic developments based on coordinated local initiatives. A key characteristic of the implementation of the UII policy in China is the encouragement of local experimentation, the strong involvement local and sectoral partners and the intensive use of soft policy tools. Such tools are the incentives encouraging the emergence of a high number of local variations or the enterprise certification system which provides special financial and symbolic advantages to companies that engage intensively in UII.

The experimental approach of the implementation of China's UII policy can be described also as an overall *governance reform* realised in the higher education system. This experimental approach appears in very clear and explicit way in a key implementation document adopted by the National Development and Reform Commission two years after the adoption of 2017 "Opinions" of the State Council (General Office…, 2019).

The National Development and Reform Commission (NDRC) is the central macro-strategic planner of the Chinese state acting as a system integrator across policy fields above the sectoral ministries (including the Ministry of Education) in many strategic domains. Its main function is overall industrial policy coordination and in this role it supervises regional economic development strategies and major investment allocations of the Chinese state. The fact that the implementation strategy of the UII policy was designed and enacted by the NDRC shows that the UII policy of China was elevated above the sectoral level and it became a key element of China's overall economic development strategy. This has upscaled the UII policy from a education sectoral initiative into a broad economic and social policy action-system where the key actors are not education institutions but cities, industrial sectors and enterprises and the target of interventions is not the curriculum or teaching methods but the operation of fundamental social-economic institutions and processes such as development investment, taxing and the use of land. A major tool to stimulate the expected transformation has been the creation of *platforms* and *ecosystems*, connecting the key actors across various sectors, and inviting them to start intensive and dynamic interactions so that this could generate original solutions and institutional processes.

The 2019 implementation plan reflects a decisive shift in China's UII policy from an education-led reform to a state-coordinated development strategy, with the NDRC acting as the central system integrator. The policy document issued by NDRC was not a simple policy guideline but a system-design blueprint turning UII into a state-coordinated, multi-level development mechanism linking education, industry, and regional governance, placing the "four chains"

[7] See, for example, the case study on Xi'an Jiaotong University prepared in the framework of our UII project by Zhuang & Peng (2026).

(education, skills production, industry needs and innovation) into one common policy framework. A three-level implementation architecture with cities as „nodes", industries as „pivots" and enterprises as core actors – leading to the territorialization of policy with a strong sectoral aspect and also to make companies co-producers of education – was presented in this document. As it was formulated. "We fully utilize the comprehensive carrying capacity of cities for reform, using urban pilot projects as a foundation, emphasizing city-enterprise-school collaboration, and coordinating industry and enterprise pilot projects". This policy document showed a significant evolution of the policy compared with the 2017 "Opinions". Perhaps it is not an exaggeration to state that the nature of subsequent processes has been fundamentally influenced by implementation logic of this document, especially in the more dynamic and prosperous regions.

The city level pilots proposed by the NDRC's 2019 implementation document aimed at (1) *building replicable models* (use pilot cities, enterprises, and institutions to experiment with new UII mechanisms); (2) *breaking institutional barriers* (reduce barriers between (a) education and production systems, (b) public and market actors and (c) administrative silos across departments; (3) improve talent supply quality. The use of pilots is crucial element: the plan explicitly legitimized local experimentation, uneven development, and policy diversity. Three kinds of pilots were defined: (1) pilot cities [核心抓手] as the main spatial units of experimentation, (2) pilot enterprises (which participate in curriculum design, co-establish training bases, co-invest in education infrastructure and receive policy incentives such as tax, finance, land use, recognition); and (3) pilot institutions (vocational colleges, applied universities and training institutions). Cities became the integrators; enterprises co-producers; and HE institutions the main implementers.

The goal was to identify institutional innovations that can later be scaled nationally. The key directions includes (a) joint curriculum development with enterprises; (b) dual-mentor systems (academic + industry), (c) work-integrated learning and long-term internships; and (d) modular and flexible training paths. The plan emphasized the physical and institutional *platforms*, such as joint training bases, shared laboratories, industry colleges and enterprise-led education platforms. This "phased approach" (pilot first and scale later) encouraged local adaptation, avoiding one-size-fits-all models. There was an explicit governance philosophy in this approach with the state steering experimentation and setting directions and local actors doing experiments.

The approach embedded in the 2019 implementation document is implicitly based on a number of assumptions such as (1) the existence of a *dense local ecosystem* (strong industrial base, active enterprises and innovation demand, (2) *enterprise-driven co-production of education* (firms co-designing curricula, provide training environments and co-producing knowledge), (3) *functional coordination platforms* (working information flows, effective matching between universities and firms), (4) *institutional flexibility* (low transaction costs, fluid mobility of teachers and industry mentors between universities and companies) and (5) *pedagogical transformation as outcome* (production-based and project-based learning, working apprenticeship systems and integration into innovation processes). To summarize, this approach assumes the existence and emergence of a self-reinforcing UII ecosystem with dynamic, active local players. In the highly developed, dynamic regions of China, such as the Great Bay area or in the similarly dynamic Chongqing-Chengdu economic area, the target regions of our first cases studies, this was a realistic assumption but its validity might be limited in the less developed North-West provinces of the country. In such provinces the capacity of institutions to simulate real ecosystems might be lower that what NDRC's concept assumes and the micro-

level conditions (such as teacher agency and pedagogical transformation capacity) might be less favourable.

When we were preparing the third case study our preliminary assumption was that in the less developed areas of North-West China the number of firms capable to play the role of co-creators of knowledge and skills is lower than in the richer regions, the SME sector is weaker and more reliance on state owned companies (SOEs) as external partners is needed, that is, there is a greater need for the government to substitute for missing industrial agency. We assumed that given the lack of stable relational depth the "ecosystem density" might be lower and there might be a higher chance for "fragmented cooperation" to emerge. This means that instead of continuous, multi-layered interaction and stable networks there is a higher chance of relying on project-based cooperation, more episodic internships and weaker long-term partnerships. We also assumed that there might be a higher chance to deviate from "innovation-driven" to "employment-driven" processes, that is weaker link to the innovation chain and less support high-tech development. As a result there might be a higher chance that UII shifts toward vocationalisation and standard forms of training. In such regions coordination difficulties might remain higher, information flows might be less smooth, incentives might have lower effects and there might be a higher chance for cooperation remaining symbolic or administrative. A further assumption has been that the probability of teacher agency also might be lower as teachers are less exposed to meaningful industry practice in advanced sectors, they might have weaker cognitive translation capacity, and might deviate from transforming to reporting. Teachers might be less open and capable to translate and integrate industry knowledge into pedagogy and to go experience reflexive transformation. As a result the impact of UII on pedagogical transformation might be weaker.

In less developed regions platforms might operate rather as infrastructure than as dynamic ecosystems enabling continuous interactions and becoming active co-creation spaces. Even if they are created, physically platforms might function rather administratively. There might be a higher probability that newly created labs remain empty and are not filled with dynamic activity. In such an environment UII might be more imported from outside than locally generated and instead of endogenous development one might see increased needs for exogenous support, that is, stronger reliance on eastern partner universities, external expertise and national projects.

Research performance assessment reform supporting UII

One further policy development that has not yet been analysed in our research on China's UII policies and practices, and which may have particular relevance for North-West China, is the recent reform movement related to research performance assessment.

From the 1990s to the 2010s, China developed a highly performance-driven academic system characterized by strong reliance on SCI/SSCI[8] indexing, impact-factor counting, publication-based incentives, cash rewards for papers, and intense ranking competition. While this contributed to an extraordinary growth in scientific output, it was also accompanied by the emergence of distorted incentives and negative phenomena such as paper mills, plagiarism, and "salami publishing".[9] As an author doing research on this noted: "the abusive use of SCI-based

[8] SCI (Science Citation Index) and SSCI (Social Sciences Citation Index) are academic indexing databases of Web of Science managed by a British-American analytics company named Clarivate. These are considered a „gold standard" for evaluating research impact used in academic promotion systems and institutional rankings.
[9] The practice of breaking comprehensive research studies into smaller "publishable units" that can artificially inflate the publication count of authors.

indicators in research evaluation has been criticized for a long time since international publications only do not adequately represent China's research activities", and "the increase of international publications may come at the expense of dissemination of research to local Chinese communities" (Shu et al., 2022).

As a result, Chinese policymakers increasingly argued that research evaluation should support real contribution to national strategic development goals and socio-economic impact rather than merely improving publication metrics. This new orientation appeared explicitly in policy documents issued in 2020, including reforms promoted by the Ministry of Science and Technology criticizing the neglect of "quality, contribution, and impact of landmark achievements" and the dominant "paper-only" orientation (MoST, 2020). In some respects, this policy shift can be compared to the emerging European movement symbolized by the Coalition for Advancing Research Assessment (CoARA), established in 2022 and now involving more than 800 research organizations.[10] Both movements criticize excessive reliance on bibliometric indicators, but the Chinese reforms also place significantly stronger emphasis on contribution to national modernization, strategic development, and societal application.

Although the research-assessment reform and the UII policy are rarely connected explicitly in official discourse, the two policy movements clearly reinforce each other. If academics and universities are evaluated less exclusively by publication performance and increasingly by social impact, contribution to talent development, industrial engagement, and educational innovation, a more favourable institutional environment emerges for the deepening of UII. This may be particularly relevant in North-West China, where universities often face the dilemma of either emulating the research-oriented performance models of leading eastern universities or prioritizing their role in regional development, industrial modernization, and local talent formation.

Curricula and industry standards: a new wave of China's UII policy

Our third case study has been prepared a few months following the adoption of an important new policy document at national level (MoE, 2026). This document reveals an increasingly systemic and ambitious understanding of UII in China. It shows that UII is increasingly seen as a comprehensive ecosystem-building strategy intended to reorganize the core structures of vocational and applied higher education around industrial modernization and skills development. The official interpretation of the reform is especially revealing. It states that earlier "reform pilots" had "explored many effective practices, accumulated valuable experience, and created a demonstration model," and that the new policy aims to "solidify these experiences into systems and mechanisms", transform talent training "from traditional knowledge transfer to comprehensive ability improvement", and change the development of high-skilled talent "from bonsai to scenery, and then form an ecology" (CCTV, 2026).

This metaphorical language is capturing well the governance philosophy underlying the reform policy of deepening UII. The reference to "bonsai" acknowledges that earlier reforms often remained limited to isolated exemplary cases and model institutions with limited systemic impact. The subsequent goal of creating "scenery" and ultimately an "ecology" expresses the ambition to scale these fragmented successes into a self-reinforcing national system linking education, industry, innovation, and regional development.

[10] Coalition for Advancing Research Assessment (CoARA) (see here: https://www.coara.org/).

The UII reform builds on a long period of experimentation launched by the 2019 implementation strategy in areas such as modern apprenticeship programs, "Double High" vocational college pilots, industry-education integration city pilots, enterprise-based training systems, "1+X" skills certification reforms, teacher enterprise practice programs, and digitally supported simulation-based training. These pilots explored whether enterprise standards, work processes, industrial technologies, and real production scenarios could become organizing principles of educational practice itself. The reforms promoted modular and competency-based curricula, project-based and work-process-oriented learning, stronger participation of enterprise experts in teaching, and the development of "dual-qualified" teachers with both academic and industrial experience.

The broader significance of these reforms lies in the fact that they seek to shift vocational and applied education away from a traditional transmission-oriented pedagogical model toward competency-oriented and situational learning. The reform explicitly promotes the transition from "knowledge transfer" to "comprehensive ability improvement," reflecting a broader pedagogical transformation, emphasizing problem-solving, integrated competencies, practical application, and work-based learning. At the same time, the reform also represents a major institutional and governance transformation (see about this more in detail Halász & Huang, 2025b). Rather than merely encouraging cooperation projects between schools and firms, policymakers increasingly seek to align the "education chain," "talent chain," "industrial chain," and "innovation chain" through coordinated institutional and also pedagogical redesign.

This systemic ambition is closely connected to the broader logic of China's developmental state. Earlier pilot projects demonstrated that deep forms of integration are possible, particularly in economically advanced regions with dense industrial ecosystems, but policymakers also recognized that successful experiments do not automatically diffuse throughout the system. As a result, the reform agenda shifted from creating isolated model institutions toward restructuring the "key elements" of the educational system itself, including majors, curricula, teaching materials, teacher standards, training bases, evaluation systems, and mechanisms of enterprise participation. The objective is not only to modernize vocational education, but to create a self-reinforcing ecosystem in which educational institutions, enterprises, technologies, labour-market demands, and regional development strategies become increasingly interconnected.

A new stage of development

MoE's 2026 policy document seems to show that the development of UII might have reached a new stage and a new development period might have started. This have certainly been influenced by another important, earlier policy document issued in 2023 by the National Development and Reform Commission, promoting industry-education integration in vocational education (NDRC, 2023). This can probably be interpreted as marking the opening of a new stage in the evolution of China's university-industry integration (UII) policy, provided that UII is understood in a broad sense, encompassing higher vocational education and applied institutions.

The 2023 document introduces several features that represent a qualitative leap especially for the vocational and applied segments of the higher education system. While previous UII initiatives focused largely on pilot programs and voluntary cooperation between schools and enterprises, this plan sets clear, quantifiable national targets, such as establishing around 50 national pilot cities for industry-education integration, cultivating over 10,000 such enterprises, and adding approximately 200 higher vocational and applied undergraduate institutions to the

national reserve project pool. These targets indicate a shift from tentative experimentation to large-scale, goal-oriented implementation and upscaling. Second, the policy deepens industry involvement beyond traditional internships by mandating that enterprises co-design curricula, develop teaching materials, participate in joint enrolment, and establish apprenticeship programs, thereby embedding industrial needs directly into the core educational decision-making process. Third, the document introduces a powerful and diversified incentive system, combining financial support, fiscal relief, land allocation under educational use, and credit facilities (including bond issuance and IPO support for eligible firms). This multi-pronged "finance + fiscal + land + credit" package represents a significant commitment to reshaping institutional behaviour rather than merely encouraging cooperation. Fourth, the plan creates new institutional carriers for integration, such as industry-education communities centred on key sectors, park-based city-level alliances, and mixed-ownership industrial colleges, signalling a move toward shared governance and asset integration. Fifth, the policy strategically prioritizes emerging industries (artificial intelligence, integrated circuits, new energy, biomedicine) and social services (elderly care, childcare, domestic services), aligning UII directly with national industrial and social stability goals. Finally, the inclusion of monitoring, credit-based enterprise evaluation, case study dissemination, and nationwide replication mechanisms institutionalizes a feedback loop that allows proven models to scale systematically.

Taken together, these elements suggest that for China's UII policy, especially in the higher vocational and the applied sector is transitioning from an initial phase of exploration and voluntary partnership to a new stage characterized by mandatory performance targets, deep enterprise-education co-governance, substantial fiscal and financial engineering, and strategic alignment with national economic priorities. The 2023 action plan thus operationalizes longstanding aspirations within its specific scope, redefining how vocational and applied education interact with industry in China, while leaving the domain of research university-industry integration to other policy frameworks.

The implementation of this reform agenda is unavoidably varying significantly across different regions of China. Many of the earlier pilots emerged in economically dynamic regions with strong industrial ecosystems and high levels of enterprise participation, such as those presented in our previous case studies. The North-West China case study is particularly interesting because it allows the exploration of how this ecosystem-oriented reform model operates under structurally different conditions. In provinces such as Xinjiang and Gansu, where industrial density, innovation capacity, and enterprise ecosystems are weaker, implementation might depend more heavily on state coordination, strategic planning, and compensatory institutional mechanisms. In such contexts, educational institutions may increasingly be reorganized not only in response to existing industrial ecosystems, but also in anticipation of future industrial modernization. This makes North-West China an especially valuable context for examining both the transformative potential and the structural limits of China's emerging UII model.

Relevant regional characteristics in the North-West area

Placing the development of China's UII policies and practices into the specific context of the North-West region might help us, among others, to understand better the dynamics of exogenous and indigenous factors shaping China's UII policies practices. This is particularly important from the perspective of both the sustainability and the transportability of these policies and practices. The underlying assumption is that the more these are rooted in indigenous processes, the more sustainable they are, and if exogenous factors play a stronger role, these policies and practices are more easily transportable to other regions and countries.

Regional development patterns

A comparison of Xinjiang, Gansu, and Shaanxi with the national Chinese average reveals significant structural differences that are highly relevant for understanding the varying conditions under which UII operates. While GDP growth rates across Northwest China appear comparable to the national average, large disparities in per capita income and industrial structure reveal fundamentally different conditions for university-industry integration (see *Table 1*).

Table 1

Comparison of key economic data of Shaanxi Xinjiang, Gansu with national Chinese data

Region	GDP per capita (USD approx.)	% of national GDP per capita	GDP growth rate (%)	Industrial structure
China (national)	~12,500	100%	~5.2%	Balanced; strong manufacturing + growing high-tech
Shaanxi	~13,500–14,000	~105–110%	~5.0–5.5%	Strong industry (energy, aerospace, tech); innovation-capable
Xinjiang	~9,000–10,000	~70–75%	~5.5–6.0%	Resource-based (energy, agriculture); state-led projects
Gansu	~6,500–7,000	~50–55%	~5.5–6.0%	Weak industrial base; traditional sectors

Source: Approximate values based on official statistics (China Statistical Yearbook and provincial statistical yearbooks of Xinjiang, Gansu and Shaanxi, 2024).

At the national level, China has reached a relatively balanced stage of development, with GDP per capita approaching the upper-middle-income threshold and an economic structure increasingly characterized by the coexistence of advanced manufacturing and rapidly expanding high-technology sectors. Against this backdrop, Shaanxi appears as the closest among the three provinces to this national pattern. Its GDP per capita is roughly at, or slightly above, the national average, reflecting a comparatively strong industrial base and a historically rooted concentration of research-intensive universities and institutes, particularly in Xi'an. The province's economic structure – combining energy industries with aerospace, electronics, and emerging high-tech sectors – provides a more fertile ground for innovation-oriented collaboration between universities and enterprises. As a result, UII in Shaanxi can more plausibly approximate the "ideal" model envisioned in national policy: enterprises have both the capacity and the incentive to engage in co-education, and universities can align teaching, research, and innovation activities with real industrial demand.

Xinjiang occupies an intermediate position. Its GDP per capita reaches only about two-thirds to three-quarters of the national level, yet its growth rates have often matched or even exceeded the national average, largely due to sustained state investment, infrastructure development, and large-scale industrial projects, especially in energy and resource sectors. However, this growth does not translate into a dense, diversified industrial ecosystem. Instead, economic activity remains relatively concentrated in capital-intensive sectors with limited spillover into small and medium-sized enterprises. Consequently, UII in Xinjiang tends to be less organically driven by local industry demand and more strongly shaped by state intervention and policy coordination. The emphasis shifts from innovation toward employment generation and skills provision,

reflecting broader socio-economic and governance objectives. In this context, UII functions more as a mechanism for aligning education with labour market needs under conditions of structural constraint than as a platform for innovation-led development.

Gansu represents the most constrained case. With GDP per capita at roughly half of the national average, it faces significant limitations in terms of industrial capacity, investment attraction, and talent retention. Its economic structure remains dominated by traditional sectors such as energy extraction and agriculture, with relatively weak development of modern manufacturing or knowledge-intensive industries. Although growth rates may appear comparable to other regions, they are largely driven by investment rather than by endogenous innovation dynamics. Under these conditions, the absorptive capacity for UII might be limited: there are fewer enterprises capable of engaging meaningfully with universities, and the incentives for deep, sustained cooperation are weaker. As a result, we can expect that UII tends to take more modest and often compensatory forms, such as internships, basic training arrangements, or policy-driven partnerships, rather than the complex, innovation-oriented collaborations envisaged at the national level.

Taken together, these differences highlight a crucial point: similar macro-level growth indicators can mask profound disparities in the underlying economic structures that shape the possibilities of UII. While Shaanxi approaches the national model and allows for more endogenous, innovation-driven integration, Xinjiang and especially Gansu illustrate how UII adapts to less favourable conditions, becoming more state-mediated, employment-oriented, and structurally constrained. These variations provide a strong empirical basis for analysing UII not as a uniform policy model, but as a context-dependent governance mechanism whose forms and outcomes are closely tied to regional development trajectories.

The regional context of UII is strongly influenced by overall regional development strategies and programs. In the North-West provinces these are oriented by China's updated "*Western Development Strategy*" (WDS) designed by NDRC and adopted by the Central Committee of the Chinese Community Party (CCCCP) and the State Council (SC) (see CCCP – SC, 2020). This document builds upon the original WDS launched in 2000, which sought to reduce regional disparities between China's coastal and inland areas.[11] As an official interpretation of the content of this guidelines stated, in the Western regions "the ability of independent innovation is not strong enough, the production mode is relatively extensive, the proportion of traditional industries and heavy chemical industries is relatively high, and the development of modern service industries is relatively lagging behind" (NDRC, 2020).

Figure 1.
Provinces targeted by China Western Development Strategy

[11] The less developed inland areas targeted by WDS include six provinces (Gansu, Guizhou, Qinghai, Shaanxi, Sichuan, and Yunnan), five autonomous regions (Guangxi, Inner Mongolia, Ningxia, Tibet, and Xinjiang), and one municipality (Chongqing).

Source: Świstak (2022).
Note: The provinces covered by this case study are coloured blue

Originally the WDS was focusing mostly on infrastructural developments, such as railways, roads, airports, hydroelectric plants, hydrotechnics, and the construction of municipal infrastructure but later other priorities, including in investment in human resources became dominant (Świstak, 2022). The updated 2020 version of WDS reframed the development priorities under the "new era" of socialist modernization, emphasizing innovation, openness, and environmental priorities alongside traditional infrastructure investment. This has direct implications for UII since such a shift in priorities certainly creates favourable conditions for interventions promoting skills-development oriented cooperation between universities and industry.

The 2020 guidelines represents a strategic move from rapid expansion toward balanced, sustainable development, further narrowing regional income gaps, stabilizing border areas, and ensuring that western region becomes a vital growth engine within China's national modernization and global connectivity agenda. The move towards innovation- and skills-led growth appears explicitly in regional strategies, such as, for example, in the chapter on "Optimizing the Layout of Innovation-Driven Development" in Xinjiang's long term development strategy. It is worth quoting this in length as it illustrates well the key regional development priorities, highly relevant form a UII perspective:

> "Strengthen the leading role and status of enterprises in innovation, establish and improve the institutional mechanisms for enterprise-led industrial technology R&D and innovation, and promote the aggregation of various innovation elements towards enterprises (…) . Encourage and support enterprises to jointly establish new R&D institutions with universities and research institutes to promote resource sharing"
>
> "Adhere to the principle of regarding talent as the primary resource supporting development, implement the policy of respecting labour, knowledge, talent, and creativity, deepen the reform

> of the talent development system and mechanism, improve the talent development planning and policy system, and cultivate, introduce, and utilize talent in an all-round way. Increase investment in talent and establish a sound diversified talent investment system involving the government, society, employers, and individuals. Implement the autonomous region's key talent plan, focusing on strengthening the cultivation and introduction of leading scientific and technological talents, backbone talents, and outstanding young talents; strengthening the construction of innovation teams and enterprise management talents, professional and technical talents, and highly skilled talents; improving the talent echelon cultivation and sustainable system in key areas; and strengthening the cultivation of innovative, application-oriented, and skilled talents" (NDRC, 2021)

As a comprehensive analysis of China's regional development policies noted "innovative industries are very underdeveloped" and have had a limited impact on creating a regional innovation system, compared to eastern China (Świstak, 2022). Cooperation between academia and industry has traditionally been weaker and only a few companies had affiliated research and development institutions. High-tech and new-tech industry and technology companies have been underdeveloped. This is reflected, among others, in the relatively low R&D expenditure of companies. As the author of the comprehensive analysis mentioned above noted, in 2019 the per capita R&D expenditure of industrial enterprises was only about one third of that of eastern companies, therefore "this sector, which is important in other parts of the world and even in other Chinese provinces, cannot drive the socioeconomic development of Western China" (Świstak, 2022). An important consequence of this is that efforts to build effective UII ecosystems in these regions might have encountered greater challenges than in the East.

The WDS created an important structural foundation for the later emergence of ecosystem-oriented university-industry integration policies in North-West China. While, as mentioned, the early phase of the strategy focused mainly on infrastructure and economic development, later stages increasingly emphasized human capital, technological upgrading, innovation capacity, and applied talent formation. As a result, universities and vocational institutions became increasingly integrated into broader regional modernization strategies, linking education, industrial upgrading, and territorial development in ways that differ significantly from many coastal innovation-driven UII models.

State-led development of education in North-West China

From what has been said so far, it may already be visible that one of the most interesting aspects of our third case study, focusing on North-West China, is the particularly strong connection between UII and broader regional development and modernisation strategies. Although this developmental dimension was already visible in our Chengdu–Chongqing case study – South-West China, including Sichuan, also belonging to the country's relatively less developed regions – it becomes significantly more pronounced in provinces such as Gansu and Xinjiang. These are among the regions where, even during the last decade, major education development programs supported by international organizations such as the World Bank were implemented, some of them directly addressing vocational education and forms of university-industry cooperation (Luo & Shi, 2015).

Prior to the 2010s major internationally supported development interventions in North-West China targeted primary and secondary education (Lee at al., 2016). These interventions were implemented by the provincial authorities and were guided not only be the national WDS but also by the specific regional development strategies. As they were accompanied by the intensive involvement of international experts form the West (especially from the US, the UK), they also created new regional platforms for international learning and knowledge sharing. It is worth

mentioning also the role of the European Union in these development program as “China invited the EU to play a stronger and more active role in developing human resources” (Robinson, 2016). In the 2010s the focus of education development interventions was gradually shifted from poverty reduction, equity and basic education to skills development and higher education, reflecting the new national economic development strategies presented earlier.

This helps illuminate what might be described as a broader developmental paradox of China’s UII policies and practices. On the one hand, UII functions as a modernization instrument in structurally challenging developmental contexts characterized by uneven industrial ecosystems, implementation difficulties, and, at times, the continued need for external developmental support. On the other hand, some elements of these same policies and practices increasingly display characteristics that may be relevant or even attractive for other countries seeking to modernize their own higher education and skills systems. In this sense, the evolution of UII in China also reflects a broader paradox of Chinese development itself: while China still remains, in some areas, a recipient of international development assistance, it simultaneously acts as an increasingly influential provider of development support, policy ideas, and institutional models for other parts of the world, including highly developed regions such as Europe (Bao, 2026).

The case of North-West China can illustrate well the impact of regional specificities on the implementation of the country’s UII policies. From this respect Xinjiang is particularly interesting because of a specially dynamic state-led modernisation supported by ambitious development programs and also because of the specific political and administrative context of this province.

One of the key elements of this context is the role of a special governmental entity called Xinjiang Production and Construction Corps (XPCC) or in Chinese shortly Bingtuan.[12] According to a document published by the State Council this is “a special social organization, which handles its own administrative and judicial affairs” owning and operating its own administrative units, companies and various institutions covering “scientific research, education, culture, health, sports, finance and insurance, as well as judiciary organs”. Although Bingtuan was created in the fifties, this kind of social entity has “centuries-old tradition of developing and protecting its border areas by stationing troops to cultivate and guard the frontier areas” and its establishment is “continuation and development of this historical experience in the new historical conditions” (State Council, 2003). The institution has a status similar to ministries or provincial governments. It owns and operates many educational institutions, including universities. According to study published by the University of Oxford and written by an author who spent a year working in this organisation, seeing it with the insiders’ eyes, Bingtuan’s Shihezi University is “one of the most famous universities in China” (Bao, 2018).

They way Bingtuan promotes UII in its own universities can be illustrated by an article written by three teachers of Xingxin Vocational and Technical College, a highly competitive technical university owned and operated by this organisation (Wang et al., 2023). This university, similarly to others, “invites industry experts to the campus to give lectures, promoting a dual-system education model” making them provide “highly valuable and practical experience to enhance the professional capabilities of the school's faculty, and also provide valuable insights for students' career development”. The school and its industry partners not only “discuss curriculum reform and teaching”, and “share valuable experience in guiding students in skills

[12] 新疆生产建设兵团 - Xīnjiāng shēngchǎn jiànshè bīngtuán.

competitions", but this cooperation also creates possibilities for teachers to "participate in practical training in enterprises (…) improving the overall quality of the teaching staff".

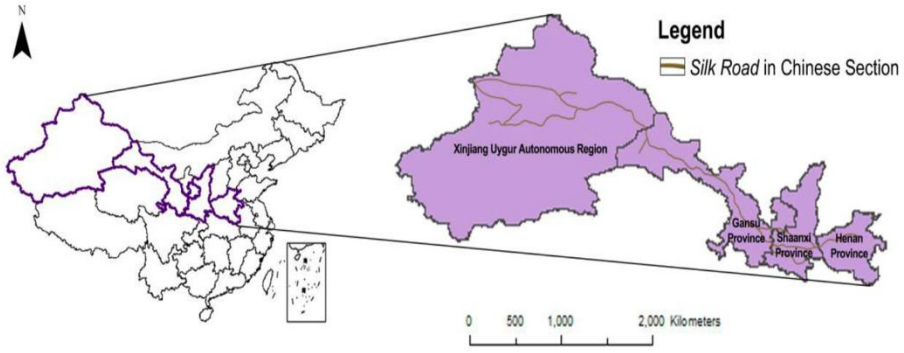
Regarding the role of state-led development programs and their relationship to UII policies and practices the North-West region seems to represent a special development pattern in which international development agencies (such as the World Bank), have been playing a significant role. As mentioned, observing and analysing this might help us to understand better the dynamics of exogenous and indigenous factors shaping China's UII policies and practices which is particularly important from the perspective of both the sustainability and the transportability of these policies and practices. The strategic national vision on university-industry cooperation became a core element of development programs supported also international development organisations, such as the multiyear Xinjiang and Gansu projects targeting higher vocational colleges and aimed at building of new institutional mechanisms connecting them to industry (Bao, 2026).

What we see in the less developed North-West regions helps us understand the challenges encountered on the road of moving from an earlier model of university-industry *cooperation* to the emerging new model of university-industry *integration*.

Cultural diversity and the North-East UII development model

The three North-West China cities our third case study include are all located along the historic Silk Road Corridor (see *Figure 2*). The transnational heritage property Silk Roads: the Routes Network of Chang'an-Tianshan Corridor was inscribed in UNESCO World Heritage List in June 2014. Three countries were involved in this application process, China, Kazakhstan, and Kyrgyzstan (UNESCO, 2014). In the Chinese Silk Road part, the natural landscape is diverse and rich, including 22 cultural sites,[13] and other types of landforms from east to west (Wartmann & Purves, 2018). Historically, the Silk Road is not only a trade route but also a space integrating merchants, craftsmen, scholars and religious practitioners (Peters, 2021) –these groups of people contributed to the circulation of knowledge, culture and economy, which also gives this area's UII a distinct historical development character.

Figure 2.
The Map of the Silk Road in Chinese area



Source: Yu et al. (2023)

[13] Henan, Shanxi, Gansu and the Xinjiang Uygur Autonomous region, ranging from Yellow River Alluvial Plain, Guanzhong Plain, Loess Plateau, Qinling Mountains, Hexi Corridor, Kunlun Mountains to Xinjing Tianshan Mountains, Tarim Basin, Taklimakan Desert.

Among the numerous culture resources, the Dunhuang academy is a specially interesting case for transforming the culture heritage into the knowledge and connecting knowledge with industry for study, conversation and further innovations of Dunhuang culture. Dunhuang academy is a research-oriented institution responsible for managing six culture heritage sites, including the Mogao Caves in Dunhuang, also a World Cultural Heritage site. In 1944, it was called Dunhuang Art Institute, it was renamed Dunhuang Cultural Relics Institute in 1950 and expanded into the Dunhuang Academy in 1984. Today, it is an established organizational framework that integrates research, conservation and the development of cultural industries (Dunhuang Academy, n.d.). To further enhance its knowledge production and innovation ability, the Dunhuang Academy cooperates with local universities in Gansu, creating a broader knowledge ecosystem for Dunhuang culture development.

Together with Dunhuang Academy, Lanzhou University established the Institute of Dunhuang Studies, which is a Key Research Base for Humanities and Social Sciences under the Ministry of Education. Its predecessor was the Dunhuang Studies Research Group, founded at Lanzhou University in 1979. This institution developed into an interdisciplinary academic platform, dedicated to do research on ancient documents, grotto art, regional history and multi-language research, transforming the regional culture heritage into academic knowledge used to cultivate researchers through postgraduate and postdoctoral education (Zhang, 2005). In 2026, the Dunhuang Academy and Lanzhou University signed a new cooperation agreement. The two parties aim to achieve major breakthroughs in areas such as the construction of the theoretical framework for Dunhuang studies, innovation in key technologies for cultural heritage conservation, the collation and research of multilingual historical documents, and the digitization and creative transformation of Dunhuang art. They seek to build this collaborative platform into a premier academic hub that leads international Dunhuang studies, cultivates academic researcher, and advances the permanent preservation and sustainable transmission of cultural heritage (Dunhuang academy, 2026).

Based on the research and university institutes' knowledge production, the Dunhuang Academy provides knowledge and technical support to enterprises within the cultural industry. It provides, for instance, technical conservation support for sites such as Mogao Caves and utilizes advanced technologies to create the "Digital Dunhuang" database. As early as the 1990s, the Dunhuang Academy began exploring the "Digital Dunhuang" initiative to ensure the permanent preservation and sustainable use of the Dunhuang Grottoes. Over more than three decades, the Dunhuang Academy has established a comprehensive technical system for the digital acquisition, processing, storage, and display of cultural relics. It has amassed a vast digital resource base – including high-resolution photographic data, 3D cave reconstructions, and panoramic virtual tours – creating a valuable asset for the creative transformation and innovative development of fine traditional culture in the digital age. In 2016, the "Digital Dunhuang" resource database went online, enabling global access to high-definition imagery and panoramic tours of 30 complete caves, with a cumulative total of over 16.8 million visits. In 2020, the "Digital Dunhuang Open Material Library" – the world's first open-access platform for digital cultural heritage based on blockchain technology – was jointly launched by the Dunhuang Academy and Tencent. The library provides global access to over 6,500 high-definition digital resource files, including materials from the Mogao Caves and other grotto sites as well as documents from the Dunhuang Library Cave, creating a "one-stop" platform for scholars, culture enthusiasts, and creative artists worldwide to share and co-create Dunhuang culture (Gansu Provincial Cultural Heritage Administration, 2022).

Supported by the cooperation among research, university and culture related industry, Dunhuang's tertiary sector is highly developed. According to the Statistical of Dunhuang City on National Economic and Social Development in 2024, the tertiary sector accounts for over 60% of its total GDP, the added value of the tertiary sector was 6.44 billion yuan, representing a growth of 3.4% and accounting for 63.8% of the total added value (Dunhuang Municipal People's Government, 2025). Hence, Dunhuang is a case that illustrates how the university, research institute and industry interaction can transform the culture resource into technology innovation, provide the foundation for knowledge exchange, talent cultivation and promote the industry development.

Except from the Dunhuang culture, our travel to the North-West also reminds us to look at the Chinese tradition thought. Confucianism, which also has an impact on the thinking and behaviour of scholars in universities. Confucian thought traditionally regards scholars (*shi*) as individuals committed to personal moral development, public service, and the observance of ritual propriety (*li*) and righteousness (*yi*) (Wong, 2008). This ethical value enforce the academics to have a strong sense of social responsibility and commitment for student development instead of profit-oriented activities (Marginson, 2011). When academics are involved in market-oriented activities, which might be incompatible with their scholar's role, it is regarded as undermining their moral statue, diverting their primary responsibility of ethical guidance, therefore, even as Chinese academics support the societal and developmental goals of their work, they often remain cautious about involvement in endeavours primarily motivated by profit (Shi and Ge, 2019; Berger et al., 2013). As Wilkinson (1963) highlighted the ancient degree-examinations were not open to the merchants, they were officially barred from it, profit-seeking was seen as selfish and greed by Confucian philosophy. Hence, from the traditional ethical thinking, the gentleman does not see money as a central measure of industrial creativity, because most of them was raised to value honour through community leadership within this culture background than through the pursuit of private enterprise.

One of our Xi'an interviewees claimed that such cultural background might influence how UII develops in Xi'an as well. This city, which is in eastern gateway of the Chang'an-Tianshan corridor, served as a capital during several dynasties, functioned as a key political, economic, and cultural hub in ancient China. It is widely considered as the most important origin of ancient Chinese civilization (Berger et al., 2013). Instead of focusing mainly on market-driven collaboration, universities in this region may emphasize partnerships with external entities, like state-owned industries through the lens of social responsibility, local economy development, student training and development, and national service. This does not mean that UII is less active within this area, rather, it indicates that the reasons, values, and underlying stories supporting such partnerships might be different from those seen in more market-driven areas, such as the Greater Bay Area, where historical emphasis was on trade and entrepreneurial spirit and this environment shaped their regional business growth, linking UII with innovation, entrepreneurship, and market competition. In cities like Xi'an and the wider North-West region, on the contrary, such partnerships are often rooted in values of public service, state-led development, and the use of knowledge for societal benefit.

Exploring UII in three North-West regions

In this section we present the main outcomes of our fact-finding mission in three North-West provinces, Xinjiang, Gansu and Shaanxi.

Xinjiang

Xinjiang offers a good opportunity to explore the relationship between China's national modernisation strategy and the UII policies and practices of the country because, from a certain perspective, this province finds itself in a similar position than the whole country about two decades ago. As mentioned above, in the context of global development comparison, at that time, China was facing the "middle-income trap" and, in order to avoid it, it moved towards a new development strategy based on innovation and high skills. Today Xinjiang, as a province, is facing a very similar challenge. As one of the target regions of the Western Development Strategy – with a kind of privileged position due to its specific political situation – this underdeveloped region went thought a intensive industrial modernisation process and experienced particularly high level growth. The challenge Xinjiang is facing now is whether it remains a moderately developed area within China, relying mostly on relatively cheap and less skilled labour and on more traditional agricultural and industrial sectors or it tries to follow the economic model of the highly developed of Eastern provinces, building a high-skills economy and using, among others, UII as an effective development tool.

The recognition of the need to move towards a high-skills development model – escaping from what the literature often describes as "low-skills equilibrium"[14] – is reflected in an emerging regional skills strategy adopted in 2026 by the provincial government This strategy, talking in its title about "building dreams" through "skill-revitalizing Xinjiang" (XJUAR – DHRSS, 2026a) names nine advanced high skill priority sectors as key development priorities[15] and envisions significant investment into producing the relevant skills for these sectors. The underlying assumption is that through "investing in people," it is possible to "build a new modern skilled talent training ecosystem (…) injecting lasting talent momentum into Xinjiang's high-quality economic and social development" (XJUAR – DHRSS, 2026b). Connecting universities and industry appears in this context in Xinjiang.

We could observe the impact of the skills-friendly environment when visiting a private training provider operated by a commercial company, named "Tianshan Snow Lotus Vocational Skills Training School" [天山雪莲职业技能培训学校] (see *Figure 3*). This is a for-profit private vocational training school that offers programs in areas like digital marketing, nutrition, health management and aviation. It is a well equipped, enterprise-linked vocational training institution, providing certification programs integrated with regional development goals. The income of the school is coming from both public institutions and consumer. It shows the existence of a flourishing learning market in the province.

Figure 3.
Tianshan Snow Lotus Vocational Skills Training School

[14] Low-skills equilibrium is a self-reinforcing economic trap where low workforce skills and low business demand for advanced skills mutually reinforce one another (see Finegold, 1993).
[15] Advanced manufacturing, digital economy, green energy, transportation, agriculture and rural areas, life services, cultural tourism, emerging business formats, and production safety.

Source: photos taken by the authors.

An interesting observation emerging from one of our interviews was the claim of a representative of a German foundation supporting the transfer of the German dual-training model to China that its implementation had been more successful in Xinjiang than in any other Chinese provinces. While this perception would require systematic verification, it seems to be plausible in light of Xinjiang's specific institutional context. The region combines strong government coordination, large state-owned and strategic industrial enterprises, persistent lack of and demand for skilled labour, and a close alignment between educational provision and regional development priorities. These conditions are similar to some of the systemic features that historically supported the German dual-training model, including long-term employer engagement in workforce development and the integration of education, industry, and labour-market planning. The Xinjiang case therefore suggests that the effectiveness of industry-education integration may depend not only on the sophistication of local markets but also on the degree of coordination among educational institutions, enterprises, and regional development strategies.

UII processes show high level dynamism in Xinjiang. This is illustrated, among others, by the high number of Industry-Education Integration Communities [产教融合共同体]. These entities constitute a strategic, alliance-based organizational model mandated by the Chinese government. Their primary goal is to break down the traditional walls between companies (industry) and schools (education) by creating a shared ecosystem where they co-develop curricula, co-teach, and co-invest in facilities. They are often led by large companies and involve several vocational colleges, universities and research institutes, often playing the role of co-leader. They define skill standards based on real industry needs and ensure the balance between practical application and theoretical/academic rigor.

Besides these sectoral industry associations local government agencies also play a key role in these communities. The members of the community share resources, such as facilities and financial and human resources. Typically they have a legal entity (e.g., a registered non-profit or a jointly-owned company) to manage funds, assets, and operations. The implementation of this national model is highly visible at the local level: exploring Xinjiang one finds very frequently news about the creation or actions of industry-education integration communities not only in well-know sectors, such as transport, construction, tourism or finance but also in

very special areas such as, for example, Jewellery and Jade Industry,[16] Beef Cattle Industry,[17] Childcare Industry or Live Streaming E-commerce (sometimes called "influencer industry")[18] Some of the locally established communities have the ambition to become national entities. For example the Beef Cattle Industry Industry-Education Integration Community, established in the city of Yining, involves over 90 initial member units, including 15 universities, 24 vocational colleges, 10 research institutes, 8 industry groups, and 38 firms, and it is explicitly tasked with "serving national strategies".

The striking intensity of creating industry-education integration communities and the similar intensity of their activities, as reflected in the provincial media (including university, company and government websites) shows that Xinjiang is not only implementing the national UII policy, but also became a kind of experimental field, that is, a testing ground for new UII models before national rollout, animated by the activity of local actors strongly committed to the UII idea. Similarly to other developments this has probably been influenced the flow of external knowledge and resources from the highly developed eastern or coastal part of China.

A concrete illustration of this east-west, high-tech UII dynamic is provided by one company we encountered in Ürümqi: the *Shenzhen Yunyi Technology Co., Ltd*. [深圳云译科技有限公司]. This company, established in 2016, focuses on the development of artificial intelligence machine translation systems and mastering the core technologies of third-generation machine translation. It is intensively cooperating with universities in several Chinese provinces, including Xinjiang. As the company's representative we met in Ürümqi explained, they not only provide internship possibilities for university students but their employees also actively participate in course-curriculum development and teaching (the company's representative we met, for example, teaches practical courses as an industry teacher at Xinjiang University).

The presence of Yunyi Technology in Xinjiang's UII ecosystem shows that this ecosystem is extending beyond the traditional manufacturing or vocational training sectors into highly developed digital economy fields, such AI-enabled applied language processing, where the production of fundamentally new skills-configurations can be assured only through intensive university-industry cooperation.[19] The AI-supported multilingual communication systems operated by Yunyi Technology are used to facilitate social and economic communication in the multi-ethnic Xinjiang province, supported, among others, by Uyghur-Chinese machine translation, which is a key feature of their platform. This generates a combination of research and skills-development cooperation with universities, such as one of Xinjiang's leading HEIs, Xinjiang University which has specific competences in this area.[20]. This is an example showing

[16] See the website „*The Xinjiang Jewelry, Jade, and Jewelry Industry Industry-Education Integration Community was officially established*" [新疆珠宝玉石首饰行业产教融合共同体正式成立] (https://jyt.xinjiang.gov.cn/edu/stjy/202601/4af23b99d3fe4998b289439773dd8dd6.shtml).

[17] See the website "*Our professors were invited to attend the founding conference of the National Beef Cattle Industry Industry-Education Integration Community*" [我院教授应邀出席全国肉牛行业产教融合共同体成立大会] (http://www.cas.zju.edu.cn/caschinese/2026/0417/c14909a3153119/page.htm).

[18] See the website „*The Corps Childcare Industry and Livestream E-commerce Industry Industry-Education Integration Community was established in Tiemenguan City, Second Division*" [兵团托幼行业、直播电商行业产教融合共同体在第二师铁门关市成立] (https://xj.news.cn/20240712/0bf19ff882224497bb41422c9e58d55f/c.html).

[19] This is similar to what we presented in another paper focusing on „intelligent predictive maintenance" (see Halász & Huang, 2026a).

[20] See, for example, the National Basic Science Data Center's (NBSDC) website „Third-party testing datasets for Vihan's multi-domain machine translation system" (https://www.nbsdc.cn/general/dataDetail?id=630485ce99f1de680f992770&type=1&utm_source=chatgpt.com).

that as advanced, low-resource language technology becomes strategically important in the specific Xinjiang developmental context, related UII also becomes a necessary development tool. This example also shows the impact of east-west knowledge flow (through a Shenzhen-based high tech service company).

Building on similar initiatives, another notable example emerged in April 2026. *Xinjiang Energy Vocational and Technical College* [新疆能源职业技术学院], a higher education institution in Ürümqi, announced that it would open a Low-Altitude Economy Industry College in cooperation with the Beijing-based *Zhongke Intelligent Control Aviation Technology Co., Ltd.*[21] This college is a leading member of a provincial-level industry-education integration community focusing on strategic emerging industries (new energy and new materials), which was created in 2023 by "5 undergraduate institutions, 42 vocational colleges, 58 enterprises, and multiple industry associations."[22]

Since industry colleges operate under the shared control of partners and represent an advanced form of resource-sharing, creating this type of institution is probably the highest level of university-industry cooperation. As this case also illustrates, such colleges typically combine research and skills development functions. This dual focus is reflected in the announcement by the Beijing-based firm's leaders: they will "fully leverage their resource advantages in industry standards, technology R&D, and market applications, jointly formulate talent training programs, build internship and training bases, and share expert faculty pools with the university (...) truly achieving an organic connection between education, talent, and industrial chains."[23]

Reflecting a broader, proactive response by Xinjiang's higher vocational education system to regional economic development strategies, this initiative is not an isolated case. Several other examples exist of Xinjiang higher educational institutions establishing industry colleges together with companies from eastern or coastal China, enabling skills development in sectors using the most advanced technologies.

One of the special focuses of our third case study has been exploring the UII-related activities of research oriented elite universities. For this exploration *Xinjiang University* [新疆大学] (XJU), a national key university affiliated with the Xinjiang Uyghur Autonomous Region and co-funded by the Ministry of Education and the regional government seems to be a good case. This comprehensive university – being part of Project 211[24] and the Double First-Class Construction[25] – represents high academic level in Xinjiang. In 2021 its position in the "Shanghai Ranking" was 129th within China, and the Nature Index Research Leaders 2025 ranked it among the top 450 leading universities globally for its high quality research publications in natural science.[26]

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[21] See the website „*Deepening the integration of industry and education to jointly build a new high ground for talent cultivation in the low-altitude economy*" [深化产教融合,共筑低空经济人才培养新高地] here: https://www.xjnyedu.com/nengyuanyaowen/1938.html.

[22] See the website „*Industry-education integration community for strategic emerging industries such as new energy and new materials*" [新能源新材料等战略新兴产业产教融合共同体] here: https://www.xjqg.edu.cn/html/1088/2023-12-01/content-4218.html.

[23] Ibid.

[24] Project 211 was a higher education development program initiated in 1995 by the Chinese government to support approximately one hundred universities become globally competitive in the 21st century.

[25] Double First-Class Initiative [双一流建设] is a higher education development program of the Chinese government initiated in 2015. Approximately 150 universities have been included in this program aimed at developing high level research capacities in specific disciplines.

[26] See the Wikipedia article on XJU (https://en.wikipedia.org/wiki/Xinjiang_University).

Figure 4.
Xinjiang University

Source: XJU's website.

Although most industry colleges are established by applied universities, Xinjiang University also has one officially recognised Modern Industry College.[27] This is the College of Modern Intelligent Manufacturing Industry (School of Mechanical Engineering), approved by the Ministry of Education in 2021 as one of the first of these institutions. Its primary mission is to cultivate talent for strategic industrial sectors in Xinjiang, offering programs in areas such as mechanical engineering, industrial engineering, robotics engineering, and intelligent manufacturing engineering.[28] As all modern industry colleges this school has a clear mandate for industry-education integration, with a strong a focus on skills development for strategic industries. As the university's relevant website describes "it achieves alignment between professional chains and industry chains, course content with professional standards, and teaching processes with production processes, establishing a talent cultivation model that integrates industry and education and collaborative education, and builds a 'sandwich' teaching model for cultivating engineering practice and industrial capabilities. [29]

Xinjiang university also offers short, intensive, industry-aligned certificate programs designed to make students job-ready in emerging sectors in areas such as low-altitude traffic management, intelligent chemical engineering and robotics, new energy storage & conversion materials or interdisciplinary basic AI applications.[30] The university has several schools of engineering[31] which maintain intensive cooperation with regional industry. One of these is the School of Electrical Engineering which is deeply connected with Xinjiang's rapidly developing energy sector, including such strategic areas as wind-energy, solar-energy or power-grid and power transmission, all of them relying on high level technology and requiring specially skilled

[27] The Modern Industry College" (现代产业学院) is a special form of industry colleges. This institution is one of the most important instruments to implement China's UII policy (MoE, 2020).
[28] See the university's website „ *Introduction to the School of Mechanical Engineering and the School of Modern Intelligent Manufacturing Industry at Xinjiang University*" [新疆大学机械工程学院、智能制造现代产业学院简介] (https://jxxy.xju.edu.cn/info/1003/2827.htm).
[29] Ibid.
[30] See the „*Notice Regarding the Enrolment of Micro-Majors at Xinjiang University for the 2025-2026 Academic Year*" [关于新疆大学 2025-2026 学年微专业招生的通 知] (https://phy.xju.edu.cn/__local/A/4F/0B/E3873F365175FCAC520729559E3_E0DC64B1_32133.pdf).
[31] See the universities website here: https://www.xju.edu.cn/zzjg1.htm.

manpower. The school (with the support of Tsinghua University) became "a strong talent training base and applied scientific research base in Xinjiang's power industry and electrical engineering fields".[32] In an interview the vice-dean of the School of Engineering of Xinjiang University we learnt that students at this school participate in a dual form of education and their teachers have to spend every week one day in industrial plants.

Xinjiang University has cooperation agreements with several companies in the energy sector, such as TBEA Co., Ltd. or Xinjiang Goldwind Science & Technology Co., Ltd. These agreements typically include co construction of industry-education integration platforms, mutual appointment of mentors across university and enterprises, shared internship/practice bases, joint talent training programs, the deepening of curriculum relevance as well as collaborations on research and technology projects also involving students. As the author of a related publication mentioned "Xinjiang Engineering College has established 158 industry-education integration bases, providing students with platforms to engage with actual industries and helping to improve their practical abilities. It has jointly built the Zhundong Industry-Education Integration Science and Technology Innovation Park with enterprises, making full use of enterprise resources to achieve close integration of talent training with the production line" (Ruixia, 2024).

This author mentions the *Zhundong Industry–Education Integration Science and Technology Innovation Park* [准东产教融合科技创新园] which is not simply a university science park or internship base but a territorial platform where industry, universities, research, engineering education, talent cultivation and regional development are physically and institutionally integrated.[33] This platform serves the UII-related activities of several universities including Xinjiang University which created its "Excellence Engineer Practice Base" there.[34]

Given the special governance constellation of Xinjiang, namely the important role of Bingtuan (presented earlier in the introductory part of this study), it is worth mentioning a case connected with this entity. As we were told, HEIs owned and operated by Bingtuan appear remarkably receptive to strong forms of industry-education integration because linking education, production, and regional development is not something new for them, but it is close to the "historical DNA" of Bingtuan itself. The fact that this government entity, having a strong regional development function, owns and operates both educational institutions and industrial companies has created a particularly UII-friendly institutional environment which might have significantly contributed to the deep integration of the two sectors in Xinjiang.

One of Bingtuan's higher education institutions is the New Star Vocational and Technical College [新星职业技术学院] which seems to represent a highly developed model of skills-focused industry-education integration. New Star was established in 2023 with the support of a Central-China province.[35] This college belongs to a new generation of vocational institutions

[32] See the website „*Overview of undergraduate teaching*" [本科教学概况] of the school: https://dqxy.xju.edu.cn/jyjx/bkjxgk.htm.
[33] See the website „*Zhundong Economic and Technological Development Zone Industry-Education Integration Science and Technology Innovation Park Project*" [准东经济技术开发区产教融和科技创新园项目] (https://xjco.cscec.com/ywly55/xx55/202308/3701657.html).
[34] See the website „*Zhundong Development Zone - Xinjiang University Excellent Engineer Practice Base Inaugurated*" [准东开发区-新疆大学卓越工程师实践基地揭牌成立] (https://m.cyol.com/gb/articles/2025-03/27/content_WVRqmlhL9m.html?utm_source=chatgpt.com).
[35] See the website „*Educational aid in Xinjiang helps upgrade vocational education in Shishi City*" [教育援疆助力师市职业教育提档升级] (https://www.btnsss.gov.cn/zjsss/hnhj/92359.htm).

designed around the principles of industry-education integration. Unlike older institutions that added UII to their original profile, New Star was built to operationalize the "industry chain drives talent chain" philosophy from its inception.

One of New Star's flagship UII structures is the "Bingtuan Green Chemical Industry Industry-Education Integration Community" [兵团绿色化工行业产教融合共同体]. This is not a symbolic partnership but a formal governance mechanism that aligns education with industrial needs through strong and daily interaction with several chemical industry companies. The college implements a "work-study alternation, dual-mentor system" with more than 80% of its professional course teachers having enterprise practice experience. As stated by a leader of the college: "industry-education integration is not simply school-enterprise cooperation, but rather making majors follow industry needs and curricula follow job requirements. By establishing the industry-education integration community, we transform enterprise demands into teaching content, turn workshops into classrooms, and ensure students are job-ready upon graduation, truly bridging the 'last mile' between talent cultivation and industrial needs." [36]

New Star is not the only example illustrating the commitment of Bingtuan to promote UII and its particularly strong involvement in implementing it. Another example is the earlier mentioned *Xingxin Vocational and Technical College* [兵团兴新职业技术学院] which has partnerships with over 15 major companies in the construction and engineering sectors and also uses the dual mentorship system, bringing in experts from companies to co-teach and co-develop the curriculum. As detailed in the earlier quoted paper (Wang et al., 2023) the school itself is a subject of action-research, systematically evaluating and refining its UII strategies.

Gansu

Similarly to Xinjiang, regional UII processes should be placed in the broader context of skills development strategies. The development of the skills production system has been seen as a key condition of modernisation and catching-up in regional development strategies also in Gansu, and strengthening links between the formal system of skills production and industry has been identified as a key element of this. According to the *Gansu Province Skilled Talent Team Construction Plan* issued in 2021 "transforming the mode of economic development must rely more on improving workers' quality and human capital innovation, and requires building a skilled talent team with comprehensive categories and excellent qualities capable of supporting innovation and creativity" (Gansu Provincial Department…, 2021). Integrating education with industry has been identified as an important component of this strategy. This was reflected, also in the World Bank's "*Gansu Technical and Vocational Education and Training Project*" launched in 2017[37] – very similar to the program implemented simultaneously in Xinjiang – with the aim of "facilitating the transition of low-skilled labour force into more productive employment".

Gansu – similarly to Xinjiang – has a highly elaborated provincial skills strategy: often called "*Skills Gansu*" [技能甘肃]. The main source of this is a policy document, issued in 2020 in

[36] See the website „*Xinxing Vocational and Technical College: Building an industry-education integration community for the Corps' green chemical industry*" [新星职业技术学院：打造兵团绿色化工行业产教融合共同体] (https://www.btnsss.gov.cn/ywdt/zwyw/116307.htm).

[37] See the announcement of the project at the World Bank's website „*World Bank to Help Strengthen Vocational Education in China's Gansu Province*" (https://www.worldbank.org/en/news/press-release/2017/03/31/world-bank-to-help-strengthen-vocational-education-in-china-gansu-province).

cooperation by the national and the provincial governments suggesting that skills-development should become a major engine for Gansu's economic and industrial development, rural revitalization, and participation in the Belt and Road Initiative (MoE – GPPG, 2020). This document encourages Gansu to experiment with new forms of higher technical education and university-industry integration incentives, assuming that UII is one of the main mechanisms through which the Skills Gansu strategy is supposed to work. This strategy follows a dominant global strategic approach, similar to what we can see in countries such a Australia, the UK or Singapore, with one major difference: it has a much stronger focus on higher education and it presupposes a major transformation of the way teaching and learning is organised in HEIs as well as how teachers work. This is reflected not only in the original strategy document, issued at national level, but also in the related provincial implementation strategies and interpretations stressing explicitly the "promotion of classroom reform in vocational colleges" (Gansu MoE, 2023a; 2023b).

The historical identity of Gansu as a Silk Road corridor and a region of cultural exchange may have contributed to a regional narrative emphasizing practical adaptation, connectivity, and service to societal needs. The region's historical experience may have strengthened the emphasis on a broader regional culture and developmental narrative focusing on mediation, exchange, practical adaptation, and responding the specific regional developmental needs. As explained earlier in the section "*Cultural diversity and the North-East UII development model*" important historical location in Gansu is Dunhuang which derived its importance from its position as a gateway and meeting point between different worlds. Merchants, monks, diplomats, artisans, translators, and travellers moving between China, Central Asia, India, Persia, and beyond all passed through the region. Dunhuang's prosperity depended less on producing knowledge or goods itself than on facilitating the circulation and transformation of knowledge, technologies, religions, artistic traditions, and commercial practices. Many of the projects encountered in the province involve translating scientific and technological knowledge into forms that can be used by local industries, agricultural producers, ecological management systems, or vocational education institutions. Universities are often less engaged in creating radically new technologies than in adapting, integrating, and applying knowledge to specific regional conditions.

A major difference between Xinjiang and Gansu is that the Gansu has a highly developed research system which has already created a favourable environment for UII (Ma et al. 2024). The province has more than 1,500 research institutions and a number of national State Key Laboratories with strong research and development capacities especially in the fields of space technology, biological products, electronic information and desertification control.[38] This implies that in this region university-industry cooperation has a stronger focus on research and technological innovation, while skills-development oriented UII might receive lower level attention in some universities.

A remarkable case demonstrating high level skills-development oriented UII activity in Gansu is *Lanzhou Petrochemical University of Vocational Technology* [兰州石化职业技术大学] (LPUVT). This institution is one of the first 10 public vocational undergraduate universities nationwide, selected as one of the first "Double High Plan" model vocational colleges[39] of China. It has a long history strongly connected with refinery and chemical industry (its most important

[38] See the website „*Economic overview of Gansu province*" (https://www.chinadaily.com.cn/m/gansu/2013-11/02/content_17076120.htm)

[39] The Double High Plan[双高计划] is a major modernisation program targeting vocational universities (MoE, 2019).

predecessor institution operated under the supervision of the relevant industry sector ministry).[40] In this history there is an interesting element that might have direct implications for the nature of this university's UII practice: one of the predecessor institutions was a college of a teacher education university strongly committed to the philosophy of connecting knowledge and practice, reflected also in the name of the institution (Zhixing College of Northwest Normal University).[41] It is worth quoting at length the relevant page of LPUVT's website presenting this philosophy:

> *Unity of Knowledge and Action*: The Ming dynasty thinker Wang Shouren first proposed the concept of "unity of knowledge and action" in his "Instructions for Practical Living," and Tao Xingzhi also advocated the argument in "Action is the beginning of knowledge, knowledge is the completion of action." This requires students to deeply understand the dialectical unity of knowledge and action, and to pursue the unity of knowledge and action as a comprehensive improvement for themselves. First, students are required to follow cognitive principles, effectively utilize opportunities such as work-study integration and internships, striving for practical application and unity of knowledge and action. Second, students are required to strengthen their theoretical foundation, enrich their professional knowledge, and improve their cultural literacy and theoretical literacy. Third, students are required to actively engage in "learning by doing" and "learning by doing" at training bases, flexibly applying professional knowledge to practice, emphasizing production internships and skills training, cultivating comprehensive practical skills, and comprehensively improving vocational skills and employment and entrepreneurship abilities, thereby truly achieving the unity of knowledge and action, and the combination of knowledge and action."[42]

This quotation shows that UII activities in the case of LPUVT are guided not only by skills-development goals but also by an institutional commitment to a pedagogical philosophy and broader value system which may contribute to the sustainability of UII-related practices. This philosophy is operationalized in concrete actions, such as, for example, a recent initiative to transform a traditional campus into a fully-integrated, industry-driven training hub, serving as a powerful, real-world extension of the university's long-standing commitment to UII. As part of the initiative the university is recruiting industrial partners offering its core assets such as campus training venues and teaching buildings. It expects that companies will invest in "professional training equipment, production facilities, and consumables" and will dispatch "industry technical backbones and operations management teams to participate in project management." The plan is to "jointly formulate talent training programs, develop distinctive courses, and built training systems, fully integrating industry standards, production processes, and technical specifications into the teaching and training process" serving simultaneously "full-time student teaching and practical training, employee training for partner enterprises, technical research and testing of enterprises, and skill enhancement for social personnel".[43] With the creation of this new campus LPUVT intends to design a venue for its pedagogical ideas. It is transforming its teaching methods to prioritize practical skills, with over 60% of courses being practice-based. By building a "school-in-factory" and "factory-in-school" model on-site, it creates an immersive environment where the boundary between learning and working dissolves.

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[40] See the university's relevant website here: https://www.lzpuvt.edu.cn/332/list.htm.

[41] Zhixing" [知行] translates to "knowledge and action."

[42] See the relevant website of the university here: https://www.lzpuvt.edu.cn/338/list.htm.

[43] See the website „*Announcement for the Public Recruitment of Cooperative Enterprises for the Joint Establishment of an Industry-Education Integration Internship and Training Base at Lanzhou Petrochemical Vocational and Technical University Baiyin Campus*" [兰州石化职业技术大学白银校区公开招募合作企业共建产教融合实习实训基地的公告] (https://www.lzpuvt.edu.cn/2026/0327/c394a124736/page.htm).

According to the information we received during our visit to LPUVT the university has developed a comprehensive UII model placing UII at the centre of its educational mission. Its approach is guided by the principles of serving regional economic development and supporting industrial transformation, particularly in strategic sectors related to petrochemicals, advanced manufacturing, and energy. To achieve this, it has established a coordinated school-enterprise cooperation system characterized by broad institutional participation, shared responsibility, and close alignment between educational activities and industrial needs. Through long-term partnerships with major enterprises such as PetroChina, Sinopec, Zhejiang Petrochemical, Xinfengming Group, and several large petrochemical industrial parks and development zones, the university has created a stable network of industry partners that contribute to skills-development, technological innovation, and regional economic growth.

A central component of LPUVT's model is the implementation of modern apprenticeship education. Together with enterprise partners, the university jointly recruits students, designs curricula, establishes practical training bases, and develops teaching teams. The institution implements a dual-mentor system in which students are guided by both academic and industry supervisors. School and enterprise partners have jointly developed professional and course standards, while more than 200 companies provide internship and employment opportunities. Apprenticeship programs have been established with major enterprises such as Hengli Petrochemical or Zhenhai Petrochemical Construction, creating pathways that integrate recruitment, training, and employment while ensuring that enterprises actively participate in the educational process.

The university also places strong emphasis on the development of dual-qualified teachers. In cooperation with enterprises, it has established teacher practice bases that allow academic staff to undertake industrial placements, workplace observation, professional certification training, and specialized professional development activities. We were told that about ten teachers spend a longer (2-3 years) period in companies and all other teachers spend shorter periods (2-3 weeks, typically during summer and winter holidays). Through these mechanisms, teachers continuously update their technical knowledge and industrial experience, while integrating current production practices and emerging digital technologies into teaching. This ensures that educational content remains aligned with technological developments in industry and strengthens the practical relevance of instruction.

Beyond degree education, the university actively fulfils a broader social mission by providing continuing education and workforce development services. It offers induction training for new employees, skills upgrading programs, and preparation for vocational skills competitions. These activities support regional economic development and contribute directly to the enhancement of workforce capabilities across the industries served by the university.

LPUVT's industry engagement also extends to applied research and technological innovation. Together with enterprises, it has established joint research teams, collaborative innovation centres, and technology development platforms. A notable example is the Gansu Chemical Industry Research Institute, jointly created with Lanzhou Petrochemical Company and more than fifty chemical enterprises. The institute seeks to integrate technology development, pilot-scale testing, and industrial services into a unified innovation ecosystem that supports both enterprise modernization and regional industrial development.

In line with recent national vocational education reforms, the university plays a leading role in building broader industry-education integration platforms. It leads both the Lanzhou New Area Industry–Education Alliance and the National Green Chemical and Advanced Polymer Materials Industry–Education Community. These structures bring together nearly 200 enterprises, industry associations, and research institutions and provide a framework for activities such as enterprise placements for teachers, apprenticeship programs, industrial colleges, and collaborative reporting on industrial development. Through these alliances and communities, the university seeks to overcome institutional barriers and create sustainable mechanisms for long-term cooperation between education, industry, and research.

Another important element of the university's strategy is the establishment of six industrial colleges in partnership with leading enterprises and industrial parks, including Xinfengming Group and the Ningdong Energy Chemical Base. These colleges operate through shared facilities, joint investment, and resource sharing arrangements. They support student training, faculty development, competition preparation, and equipment upgrading, while promoting the integration of industrial chains, educational chains, and innovation chains. In doing so, they provide an institutional framework through which educational programs can respond directly to industrial development needs while simultaneously contributing to technological innovation and regional modernization.

Some posters displayed in the university building, such as those shown in *Figure 5*, provide additional insight into LPUVT's approach to university-industry integration. The poster on the left presents the university's Open Regional Industry-Education Integration Practice Centre [开放型区域产教融合实践中心], which is depicted as a shared platform [共享] connecting education, industry, and society. The centre integrates three major functions: student practical training, social training, and technical services. Student-oriented activities include vocational school student internships, undergraduate student internships, and graduate employment-related placements. The social training component provides vocational skills training and enterprise employee training, while the technical service component offers product testing, process improvement, and technology development services for industrial partners. The poster emphasizes the idea that educational resources should serve not only students but also enterprises and the wider regional economy.

Figure 5.
LPUVT's UII approaches

Source: photos taken by the authors

The poster on the right presents concrete industry–education integration cases [产教融合案例] implemented through the centre. It highlights two main categories of activities. The first consists of vocational training projects [职业培训项目], demonstrating the university's role in providing workforce development and skills-upgrading programs for enterprises and other organizations. The second consists of technical service projects [技术服务项目], illustrating cooperation with companies through consulting, applied research, technical problem-solving, and technology support activities. The two posters together portray the practice centre as a multifunctional interface between education and industry, combining talent cultivation, workforce development, and technical support within a single institutional framework. Rather than focusing exclusively on student education, the centre operates as a regional platform through which the university contributes simultaneously to skills formation, enterprise development, and regional economic modernization.

The photos on *Figure 6* present one of the practical training centres we visited at LPUVT's. The image in the centre shows a digital model of a process-simulation platform designed to replicate an industrial chemical production environment. This "miniaturized" (1:30) industrial installation reproduces the key elements of a real petrochemical production system and enables students to practise the operation, monitoring, and control of complex production processes in a safe but highly realistic setting. The photographs on the right show students working in the training facility, where they engage in hands-on exercises based on simulated real-world industrial scenarios, including process optimization, equipment operation, and emergency-

response situations. This training centre is not simply a laboratory; it is an institutional device through which industrial practice is translated into educational practice.

Figure 6.
LPUVT's training base for coal-chemical industry

Source: photos taken by the authors

The pedagogical approach employed in this training centre differs significantly from traditional classroom-based instruction. We could observe a teacher guiding the work of the students shown in the photo, asking him about his pedagogical approach. This confirmed that students learn through participation in realistic production scenarios that closely resemble those encountered in real industrial workplaces. The training environment supports experiential, problem-based, and scenario-based learning by requiring students to analyse process data, make operational decisions, cooperate in teams, and respond to unexpected events. Knowledge from chemistry, engineering, automation, safety management, and production organization is therefore applied in an integrated manner rather than being learned as separate subjects.

University-industry integration plays a crucial role in enabling this pedagogy. The simulated production system, the operational procedures used during training, and many of the practical tasks are derived from actual industrial practice and developed in cooperation with enterprise partners. As a result, students are exposed not only to technical knowledge but also to the norms, routines, and problem-solving practices of the workplace. In this sense, UII does not merely provide equipment or internship opportunities; it helps create an authentic learning environment in which industrial logic becomes embedded in the educational process itself. This illustrates how UII can act as a catalyst for pedagogical transformation by moving learning closer to real production contexts and by strengthening the connection between theoretical knowledge and professional practice.

Taken together what we could see at LPUVT shows that the UII practice at this university extends far beyond traditional internship arrangements or enterprise partnerships. LPUVT has developed a comprehensive ecosystem that combines apprenticeship education, dual-qualified teachers, industrial colleges, applied research, workforce development, innovation platforms, and regional governance structures into a coherent model of skills-oriented higher education. The result is a highly institutionalized form of industry-education integration in which talent cultivation, technological development, and regional economic development are pursued simultaneously through close and sustained cooperation between the university and industry.

Similarly to Xinjiang, our visit to Gansu allowed us to explore the UII-related practices of not only technical-vocational colleges (applied universities) but also traditional, research-oriented universities, such as *Lanzhou University* [兰州大学] (LZU) which is a well known, leading

national comprehensive research university and *Lanzhou University of Technology* [兰州理工大学] (LUT) described as an institution „jointly established by the Gansu Provincial People's Government, the Ministry of Education, and the State Administration of Science, Technology and Industry for National Defence („„) building a high-level university".[44]

LUT is one of those Chinese universities which can be characterised as having UII "in their DNA". Its roots lie in the industrialization period of the PRC: it was established to support the development of industrial sectors such as heavy industry, metallurgy, machinery, industrial equipment manufacturing and energy. A key feature of LUT's UII model is its close alignment with regional industry, links with it were built into the institution long before the term UII [产教融合] became fashionable.

LUT has a substantial applied-research profile having several engineering research centres, key laboratories and industry-linked research platforms based on direct cooperation with manufacturing firms, energy enterprises, equipment producers and provincial industrial actors. This creates opportunities for student participation in applied projects, industry-informed thesis topics, and project-based teaching connected with real-life industry problems. While LPUVT shows UII in its most production-oriented form and Xinjiang University's School of Distinguished Engineers shows UII in a research-intensive setting LUT sits between these two poles, revealing how industry participation reshapes curriculum, teaching methods, faculty roles, and engineering identity formation. It is also important to mention that LUT is committed to be involved in international engineering accreditation processes and meet international engineering-education standards. This is important because this kind of engineering accreditation encourages outcome-based education, project work, the development of practical competencies and industry relevance, that is, it enhances educational-reform mechanisms.

Like many Chinese engineering universities, LUT has participated in the national Modern Industry College movement, promoting enterprise participation in curriculum design, practical training, industry experts' teaching, project-based learning and collaborative innovation. LUT has one industry college, specialised in microelectronics, which has officially been recognised by the national authorities as Modern Industry College. The Microelectronics Modern Industry College [微电子现代产业学院] (MMIC) was established in 2025 as a "major initiative by the university to respond to the national integrated circuit industry strategy and serve the economic development of the western region". [45]

LUT's MMIC operates as a laboratory for pedagogical reform based on strong UII practices. The College „has appointed more than 30 corporate mentors, and technical experts from leading companies such as Huatian Technology, who are deeply involved in teaching and research, forming a unique advantage of 'dual teachers' collaborative education between schools and enterprises".[46] Being equipped with advanced process simulation software, packaging and testing equipment, it allows students to participate in the entire process of chip design, packaging, and verification. As a media news presenting the learning experiences of one of the first graduates of MMIC described: "unlike previous years [the student], designed his graduation project as a 'real enterprise exam.' Over the past six months, his learning

[44] See the related Baidu article here: https://baike.baidu.com/item/%E5%85%B0%E5%B7%9E%E7%90%86%E5%B7%A5%E5%A4%A7%E5%AD%A6/381933.
[45] See the College's website here: https://weidianzi.lut.edu.cn/xygk/xyjj.htm.
[46] Ibid.

environment has often shifted between campus laboratories and integrated circuit company workshops, learning about frontline production technical needs with company mentors".[47] The same media news also quoted a teachers saying that "we are actively exploring development paths under the new system, striving to form replicable and scalable new experiences in areas such as industry-education integration, science and education convergence, and organized scientific research".

Our conversation with the MMIC's dean and other LUT teachers we received confirmation that UII in the less developed areas of North-West China, such as Gansu, faces special challenges due to the limited role of the private sector. As one university leader we interviewed mentioned: „compared to private enterprises in Shenzhen and Chengdu, which are more willing to develop projects, western regions are dominated by large state-owned enterprises with limited capacity to break down projects into smaller, more manageable parts. This makes challenge-based teaching extremely difficult. Secondly, the large number of undergraduate students makes it difficult to maintain sustained investment from companies. Under these circumstances, it's very challenging to use industry-education integration to promote innovative teaching methods."

A deeper understanding of China's UII practices can be supported by exploring the modalities of these practices in various sectors. From this respect the case of *Gansu Agricultural University* [甘肃农业大学] (GAU) is particularly interesting since the meaning of UII in the agricultural sector is quite different from what we see in the classical industrial or in the service sectors. The nature of the ecosystem in which this university is embedded is significantly different from what we could see in the case of LPUVT and LUT. While these latter institutions interact mostly with manufacturing and technology companies and focus mostly on skills needed in classical production processes or in systems using advanced technology agricultural universities interact more intensively with farms and rural communities, and are often engaged in activities such as rural revitalisation, environment protection and community development or poverty alleviation. This implies that UII in this sector is strongly connected to societal development goals. The role of universities here is not merely to produce graduates but also to train farmers, provide consulting and support local development.

This can be illustrated well by a photo we took at GAU presenting a poster exhibited in its campus museum (see *Figure 7*). The text on the poster says "the university has established a practical teaching system that organically integrates four levels: basic practice, professional practice, comprehensive practice, and innovation and entrepreneurship practice. The system connects on-campus and off-campus learning environments. It has also created a student innovation platform centred on undergraduate research training programs, supplemented by professional skills competitions and social-practice activities, achieving seamless integration between the first classroom (formal curriculum) and the second classroom (co-curricular and experiential learning)."

Figure 7.
Practical education at GAU

[47] See the website „*Lanzhou University of Technology: Breaking Disciplinary Barriers and Directly Addressing Industry Demands*" [兰州理工大学：打破学科壁垒 直面产业需求] (http://jyt.gansu.gov.cn/jyt/c070702/202602/174280596.shtml).

Source: photos taken by the authors

The photos on the poster present different dimensions of GAU's practical teaching model. The upper right photo shows field-based agricultural learning where students participate in agricultural fieldwork and rural practice. The banner the students hold means „cultivating knowledge through study and agricultural labour", reflecting a long Chinese educational tradition that has been revived by the recent UII policy. The photo in the middle left is illustrating students' field practice or agricultural internship and on the one in the middle right we see students learning inside a greenhouse production environment. The lower left picture shows students participating at machinery training in a workshop environment, and on the right picture we see them visiting (or working in) a processing facility.

These pictures suggest that GAU does not treat internships as isolated activities, but applies a comprehensive practical-teaching system that combines basic, professional, comprehensive, and innovation-oriented forms of practice across both campus and external environments. Students are learning in fields, greenhouses, workshops, and agricultural processing facilities, connecting academic learning with real production systems. This shows that the integration of education with external economic and social environments at GAU is not merely an organizational arrangement but an integral pedagogical principle.

In the case of agricultural education the meaning of the "industry" component of UII is typically broader than in classical engineering or technology fields: it includes such areas as primary production, processing, logistics, rural tourism, e-commerce and environmental management. Workplace learning in GAU often occurs in farms, demonstration fields, livestock facilities and rural communities. As we were told, GAU students spend a large proportion of their study time in production practice, farm projects, field experiments and other extension activities. This kind of experiential learning is different from what we can see in classical engineering or technology colleges.

Rapid technological changes influence UII also in the agricultural sector. As one GAU teacher mentioned: "we need to go to the fields and bring the latest knowledge into the classroom, especially through project-based learning, integrating research knowledge with teaching. In seed-related fields, the equipment is very modern, and our research incorporates this latest knowledge into the classroom". The involvement of practitioners in teaching is different in GAU that in the other universities we visited. As one teacher described: co-teaching is "rare in the classroom. It's rare for two teachers to be present at the same time. But in practical situations, both teachers need to be present. For example, if a farmer needs certain machinery, the farmer must be there. It's in the form of on-site teaching and seminars."

GAU is involved in several industry-education integration communities, in most of the cases playing a leading role (see *Box 1*). As we were told, the "Northwest Cold and Arid Region Modern Agriculture Industry-Education Integration Community" has the strongest influence on their teaching practice. This collaborative platform was established under the guidance of the Gansu Provincial Department of Education in 2023 with the function of addressing critical challenges in talent development and technological innovation for modern agriculture in North-West China's specific cold and arid environment.[48]

Box 1.
Industry-education integration communities involving GAU (including the most important partner organisations)

1. National Modern Seed Industry Technology Industry-Education Integration Community (Dunhuang Seed Industry, Gansu Agricultural University, Jiuquan Vocational and Technical College)
2. Northwest Cold and Arid Region Modern Agriculture Industry-Education Integration Community (Gansu State Farms Agricultural Reclamation Group Co., Ltd., Gansu Agricultural University, Gansu Agricultural Vocational and Technical College)
3. National 5G Digital Intelligence Empowered Agriculture Industry-Education Integration Community (China Mobile Communications Group Gansu Co., Ltd., Gansu Agricultural University, Lanzhou Modern Vocational College)
4. Gansu Modern Animal Husbandry Industry-Education Integration Community (Gansu Qianjin Animal Husbandry Technology Co., Ltd., Gansu Agricultural University, Gansu Animal Husbandry Engineering Vocational and Technical College)

[48] See the website „*The founding conference of the Modern Agricultural Industry-Education Integration Community in the Northwest Cold and Arid Region was held at Gansu Agricultural Vocational and Technical College*" [西北寒旱区域现代农业产教融合共同体成立大会在甘肃农业职业技术学院举行] here: https://www.163.com/dy/article/IHQSMPQU0514R9NP.html.

5. Modern Food Industry-Education Integration Community (Gansu Red Sun Flour Group Co., Ltd., Gansu Agricultural University, Gansu Animal Husbandry Engineering Vocational and Technical College)
6. Modern Silk Road Cold and Arid Agriculture Mechanization Industry-Education Integration Community (Gansu Mechanical Science Research Institute Co., Ltd., Gansu Agricultural University, Gansu Animal Husbandry Engineering Vocational and Technical College)
7. China Lanzhou Beef Noodle Industry-Education Integration Community (Gansu Jinweide Noodle Culture Industry Group, Gansu Agricultural University, Lanzhou Modern Vocational College)
8. Gansu Artificial Intelligence Industry-Education Integration Community (Northwest Normal University, Lanzhou Resources & Environment Vocational and Technical University, Silk Road Information Port Co., Ltd.)
9. National Artificial Intelligence Safety (Digital Security) Industry-Education Integration Community (Xi'an 360 Technology Co., Ltd., Lanzhou University, Jiuquan Vocational and Technical College)

Source: GAU

In general, it can be stated that UII in GAU is rather different form the general pattern and its impact on pedagogy is less direct that in other universities. In our conversation with GAU's leaders and teachers we got the impression that – although in the exhibition hall presenting the history of the university a whole section was devoted to the implementation of the policy of reforming undergraduate education launched by the Ministry of education in 2018 and the so called "Four Returns" [四个回归 - *sì gè huíguī*)] (Chen, 2018; MoE, 2018) – research receives in general higher level attention than teaching. We also noticed a lower level transformative impact of UII on teaching. This has been confirmed by a recent publication by one of GAU's teachers criticizing the university's "traditional teaching methods" involving students in simple routine tasks. The author proposes that students should be more involved in advanced activities such as solving production problems, processing agricultural products, participating in projects and using virtual simulation platforms (Zhang, 2025).

As mentioned earlier, one of the specific focuses of our third case study has been to explore the skills-development oriented UII practices of elite research universities (see also our previous analysis on Xinjiang University). A particularly good illustrative example is Lanzhou University [兰州大学] (LZU). During our stay in Gansu we could visit twice this particularly high status institution which is not only one of the 147 universities participating in the "Double First-Class" program but it was also among the 39 universities of "Project 985" (launched in 1999) and among the 115 universities of the "Project 211" (launched in 1995).[49] This is one of China's the "top universities" in in terms of contributions to academic publications in high rank international journals, ranking the 26th among all Chinese universities in number of citations per paper from 2008 to 2017.[50] It is worth mentioning that two researchers of the Institute of Higher Education, Lanzhou University recently published a paper on the specific features of UII in Double-First Class universities, making it clear that – against some assumptions – China's UII policies are not restricted to the vocationally oriented or applied sector of higher education but are highly relevant also for elite research universities and UII must be a core component of the operation of these institutions (Geng & Zhang, 2025). As they wrote: "Double

[49] These well-known programs have been aimed to create world-class universities in China.
[50] Source: Wikipedia.

first-class construction universities are responsible for all functions of the integration of industry and education". The authors argue that UII in research universities is still underdeveloped and research universities should not merely transfer technology but they should become integrated platforms that simultaneously perform education, research, innovation, entrepreneurship and industrial development.

We had the opportunity to interact with leaders, teachers and students at LZU and also with colleagues at its higher education research centre (see *Figure 8*), and collect sufficient information about how UII is transforming the institution's daily operations.

Figure 8.
Meeting with LZU leaders and teachers at LZU's Institute of Higher Education Research

Source: photo taken by the authors

LZU's broad third mission strategy and practice can be known, among others, from a document issued by the Ministry of Education in 2025 presenting it as a model of connecting high level scientific activities with national and regional economic priorities and transforming, accordingly, talent development (MoE, 2025). A key element of this process is the creation of integrated study programs (major) breaking disciplinary silos and focusing on key social-economic challenges. According to an interview with the student recruitment officer of LZU (XNA, 2026), the university launched 17 "interdisciplinary innovation classes" (see *Table 2*).[51] The university is also creating "micro-majors" offered to all students to enhance the alignment between disciplines and economic and social development.

Table 2
The "Interdisciplinary Innovation Classes" of Lanzhou University

	Discipline	**Innovation Class**
1	Information and Computing Science	Advanced Computing Innovation Class
2	New Energy Materials and Devices	New-Type Power Systems Innovation Class
3	Physics	Quantum Technology Innovation Class

[51] For a detailed, illustrated presentation of the new integrated specialisation classes see the website „*Lanzhou University's first interdisciplinary innovation class officially launched, enrolling a total of 625 students*" [兰州大学首届跨学科创新班正式启动 共招生 625 人] (https://www.lzu.edu.cn/dxrh/info/1091/2913.htm).
"

4	Microelectronics Science and Engineering	Integrated Circuit Design and Application Innovation Class
5	Biotechnology	Biological Breeding Innovation Class
6	Ecology	Ecological Informatics Innovation Class
7	Applied Meteorology	Smart Meteorology Innovation Class
8	Geology	Digital Earth Innovation Class
9	Civil Engineering	Smart Civil Engineering Innovation Class
10	Preventive Medicine	Smart Health Innovation Class
11	Drama, Film and Television Literature	Digital Humanities and Cultural Creativity Innovation Class
12	Journalism	International Communication Innovation Class
13	Cultural Heritage and Museology	Cultural Heritage Conservation Innovation Class
14	Finance	Digital and Smart Finance Innovation Class
15	Business Administration	AI and Smart Management Innovation Class
16	English	International Organization Innovation
17	Law	Foreign-Related Rule of Law Innovation Class

LZU's endeavour to promote UII can be particularly well illustrated by the establishment of 37 "school-enterprise joint courses" (MoE, 2025). These courses are designed to bring practical, real-world expertise and technology standards directly into the classroom, bridging the gap between theoretical learning and industry demands by introducing the technologies, standards, processes, and rules commonly used in industry into the university curriculum.

According to what we were told by some leading teachers, an increasing number of students at LZU are enrolled in professional MA/MSc programs [专业学位硕士] which significantly differ from classical academic MA/MSc programs [学术学位硕士] (see *Table 3*). These professional master's degree programs create an institutionalized pathway through which enterprises can influence the design and delivery of teaching, practical projects can enter curricula, industry experts (e.g. engineers) can participate in supervision and applied problem-solving becomes a central educational objective. Professional programs are offered not only at masters but also at PhD level and enrolment to these programs increases also at this level. Teachers are teaching simultaneously in both academic and professional programs and – as they expressed in some interviews – they find similar professional enjoyment in this. When we were asking a teacher about which one she would choose to teach the answer was 50%-50%.

Table 3

The comparison of academic and professional programs

	Academic Master's	**Professional Master's**
Nature of practice	Laboratory research	Enterprise projects
Supervision	Academic supervisor	University + enterprise supervisor
Basis of graduation assessment	Scholarly thesis	Engineering solution
Focus of outcomes	Publication emphasis	Industrial application emphasis
Expected career after graduation	Future PhD	Future engineer

LZU has implemented several skills-development oriented UII practices aimed at enhancing employability. These practices focus on developing student skills through internship

placements, practice base construction, and curriculum reform (including collaborative curriculum design or specialized training modules co-developed by the university and companies) aligned with industry needs. One example is the Professional Internship & Training Base established by LZU's School of Foreign Languages and Literatures in partnership with a translation company with the aim of "reforming curriculum design and innovating teaching models to cultivate well-rounded, application-oriented translation professionals equipped with strong linguistic and cultural competence, technological literacy, and intercultural communication skills". The partners jointly established „a professional internship and training base to offer stable, high-quality internship positions and workplace experience for students".[52]

Another very recent example is LZU joining a national initiative called "*National Pilot for Professional and Standardization Education Integration*" in partnership with China Municipal Engineering Northwest Design and Research Institute Co., Ltd. In the framework of this initiative LZU's School of Earth and Environmental Sciences develops a micro-specialization in "Smart City Energy Management and Standardization", with course content covering energy management, fluid transmission and distribution, geographic information systems, fundamentals of standardization, and artificial intelligence. This program aims at developing "high-quality, versatile professionals capable of applying standardization methods to solve complex problems in the field of smart city energy management, thereby contributing Lanzhou University's wisdom and strength to the national standardization strategy and high-quality regional development."[53]

A further, earlier example from 2022 is an agreement between LZU and Gansu Hanju Pharmaceutical Co., Ltd. to create a "practical internship and employment base".[54] The purpose of the base is to provide students with structured, hands-on learning opportunities. This agreement represents a formal mechanism to bridge classroom learning with workplace application. It is not focused on joint research or technology transfer but on cultivating student competencies, enhancing employability, and aligning educational outcomes with industry requirements.

Similarly to other research oriented universities UII is often realised at LZU in activities combining research and talent development. It is typical that teachers and students are involved together in various "horizontal" research projects[55] where the common activity serves not only research or practical problem-solving but also the development of students' knowledge and skills. Students typically become involved in horizontal, industry-funded research projects through their role as research assistants in a professor's laboratory or research group. The professor, acting as the principal investigator, assigns specific, problem-oriented tasks to

[52] See the website „*School Leaders Visit Oulang International Translation Company for Enterprise Engagement*" here: https://wyyen.lzu.edu.cn/newsevents/2026/0114/327477.html.
[53] See the website „*Lanzhou University Successfully Selected as One of the First Batch of National Pilots for the Integration of Professional and Standardization Education*" here: https://geoscience.lzu.edu.cn/info/1103/8077.htm.
[54] See the website „*Specialized, Refined, Distinctive, and Innovative: Good News! Lanzhou University and Specialized and Innovative Chemical Industry Incubation Base Enterprises Jointly Build a "Practical Internship and Employment Base*" [专精特新：喜讯！兰州大学与专精特新化工产业孵化基地入驻企业共建"实践实习就业基地"] here: http://www.lzxqsh.com/col_fhpt/202604/61E8F0CB1CB2C105DF3101708DB61707.htm.
[55] Horizontal projects (applied research/industry collaboration) focusing on solving specific technical problems, technology transfer, and R&D services (e.g., product development, consulting) are funded by enterprises, companies, or local governments. Vertical projects (basic research), focusing on theoretical research, basic science, and tackling key national challenges, are typically funded by government agencies (e.g., National Natural Science Foundation, Ministry of Education).

graduate and advanced undergraduate students, who then work directly on real-world challenges posed by the funding company, such as optimizing a manufacturing process, validating a new material's properties, or developing a software prototype under commercial constraints.

This hands-on engagement supports student development by bridging the gap between theoretical knowledge and industrial practice. Unlike vertical projects, which may focus on fundamental discovery, horizontal projects require students to adhere to industry standards, project timelines, and specific performance targets. Consequently, they gain crucial skills in project management, teamwork, technical reporting, and solution-oriented problem-solving. Furthermore, this direct exposure to corporate R&D environments enhances their employability, as they build a professional network and acquire practical competencies that are directly transferable to their future careers in industry. This is well illustrated by a media news about LZU's UII practices under this heading: "The results in the lab must be transformed into products on the production line":

> In recent years, Professor Peng Peng from the School of Materials and Energy has led a team in cooperation with Jiugang Group to overcome corrosion resistance technical challenges in hot-dip galvanized aluminum-magnesium sheet and strip, improving product performance to industry-leading levels and generating tens of millions of yuan in profits for the company. A master's student participating in the project frankly stated that by deeply engaging in the project's breakthroughs, they gained practical opportunities to directly face real industry problems, achieving the goal of 'problems coming from the industry, and results going to the industry'.[56]

What we could see at LZU is a good illustration of how an elite research university can move towards a "UII-friendly" mode of operation. This move, however, might require further explanation, and exploring institutional history might help us better understand this process. Textual and visual evidences at LZU's campus museum allows us to trace this history. On *Figure 9*, for example, we can see a photo showing the founding team of the university's Gansu Provincial Grassland Ecology Research Institute. At first glance, this photograph, taken in 1981, shortly after the launch of China's Reform and Opening period, appears to document a relatively modest institutional event: a small group of researchers standing in front of the preparatory office of a newly established research institute. But viewed from the perspective of the contemporary debates on UII, the image reveals a more significant phenomenon. The researchers on the photo are not very different from workers. They created the institute primarily not to advance a disciplinary field in isolation, but to address concrete regional challenges related to grassland management, ecological sustainability, livestock production, and agricultural development in the arid and semi-arid environments of North-West China. From its inception, the institute embodied a close connection between scientific research and societal needs.

Figure 9.
Photo of the founding team of the LZU's Gansu Provincial Grassland Ecology Research Institute, March 1981

[56] See the website „*Lanzhou University continues to advance educational and teaching reforms*" [兰州大学持续推进教育教学改革] (https://www.peopleapp.com/column/30050479825-500007135808). See also another communication about the teaching practice of professor Peng at the website „*Peng Peng's Industry-Academia-Research Secret: From Single-Point Breakthroughs to Chain-Driven Overall Action*" [彭鹏的产学研密码：从单点突破到链动全局] (https://news.sciencenet.cn/htmlnews/2025/6/546012.shtm).

Source: photo taken by the authors

This historical example is particularly relevant for understanding Lanzhou University's contemporary engagement with UII. The photograph suggests that although as an elite research university LZU differs considerably from applied universities and vocational institutions (whose UII activities are often centred on direct cooperation with manufacturing enterprises) it has always been active in connecting knowledge production with external developmental needs, This kind of dee embeddedness in local economy and society is not alien to the university's institutional identity. Long before the emergence of the current policy of industry-education integration, LZU was already establishing research organizations whose mission was to generate knowledge for the solution of regional ecological and economic problems. In this sense, contemporary forms of UII at LZU may be interpreted not as a radical departure from its historical mission but rather as an extension and rearticulation of a long-standing tradition of socially embedded research.

This continuity is also visible in the university's current strategic orientation. Today, LZU's UII-related activities are often linked to ecology, environmental protection, renewable energy, sustainable agriculture, climate adaptation, and regional innovation. Although this does not necessarily require conventional factory-based partnerships it requires continuous openness to its social-economic environment. The university's interdisciplinary innovation programs, collaborative research platforms, and partnerships with government agencies and external organizations reflect a model in which research, education, and regional development are increasingly intertwined. The founding of the Gansu Provincial Grassland Ecology Research Institute in the early 1980s thus provides a historical illustration of a broader institutional logic that continues to shape the university today: the belief that high-level scientific research should contribute directly to solving real-world problems. From this perspective, LZU's contemporary movement toward more UII-friendly forms of operation can be understood as building upon an existing institutional DNA rather than importing an entirely new organizational philosophy.

Shaanxi

Similarly to the two other provinces Shaanxi has a highly elaborated skills-strategy (SPG, 2019; 2025) which is guided by the national skills strategy titled "Skills Light Up the Future".[57] This strategy has a strong focus on company based training and encourages education institutions (including universities) to provide direct training services to companies. As the relevant policy documents states: training can be provided by all "capable training institutions from the whole society" including "universities, vocational schools, technical schools, public training bases, corporate training centres, and skill training institutions" (SPG, 2025). This is encouraging universities to compete for government-funded training contracts in critical areas like advanced manufacturing and digital skills, design curricula based on specific industry needs identified by the province's key industrial chains and align their training output directly with labour market shortages, creating a demand-driven ecosystem.

While the broader skills policy framework is highly relevant and has direct influence on UII, the kind of UII our research project aims to explore is focusing mostly on undergraduate and graduate education within universities and the reform of teaching and learning within universities is a key element in this. In fact, besides the strategy focusing on upgrading the skills of company workers Shaanxi is simultaneously pursuing a separate, robust track of higher education reform that directly addresses undergraduate and graduate education. The province has developed a comprehensive, multi-layered reform architecture that might fundamentally reshape how universities educate degree-seeking students through industry integration. However, so far this might have produced relatively modest results. This has been exposed very explicitly in paper published in 2025 by a middle level Xi'an university leader:

> "According to the survey, only about 30% of enterprises in Shaanxi Province are willing to actively participate in the process of vocational education talent cultivation. Most enterprises only provide certain support during the student internship stage, and participate less in key links such as curriculum development and talent cultivation plan formulation. There is a lack of effective communication and cooperation mechanisms between schools and enterprises, resulting in poor information exchange. Schools have insufficient understanding of the talent and technical needs of enterprises, resulting in a disconnect between professional settings and talent training programs and the actual needs of enterprises. Enterprises lack understanding of the teaching situation and student training quality of schools, and have a low willingness to participate in school teaching and talent development. At the same time, the cooperation between schools and enterprises often lacks long-term planning and stable cooperation models, mostly short-term and scattered cooperation, making it difficult to form a long-term collaborative education mechanism" (Liu. 2025).

To answer these challenges the provincial government has launched a number of initiatives. One of these was encouraging Shaanxi universities to participate in MoE's collaborative education project program which – as we stressed in the introduction section of this study – connects UII explicitly with pedagogical transformation. The official call for applications of the provincial ministry stressed that universities participating in the program should include these key elements in the application: (1) "Four New" construction projects[58], (2) teaching content and curriculum system reform projects, (3) teacher training projects, (4) practice

[57] See the website „*Ministry of Human Resources and Social Security Interprets the 'Notice on Implementing the 'Skills Light Up the Future' Training Action'*" [人社部解读《关于实施"技能照亮前程"培训行动的通知》] (https://news.cctv.cn/2025/03/26/ARTIRRJlJe2Jymmx8MiMNcYI250326.shtml).

[58] The „Four New" refers to the renewed disciplines of „New Engineering", „New Medicine", „New Agriculture" and „New Liberal Arts".

conditions and base construction projects, (5) innovation and entrepreneurship education projects (SPDoE, 2025).

Another interesting initiative has been the creation of a number of new integrated, problem-oriented study programs, similar to what we saw in Gansu (see *Table 2*). This has been described at a press conference as "small entry points (…) to drive a major transformation in talent cultivation models, promoting a systematic reconstruction of university education systems, achieving a profound shift from knowledge transmission as the main focus to ability cultivation as the priority".[59]

Perhaps the most important initiative has been a call for Shaanxi universities the establish Future Technology Colleges and Modern Industry Colleges. This is a good example showing how Shaanxi has been translating national UII priorities into regional higher-education policy. The relevant document issued by the Shaanxi Provincial Department of Education (SPDoE, 2022) created a provincial framework for the use of a key policy tool to promote UII through these new institutional forms aimed at cultivating interdisciplinary talent capable of contributing to frontier and disruptive technologies over a 10–15 year horizon and to align talent development directly with the needs of strategic emerging industries and regional economic transformation.

This initiative places strong emphasis on multi-stakeholder governance, stable enterprise participation, integrated education-research-industry cooperation, and long-term institutional sustainability. Particularly noteworthy is that universities applying for Modern Industry College status must demonstrate not only academic quality but also effective industry partnerships, internship systems, enterprise participation in teaching, graduate employability, and the existence of industry-research-service platforms. The document therefore illustrates how Shaanxi seeks to institutionalize UII simultaneously as an innovation strategy and as a mechanism for regional industrial modernization. In the broader context of the provincial innovation policy, these colleges can be interpreted as educational platforms linking the innovation chain, talent chain, and industrial chain within a common regional development framework.

As a key policy environment factor strongly determining the province's UII policies and practices, Shaanxi's innovation policy deserves special attention. In the early 2020s the provincial leaders identified the weakness of university-industry cooperation and the lack of effective knowledge/technology transfer mechanisms as one of the bottlenecks of further economic development and a major obstacle to move from capital investment driven to innovation led growth. While the province has a highly developed university system achieving outstanding academic performance, this has been perceived as too much detached form industry and contributing insufficiently to technological innovation in industry. Complaints about universities and research institutes producing large numbers of patents and scientific results, but only a small proportion reaching the market became frequent, as often expressed by the saying that scientific and technological achievements should move from "bookshelves" to "shop shelves".[60]

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[59] See the website „*Shaanxi is promoting the systematic restructuring of the university education system*" [陕西推动高校育人体系系统性重构] February 25, 2026. Shaanxi Daily. https://www.shx.chinanews.com.cn/news/2026/0225/109602.html. ‘

[60] See, for example, this article: „*Three Strategies to Transform Research Achievements from 'Bookshelf' to 'Shop Shelf*'" [三招让科研成果从"书架"到"货架"] (https://www.163.com/dy/article/JEC7POV90552UVG7.html).

The provincial authorities launched ambitious programs to promote university-industry knowledge/technology transfer with a special focus on ownership, disposal and revenue distribution rights (called „Three Reforms"). The relevant policy document (CPC – SPG, 2024), proposing a complex set of measures can be described as the general framework of Shaanxi's broad innovation policy. A particularly significant development has been the creation of Qinchuangyuan [秦创原], a province-wide innovation-driven development platform launched in 2021. The initiative aimed at building an integrated innovation ecosystem linking universities, research institutes, enterprises, financial actors, and government agencies. Building on Shaanxi's strong higher education and research base – including institutions such as Xi'an Jiaotong University, Northwestern Polytechnical University, and Xidian University – the initiative was seeking to overcome the long-recognized gap between scientific research capacity and industrial transformation. Through mechanisms such as technology-transfer platforms, joint university-enterprise research centres, entrepreneurship support programmes, and incentives for the commercialization of research results, Qinchuangyuan aims to convert academic knowledge into productive forces and regional economic development.[61]

From the perspective of university-industry integration, Qinchuangyuan is particularly noteworthy because it extends collaboration beyond individual projects or partnerships and attempts to embed universities within a broader regional innovation and talent-development system. In this sense, Qinchuangyuan can be interpreted as a territorial governance mechanism supporting the integration of education, innovation, industry, talent, and finance, reflecting national policy objectives associated with innovation-driven development and the reform of science and technology achievement transformation. As we shall see later in the section about Xi'an Jiaotong University, the Qinchuangyuan environment has significantly influenced the UII practices of research universities, creating particularly favourable conditions for research-driven forms of UII and for institutional arrangements embedding skills-development in research activities.

It is worth noting that Shaanxi's dynamic research and innovation policy might have had a paradox effect on skills-development oriented UII activities. The strong traditional academic culture together with a major military-industrial and engineering base (especially in the fields of aerospace, aviation, materials science and electronics) and the rapidly developing innovation economy has created a rather distinctive UII ecosystem with a strong focus on research and innovation that might have diverted attention from skills-development oriented forms of UII.

One of the universities we visited in Shaanxi is *Baoji University of Arts and Sciences* [宝鸡文理学院] (BUAS]. This public university in Baoji City, 160 km from the provincial capital, Xi'an, has been very active in the MoE's collaborative education project program. An advanced thinking about what later became the national UII paradigm appeared very early at this university. It is worth quoting a paragraph of a paper – published by a BUAS researcher four years before the adoption of the 2017 "Opinions" on deepening university-industry integration – anticipating many elements of the of the later paradigm, such as external partnerships, applied talent cultivation, ecosystem thinking, and the breaking down of institutional boundaries.

[61] See the website „*Notice from the Shaanxi Provincial Committee of the Communist Party of China and the Shaanxi Provincial People's Government on Issuing the "Three-Year Action Plan for the Construction of the Qin Chuangyuan Innovation-Driven Platform (2024–2026)"*" [中共陕西省委 陕西省人民政府关于印发《秦创原创新驱动平台建设三年行动计划（2024—2026 年）》的通知] (http://www.xibugroup.com/shownews.asp?id=2974).

> "Building an innovative nation not only urgently requires a large number of world-class academic innovation and engineering technology development talents, but also a large number of application-oriented talents serving scientific research and experimental technology, engineering technology implementation, and solving problems on the front lines of production. It also requires a large number of compound talents with both technical expertise and market acumen, possessing strong application capabilities. Such application-oriented compound talents cannot be cultivated through the traditional, independent education methods of universities; they must step outside the campus and be cultivated through university-enterprise, university-institute, and university-local government collaborations, participating in actual research and development and production practices in enterprises and research institutes, and in the practice of local economic development" (Yang, 2013).

BUAS submitted a high number of successful collaborative education project application to MoE: in the first batch of 2024 alone 18 BUAS collaborative education projects were approved. They were covering the key areas of faculty training, curriculum reform, practice base construction, and New Engineering disciplines. Partner companies included both national technology firms and local enterprises, demonstrating BUAS's ability to attract diverse industry partners.[62] In these project faculty training aimed at developing teachers' industry-relevant skills was the a major component and curriculum reform the second largest category. Target areas went beyond engineering, they included also teacher education and humanities.

BUAS is a good example to demonstrate how UII expands works beyond classical industrial and STEM areas into the field of humanities and social sciences and related industries. One of the modern industry colleges being established by this university is the Zhou-Qin Cultural Tourism Innovation Industry College. In this case the circle of external partners includes not only companies (from the hospitality businesses) but also public institutions (such as museums) and even government agencies. BUAS' leaders described the college as not only serving "deep industry-education integration" as well as becoming an "engine for Zhou-Qin cultural heritage and innovation," and a "thinktank for local development". [63]

It is important to stress, however, that none of BUAS' modern industry colleges were yet operational at the time of our visit. It seems that the creation of modern industry colleges started here that in other regions which might be a signal showing that building deep UII might be slower in Shaanxi than in other regions. This might be, paradoxically, connected to the fact that the province's strong innovation policy strengthens the focus of research-oriented university-industry cooperation and weakens the skills-development focus. When, for example, we were asking leaders about the development of modern industry colleges we were told that some of them have been conceived rather for research than for skills-development.

This is all the more surprising that in the institutional identity of BUAS there is an important component that could enhance stronger skills-development oriented UII involvement, similarly to what we saw at Lanzhou University. The university hosts a permanent exhibition presenting the history of the Northwest Industrial Cooperative Movement, which includes important

[62] See the page „*Eighteen projects were approved for the first batch of Ministry of Education industry-university cooperation collaborative education projects in 2024*" [18 个项目获批 2024 年第一批教育部产学合作协同育人项目] at BUAS' website (https://www.bjwlxy.cn/info/1107/34325.htm).

[63] See the page „*The university held the inauguration ceremony for the Zhouqin Cultural Tourism Sunac Industry College*" [学校举行周秦文旅融创产业学院成立仪式] (https://www.bjwlxy.edu.cn/info/1034/39075.htm).

episodes of combining education and work (see *Figure 10*) and bought to our attention to a new element of the historical roots of UII in China.

Figure 10.
The entrance of the permanent exhibition on the history of the Northwest Industrial Cooperative Movement at BUAS

Source: photo taken by the authors

In the UII context the Industrial Cooperative Movement (工合 - Gung Ho) exhibition hall at BUAS might be more than a local historical museum. It could represent a regional memory of a tradition in which education, technology, production, and social development were understood as inseparable. For a university that today promotes university-industry integration, this historical narrative could be potentially powerful.

Although the Gung Ho cannot be described as a direct predecessor of contemporary UII policies and practices it promoted forms of technical training, apprenticeship, productive labour, and work-study education that blurred the boundaries between learning and production. The movement articulated an educational philosophy emphasizing the integration of "hand and brain", providing an important historical antecedent to later Chinese efforts to connect education with the world of work. This spirit is present in BUAS' historical memory but apparently it did not generate in itself a strong incentive to pursue an active and practical institutional UII policy.

While UII has not yet reached a high level institutionalisation at BUAS (represented by the Modern Industry Colleges), the Gung Ho tradition is present in the daily work of the university. We heard stories about projects, connecting teachers from different disciplinary areas and bringing students to work on real life social-economic issues outside the university – such as promoting E-commerce of products or popularizing Shaanxi opera beyond the province – with the aim of developing their innovation and entrepreneurship competences.

Another institution visited in Shaanxi is the *Xi'an University of Science and Technology* [西安科技大学] (XUST) which seems to be a contrasting case. This university – similarly to LUT in Gansu – has strong industry roots, especially in the area of mining, safety engineering, emergency management, occupational safety and disaster prevention. It has intensive working relations with coal and energy enterprises as well as government regulators, its main industrial partners being large state-owned enterprises. One of XUST's strength is its research activity related to intelligent mining based on the use of AI, sensors, robotics, digital twins and automation. Its students often work on safety cases, special engineering designs and industrial

simulations illustrating the positive impact of UII on pedagogical transformation. UII at XUST is not only a mechanism for technology transfer but also a mechanism for reconstructing engineering education around real industrial systems and problems.

XUST is one of those universities that reacted quickly to the national level efforts to reform engineering education under the "Four New" initiative, playing an active role, similarly to Xinjiang University, in renewing teaching. This is evidenced, among others, by a paper published by six XUST teachers in 2020 about "intelligent mining talent cultivation" (Ding et al., 2020). This publication provides a concrete example of how XUST interprets "New Engineering" and how it translates it into curriculum reform, pedagogical transformation, and industry-linked talent cultivation. The authors criticise traditional programs designed for labour-intensive mining, whereas future mining requires intelligent systems and automation. They argue that intelligent-mining engineer cannot be produced through traditional classroom instruction, and industry knowledge, enterprise participation, practice bases, interdisciplinary teaching, and project-based learning should become integral parts of the educational process.

XUST reacted quickly and positively also to the call of the national and provincial governments to establish future technology colleges and modern industry colleges (MICs). In 2021, its Green Smart Mining Industry College was approved as one of the first batch of provincial model modern industry colleges and in 2023, its College of Carbon Neutrality Future Technology and College of Coal Mine Intelligent Industry were approved as provincial-level model future technology colleges and modern industry colleges.[64] It is worth quoting the words of the dean of the latter as it provides a good description of the way how XUST is using these colleges UII as a tool to combine research with teaching innovation:

> "Modern Industry College should adhere to the principles of 'frontier-oriented, interdisciplinary integration, integration of science and education, exploration and innovation, and leading demonstration', and explore a new model for talent cultivation for coal mine intelligence that integrates talent cultivation, scientific research, technological innovation, enterprise services, and student entrepreneurship and is promotable. [It] will offer micro-majors related to coal mine intelligence to cultivate talent, (…) connecting with enterprises through industry-education integration forums, enterprise research, and other methods. [It will] identify university-enterprise collaborative courses related to coal mine intelligence, jointly discuss and revise talent training programs, further refine the organizational structure of modern industry colleges, rely on the university's main coal mine laboratories to jointly build a coal mine intelligence practice platform, actively carry out organized scientific research, and achieve the development of mechatronics discipline clusters and professional clusters. Promote the intelligent development of national coal mines, make new and greater contributions to the university's construction of a 'first-class university and first-class discipline', and accelerate the development of a world-class university in energy and security."[65]

The creation of the modern industry college allowed XUST to implement the "school-enterprise dual-teacher on stage" model that "breaks the boundaries of traditional classrooms, and creates "an innovative practice of putting the school-enterprise collaboration educational philosophy

[64] See the page „*Cultivating Innovative Leading Talents: The university held a special seminar on new types of colleges*" [培养创新领军人才 学校召开新型学院专题研讨会] (https://jwc.xust.edu.cn/info/1009/5795.htm).
[65] See the website „*Xi'an University of Science and Technology held a seminar on the construction of a modern coal mine intelligent industry college*" [西安科技大学召开煤矿智能化现代产业学院建设研讨会] (https://dwgk.xust.edu.cn/info/1007/7631.htm).

into action".[66] The university has been restructuring its courses by integrating disciplines like mechanical engineering, electrical engineering and computer science to meet the demands of intelligent mines, building practical platforms using the university's key laboratories. An interesting key element of this transformation is the integration of bachelor and master level programs as explained in a report by the heads of XUST modern industry colleges "on the formulation of the innovative undergraduate and master's integrated program training program from aspects such as training objectives, curriculum system, and reform of integrated bachelor's and master's programs.".[67] For a more detailed analysis of the pedagogical model of the Coal Mine Intelligence Modern Industry College see *Box 2*.

Box 2.
XUST's Coal Mine Intelligence Modern Industry College as an institutional vehicle for pedagogical transformation

At Xi'an University of Science and Technology, the Coal Mine Intelligence Modern Industry College serves as an institutional vehicle for fundamentally reshaping how degree-seeking students are educated. The pedagogical reforms are driven by three interconnected mechanisms: program design restructuring, curriculum integration, and management innovation.

The 6-year integrated bachelor-master program represents a structural departure from traditional segmented degree pathways. By eliminating the administrative and curricular barriers between undergraduate and graduate education, the university creates a continuous learning trajectory that allows students to develop both theoretical depth and industry-relevant competencies without the disruption of separate admissions processes. This long-term perspective enables deeper industry immersion: students can spend extended periods on enterprise projects, participate in longitudinal research, and build sustained relationships with corporate mentors over six years rather than the fragmented exposure typical of traditional internships.

The phased tutoring system operationalizes university-industry integration at the individual student level. During the undergraduate phase, on-campus academic advisors provide foundational course guidance and academic planning. In the graduate phase, students enter a mutual selection process with research supervisors. This is complemented by external mentors from industry who participate in the entire talent cultivation process. The dual-teacher teaching model where an industry expert and a university professor co-teach a single course brings real-world engineering problems directly into the classroom. This is not a guest lecture but sustained co-instruction, requiring faculty to cede some control over curriculum delivery while ensuring that course content remains current with industry practice.

The dynamic "elimination mechanism"[68] creates accountability for both students and faculty. Combined with home-school communication and personalized guidance, this creates a high-expectation environment that pressures the institution to deliver

[66] See the website „*The first report meeting of the School of Mechanical Engineering on 'Scientific and Technological Achievements in the Classroom' and the Hundred-Thousand-Ten Thousand Project series of report meetings*" [机械工程学院"科技成果进课堂"首场报告会暨百千万工程系列报告会] (https://jxxy.xust.edu.cn/info/1057/8629.htm).

[67] See the website „*Xi'an University of Science and Technology held a special seminar on new colleges to promote the cultivation of top innovative talent*" [西安科技大学召开新型学院专题研讨会推进拔尖创新人才培养] (http://apply.crgkxl.com/bxzxinfo/R8015.htm).

[68] The term "elimination mechanism" (淘汰机制) refers to a systematic process of removing students from a program who fail to meet defined academic or performance standards. This is a competitive selection processes where weaker candidates are progressively filtered out, leaving only those who meet the highest standards.

effective teaching—students who do not progress are removed, incentivizing continuous pedagogical improvement.

The curriculum itself has been reformed to integrate AI and mining content, requiring students to master both traditional engineering fundamentals and emerging technologies like machine learning and signal detection. The explicit emphasis on "solving complex engineering problems" shifts assessment away from rote memorization toward project-based evaluation. Students must demonstrate four progressive competencies: identifying key technical issues, designing multiple solutions, conducting research through experimental design, and selecting appropriate modern tools for analysis.

Practical teaching is embedded as credit-bearing requirements rather than optional add-ons. Students visit enterprise production workshops, tour model worker studios, and participate in university-enterprise symposia as formal components of their education. The partnership with Tongchuan Coal Mining Machinery Co., for example, includes on-site teaching, production internships, and access to national model workers as informal educators.

In essence, XUST's Modern Industry College has moved beyond project-based collaboration toward systemic pedagogical reform achieved through structural integration (bachelor-master continuum), relational integration (dual-tutor and dual-teacher models), and curricular integration (AI infusion and complex problem-solving requirements). The elimination mechanism ensures continuous quality pressure, while the formal policy framework provides sustainability. This case suggests that effective UII-driven pedagogical reform requires institutional redesign, not just additional industry projects layered onto traditional academic structures.

Source. Various public documents and websites of XUST.

It is important to stress that modern industry colleges at XUST– similarly to BUAS – are not physical entities and they do not have a legal status. They function not as a separate institutions but rather as a networks or platforms, realising the pedagogical model presented in *Box 2* without being established as independent organisations. This is very different from what we saw in the southern regions of China where many MICs are legal and physical entities, with their own buildings, staff and enrolled students. Although the Coal Mine Intelligence Modern Industry College has a its own dean and its own industrial partners,[69] it does not have separate, independently enrolled students but operates by integrating its curriculum and training model into existing programs, offering "micro-major" courses [微专业] or "excellent classes" [卓越班] in physically and legally existing faculties, such as the integrated bachelor-master program mentioned in in *Box 2*).

It is also important the stress that XUST, which defines itself as a teaching and research university, has advanced industry laboratories and practical training places in its building complex, such as the “Comprehensive Lab and Training Centre for Coal-Related Programs” or the “Civil Engineering Experimental and Training Centre” (see *Figure 11*). The former is, in fact, a coal mine replication with all the equipment we can see in a real coal mine, and it is

[69] See the websites „*Xi'an University of Science and Technology held a meeting to promote the construction of a modern coal mine intelligent industry college*” [西安科技大学召开煤矿智能化现代产业学院建设推进会] (https://dwgk.xust.edu.cn/info/1007/7409.htm) and „*Xi'an University of Science and Technology held the unveiling ceremony for the provincial-level Future Technology College and the Coal Mine Intelligent Modern Industry College”* [西安科技大学举行省级未来技术学院、煤矿智能化现代产业学院揭牌仪式] (http://news.xust.edu.cn/info/1002/27030.htm).

operated together with a state owned company (China Coal Technology & Engineering Group Changzhou Research Institute Co., Ltd). The network of experimental laboratories, simulation facilities, innovation bases jointly operated university-enterprise training centres provide students with opportunities to engage in experimentation, simulation, engineering design, and problem-solving in environments closely aligned with contemporary industrial practice.

Figure 11.
Industry laboratories and practical training places at XUST

Source: photos taken by the authors

The fact that in Shaanxi MICs remain programmatic or virtual might be a signal of a rather conservative approach in deepening university-industry integration in this province. There seems to be a preference to realise UII within existing academic intuitional structures, without transferring strong organisational and financial control to companies, unlike to what we could see, for example, in Shenzhen. This reflects distinct regional innovation systems, historical legacies, and mechanisms of government. The fact that Shaanxi's Modern Industry Colleges remain predominantly programmatic or virtual reflects particular strategic UII model of that prioritizes curricular and pedagogical reform within existing institutional frameworks rather than structural reorganization or industry governance participation. This may indicate a more incremental and institutionally embedded approach compared to Shenzhen's systemic experimentation with new institutional forms and equity-based partnerships and it reflects a specific variation in industrial base, policy permissions, and historical starting points.

A further interesting UII model in Shaanxi is the one we found at *Shaanxi Xueqian Normal University* [陕西学前师范学] (SXSNU) which is a typical Chinese provincial educational university having teacher education as its main profile but developing into a comprehensive university offering programs in various disciplinary areas also for those who do not necessarily want to become teachers. While the other universities we visited are focusing mostly on areas like engineering, manufacturing, agriculture or energy and one of their mission is technology transfer in technological innovation ecosystems SXSNU represent an the educational-service model of UII where the "industry" is not manufacturing but the education sector itself. The university maintains specialized experimental centres in preschool education, psychology, information technology, food engineering, chemistry, and life sciences, complemented by a wide variety of professional training facilities, including Montessori classrooms, digital media laboratories, molecular biology laboratories, and smart teaching environments

Although the primary profile of SXSNU is teacher education, as mentioned, it is developing into a comprehensive university providing programs also in other areas. Furthermore this university seems to be particularly active in establishing modern industry colleges. At the time of our visit it was running five MICs, some of them not linked with the education sector (such as the "*Smart Finance, Taxation & Digital Economy Industry College*" or the "*Shaanxi Medicinal & Edible Biological Resources Development Industry College*". These MICs are built through collaborative partnerships with local governments and industry enterprises. Similarly to *XUST* they function as institutional agreements and curriculum arrangements, they

are housed within existing academic departments and do not appear to have independent legal status or dedicated physical campuses.

SXSNU provides an interesting case of a teacher education university developing institutionalised UII practices outside the education sector, expanding this beyond the institution's traditional teacher-education mission. We found evidence of substantial cooperation with actors from various non-educational sectors. SXSNU's School of Information Engineering, for example, has developed industry-linked programs in digital media technology, computer science, data science and big data technology, and electronic and computer engineering, explicitly presenting some of these as "industry-education integrated" majors. It has established partnerships with technology companies, organized enterprise-based practical training, participated in joint talent-development activities, and involved students in work-based learning in real business environments. We also encountered evidence of an industry college dedicated to the development of medicinal-and-edible biological resources, bringing together biotechnology, food-processing, dairy, and agricultural enterprises in activities ranging from internships and personnel training to product development and applied research. This makes SXSNU an interesting example of how the UII logic spreads beyond engineering and vocational institutions and is increasingly reshaping even teacher-training universities, broadening their regional-development role and diversifying their educational missions.

Among the universities we visited in North-West China perhaps the *Shaanxi Polytechnic University* [陕西工业职业技术大学] (SNPU) is the most directly and the most deeply connected with industry. This university grew out of the training activities of state companies producing textile products and machine-tools: when waking around the campus we still could see not only the old factory buildings and their products (old machine tools), but also the photos of some teachers who used to be factory workers 30-40 years ago. Today SNPU is a modern institution, in many respect similar to Shenzhen Polytechnic University (SPU) presented in our first case study, with intensive international and also research activity. Its upgrading and rapid transformation, similarly to SPU, has been supported by the Double High Plan.[70]

SNPU hosts several multifunctional training centres, created together with companies, which serve both undergraduate education and adult education and both SNPU's own students and students of other universities. One of these training centres is run together with the battery producer company CATL. This centre serves not only as a training place, but also as an exhibition hall presenting the company's history and its global activities and as a research centre where the company's engineers together with researchers from SNPU and other universities do research with advanced laboratory equipment. We could visit several such training centres walking round in SNPU's campus, observe student groups learning to use of advanced technologies, and also talk with some of their teachers. (see *Figure 12*). In one of the centres we could see an exhibition of award winning teaching material produced in cooperation by company and university staff, such as detailed presentations of teaching projects. This latter deserves special attention because what we saw are not "textbooks" (as often translated) but modular teacher handbooks [活页式教材] directly guiding the organisation of project-based teaching.

Figure 12.
Training centres at SNPU's campus

[70] See more about this in the chapter „The vocational education policy environment" in Halasz & Huang (2025a).

Source: photos taken by the authors

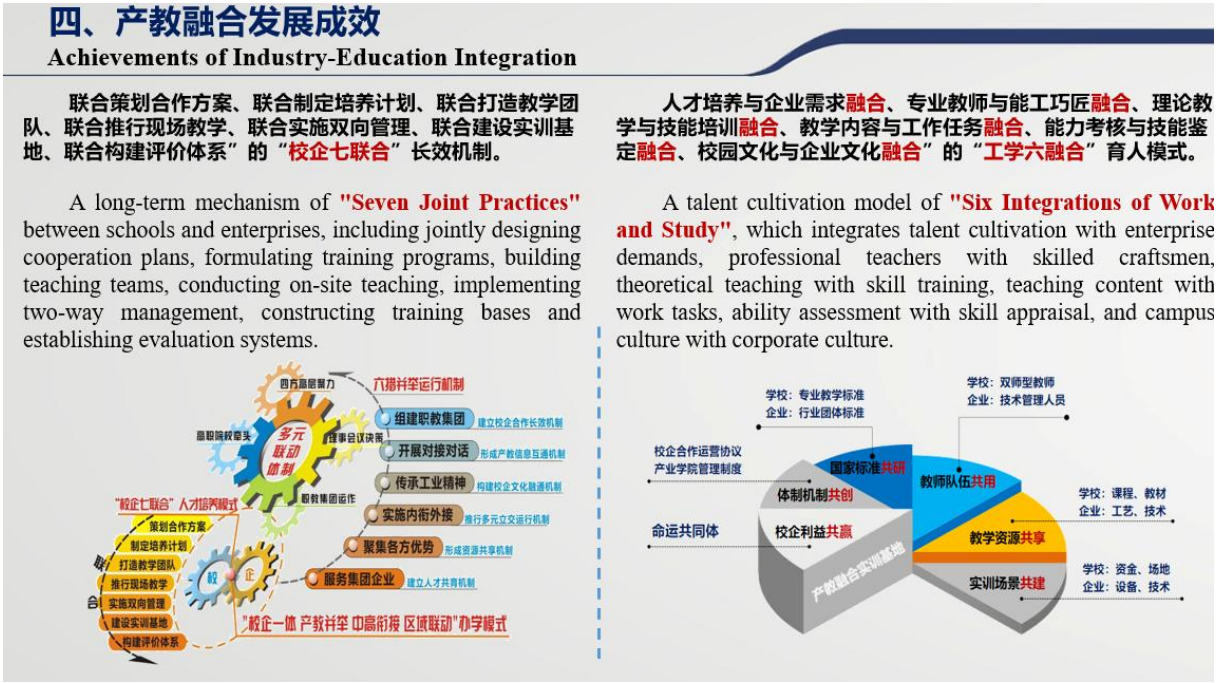
In one of the visited centres we could also see real production process as company workers were packaging of products to be sent out to clients. This has been a further genuine illustration of the "school in the factory, factory in the school" model often mentioned in the UII literature. The ubiquitous presence of various industrial companies in the campus is also illustrated by the fact that in one of the school building where students have lessons the walls of the corridor were decorated not by historic figures or political slogans but by posters presenting various companies.

SNPU is not only practicing UII but also cultivates high level theoretical reflection on it. The university has a research centre, named *Western Institute of Industry-Education Integration* which is not only supporting the implementation of UII-related activities but also does systematic research in this area (together with other research platforms, such as the Western Modern Vocational Education Research Institute and the Western Innovation and Entrepreneurship Research Institute).[71] Our conversations with the dean of this institute and the resources shared with is by him helped us significantly understand better not only the specificities of UII in SNPU but also the broader North-West China context and the role of city level policy integration of UII activities.

A *Figure 13* shows SNPU understands UII not simply as cooperation between schools and enterprises but as the creation of a complex an integrated ecosystem with has two main pillars. The first is – similarly to what we saw at SPU – co-acting with industry partners in every areas of designing and implementing education: this is what SNPU calls "*Seven Joint Practices*". Ther second is promoting integration in every strategic and operational organisational dimension: this is what SNPU describes as "*Six Integrations of Work and Study*" model. This latter component is especially remarkable because it goes beyond the area of teaching and involves all institutional layers.

Figure 13.
SNPU's "Seven Joint Practices" and "Six Integrations of Work and Study" model

[71] See the website „*Introduction to the Western Industry-Education Integration Research Institute*" [西部产教融合研究院简介] (http://xbcjrh.sxpi.edu.cn/yjygk/jj.htm).



Source: a presentation by the dean of SNPU's Western Institute of Industry-Education Integration

The "Six Integrations of Work and Study" [工学六融合] model that we saw first at SNPU deserves particular attention as it seems to represent a further step towards a systematic way to deepen UII. The model advocates the integration of (1) talent cultivation and enterprise needs, (2) professional teachers and skilled practitioners, (3) theoretical instruction and skills training, (4) teaching content and real work tasks, (5) academic assessment and occupational skill certification, and (6) campus culture and enterprise culture. This framework extends integration beyond curriculum design, internships, or school-enterprise partnerships. It seeks to align virtually all major dimensions of educational and related organisational processes – from governance and staffing to pedagogy, assessment, and organizational culture – with the realities of professional practice. In this sense, the model can be interpreted as an attempt to move towards an exceptionally high level of integration, where the traditional boundary between education and work is no longer merely bridged but systematically reconfigured.

Our understanding of the "Six Integrations of Work and Study" model was significantly enhanced by the presentation of the dean of SNPU's School of Electrical Engineering who shared the practical experiences of this school in implementing UII. He presented "six entries" where industry penetrates into the education process, in the following order:

(1) bringing corporate culture onto campus (企业文化进校园),
(2) introducing corporate operating models into teaching (企业模式进教学),
(3) embedding quality-oriented and professional development objectives into training plans (素质教育进方案),
(4) introducing corporate management practices into the classroom (企业管理进课堂),
(5) involving students in enterprise-related activities and organizational life (企业活动进班组), and
(6) bringing enterprise mentors into training bases and practical learning environments (企业导师进基地).

These concrete measures can be interpreted as the practical implementation of the broader Six Integrations framework. While the latter defines the strategic dimensions along which education

and work should be connected, the "six entries" specify the concrete mechanisms through which this integration is realized in everyday educational practice. Together, they illustrate an effort not only to align curricula with labour-market needs but also to integrate organizational culture, management practices, professional identities, and workplace norms into the learning experience, thereby creating a particularly deep form of industry-education integration. What we can see here is not only the university teaching students with the help of a company but *the university learning how to teach from the company*.

SNPU's particularly strong commitment to UII was illustrated also by the fact that the representatives of their partner companies were not only invited to participate in our conversations but one of them also presented as model for modernising teaching and learning at the university. SNPU's School of Electrical Engineering is involved in a long-term partnership with one of China's leading industrial automation companies, *Inovance Technology* (汇川技术). This cooperation goes much beyond simple resource-sharing and has become a platform directly contributing to the modernisation of teaching through UII at SNPU allowing the university to learn not only about technology but also about pedagogy form industry (see *Box 3*). The university here is explicitly treating industry not merely as a provider of equipment, projects, or internships, but as a source of pedagogical knowledge and educational capability demonstrating a clear example of "reverse knowledge transfer".

Box 3.
Learning pedagogy from industry: the cooperation between SNPU's School of Electrical Engineering and Inovance Technology

One of the most revealing examples encountered during our visit to Shaanxi Polytechnic University (SNPU) was the long-term partnership between the School of Electrical Engineering and Inovance Technology (汇川技术), one of China's leading industrial automation companies. While university–industry cooperation is often understood as a mechanism through which companies influence curriculum content or provide internships, this case illustrates a much deeper form of integration. Here, the university is not only learning new technologies from industry; it is also learning new ways of teaching.

The cooperation is built around a jointly developed talent cultivation system that integrates programme design, teaching materials, teacher development, practical training, applied research and enterprise services. Industrial projects are incorporated directly into the curriculum through what the partners call "industry project training cases" and an "industry virtual project pool". Rather than treating practical experience as a separate internship phase at the end of studies, real engineering projects are embedded into the teaching process from an early stage and continue through graduation projects and workplace learning. The logic of industrial project implementation – problem identification, system design, equipment assembly, programming, testing and commissioning –becomes simultaneously the logic of student learning.

A particularly significant feature of the partnership is the creation of mixed "teacher + engineer" teams. Enterprise engineers participate in teaching, curriculum development, textbook writing and student supervision, while university teachers receive specialised industrial training and professional certification from the company. This arrangement goes beyond the traditional model of inviting practitioners as guest lecturers. It creates a process through which academic staff become familiar with industrial ways of organising work, solving problems and developing professional competence. In effect, the company contributes not only

technological expertise but also pedagogical practices rooted in contemporary engineering work.

The partnership is supported by an open industry-education integration practice centre that functions simultaneously as a teaching facility, a technology development centre and a service platform for regional enterprises. Students, teachers and company engineers collaborate on real industrial challenges in areas such as automation control, industrial software development, robotics and intelligent manufacturing. As a result, the boundary between learning and working becomes increasingly blurred.

From the perspective of university-industry integration, the most important lesson of this case is that industry can influence not only what universities teach but also how they teach. The SNPU – Inovance partnership therefore provides an example of UII as a mechanism of pedagogical transformation. The university adopts elements of the company's own methods for developing engineers—project-based learning, workplace problem solving, team-based innovation and competency-oriented assessment, and translates them into formal educational practice. This suggests that contemporary Chinese UII may be understood not only as a strategy for improving employability or supporting industrial innovation, but also as a process through which higher education institutions learn new pedagogical models from the productive sectors with which they collaborate.

Source: a presentation by the school's dean

In this case the company functions as a kind of parallel educational institution participating in participating in building curriculum theory, designing teaching methods and enhancing faculty development (not only training students, but also training teachers). The company is here not simply an industrial organisation but increasingly resembles an educational organization embedded inside the industrial ecosystem which makes it possible for the university not merely to use company resources but learning educational practices from another educational actor. The Inovance–Shaanxi Polytechnic University partnership illustrates a particularly mature form of university–industry integration in which the flow of knowledge is bidirectional: industry contributes not only technologies and projects but also pedagogical models, teacher development mechanisms, curriculum design capabilities, and organizational learning processes, thereby becoming an active source of educational innovation rather than merely a destination for graduates.

A further university visited in Shaanxi is the *Xi'an International University* [西安外事学院] (XAIU), a private institution focusing mostly on undergraduate education both in liberal arts and various vocational areas, but offering also master level programs in engineering. XAIU, selected by the Ministry of Education as a "National Model University for Innovation and Entrepreneurship",[72] is in my respect is a unique case. It has not only developed advanced forms of UII but also illustrates the general innovative capacities of Chinese general higher education, and the role of private institution in promoting innovation.[73]

The institution has developed an original educational model called College + Academy" model, which is a distinctive, integrated system for student development that combines academic

[72] See the website „*A comprehensive understanding of the international Xi'an International Studies University*" [全面了解国际化的西安外事学院] (https://www.sxdaily.com.cn/2020-08/21/content_8658462.html).

[73] XAIU became a case taught at Harvard Business School to learn about private investment in higher education, exploring whether higher education be scaled and managed like a business enterprise (see Kirby et al. (2009). The university has a particularly interesting history presented in detail in Li at al., (2012)..

instruction with holistic personal cultivation, often strongly embedded in practical activities. This is XAIU's signature educational framework conceived by the founder and president of the university, professor Huang Teng, based on a dual-track system where the "College" (学院) focuses on professional knowledge and skills, while the "Academy" (书院) focuses on character development and comprehensive cultural literacy (素养). These are institutions combining dormitory services with teaching, learning and leisure facilities (see photos on *Figure 14*). This has been inspired, among others, by the traditional British college model offering both education and living environment. A major difference is that in XAIU model we can see a the deep integration of professional education and general education, and XAIU's colleges are integrated into the general university structure.

Figure 14.
Learning spaces at one of XAIU academies

Source: photos taken by the authors

A significant part of presidential responsibility at XAIU has already been transferred to the president/founder's son, his assistant, who is working on his PhD dissertation focusing on university-industry integration, under the supervision of leading contemporary educational thinker who is also the president of one of the most innovative Chinese universities. Our interview with him helped us getting a deep understanding of XAIU's UII philosophy and practice. Perhaps the most important element, highly relevant for our UII project, is that UII is seen here not only as a tool to make education better connected to industrial needs and not only as a modernisation tool but also as the (probably the most effective) way to make universities sustainable in the future.[74] For the young assistant president UII is not primarily a mechanism for improving employability or supporting industrial innovation; it is a strategy for reinventing the university's value proposition in an era when knowledge and credentials are no longer scarce.

[74] This resonates strongly with the approach of the authors of this case study presented in a recent manuscript submitted to publication (Halász & Huang, 2026b).

A key element of XAIU' UII model is what the assistant president described as "apprenticeship communities". As he formulated: "Our goal is not simply to prepare students for future work. It is to enable them to participate in meaningful value creation while they are still learning. By value creation, we do not mean routine labour. We mean the development of capabilities that accumulate over time and generate increasing returns through experience, expertise, and contribution". An emerging form of this is transforming projects into small real companies, producing marketable value. Project-based learning in off-campus settings has been build into XAIU's pedagogical portfolio several years ago[75] but recently this has been evolving into a radically new form as described in *Box 4*. According to our interview XAIU has already launched five "project-enterprises" serving student learning.

Box 4.

XAIU's new approach to off-campus project-based learning - apprenticeship communities: integrating enterprise organization and academic mentorship

One of the most innovative practices encountered during our visit to Xi'an International University (XAIU) was the development of what university leaders described as "Apprenticeship Communities". The initiative emerged from the university's dissatisfaction with conventional project-based learning. While student group projects can provide valuable learning experiences, they often remain disconnected from real economic and social value creation. Students complete assignments, receive grades, and move on, with limited exposure to authentic professional responsibilities.

In response, XAIU sought to create learning environments that more closely resemble real organizations. Rather than organizing students into temporary project teams, the university established communities in which students gradually assume responsibility, contribute to meaningful work, and learn from more experienced participants. The model combines two organizational logics. The first is drawn from enterprises, where people collaborate around real tasks, responsibilities, deadlines, clients, and value creation. The second is derived from academic research groups, where learning takes place through mentoring relationships, participation in authentic activities, and the gradual transfer of knowledge and responsibility from senior to junior members.

The resulting Apprenticeship Communities place faculty members in the role of mentors while students enter as apprentices and progressively take on more complex responsibilities. The objective is not simply to acquire knowledge but to participate in projects that generate value for external partners and clients. In some cases, these activities are conducted through legally established enterprises affiliated with the university, allowing projects to operate in genuine market environments while maintaining educational objectives. Students therefore do not merely simulate professional practice; they participate in authentic economic and social activities under appropriate supervision.

This approach also transforms the relationship between education and work. Instead of treating learning and employment as separate phases, XAIU seeks to integrate them. Learning occurs through participation, responsibility increases progressively, and students contribute according to their developing capabilities while continuously acquiring new skills and experiences. The model reflects the university's belief that,

[75] See, for example, the website „*Xi'an International Studies University: Effectively advancing the reform of practical teaching*" [西安外事学院：做好实践教学改革这篇大文章] (https://www.xaiu.edu.cn/info/1027/14281.htm).

in an era of rapid technological change and increasingly unpredictable career paths, the ability to learn through participation, collaboration, and value creation is becoming more important than mastery of any fixed body of knowledge.

Importantly, XAIU does not view apprenticeship as a return to historical forms of vocational training. Rather, it seeks to develop a contemporary form of apprenticeship that combines the strengths of universities, enterprises, and learning communities. The goal is to prepare students not only for their first job but for lifelong adaptation and contribution in a rapidly changing world. From the perspective of university–industry integration, the significance of the model lies in its attempt to blur the traditional boundary between education and productive activity, creating a learning environment in which students develop by participating in real-world value creation from the very beginning of their university studies.

Source: interview with XAIU's assistant president.

As mentioned earlier one of the focuses of our third case study has been to explore the specificities of UII practices at outstanding research universities. This was made possible, among others, by visiting Xi'an Jiatong University [西安交通大学] (XJTU) which has been not only part of is part of Project 211, Project 985, and the Double First-Class Construction but it is also a member of the C9 League of elite HEIs.[76]

At XJTU a particularly interesting example of the ecosystem-oriented evolution of UII could be observed: called "6352" collaborative talent cultivation model. Developed around the Western China Science and Technology Innovation Harbor, this model seeks to integrate education, technological innovation and talent development through a comprehensive ecosystem approach. According to a presentation made by a XJTU leader[77] the "6" refers to the integration of six key elements: government, industry, education, research, application and finance; the "3" to the establishment of three strategic educational platforms, including a Future Technology College, the Silk Road International College and a Modern Industry College; the "5" to the creation of five supporting ecosystems covering policy, finance, infrastructure, legal arrangements and services; and the "2" to technology trading and venture capital platforms supporting the commercialisation of research results. Particularly noteworthy is the enterprise-led governance model based on "dual management, dual chiefs, dual mentors and dual signings", through which companies participate not only in technology development but also in curriculum design, talent cultivation and educational governance. This model illustrates how Chinese UII is increasingly moving, especially in research universities, beyond conventional university-industry cooperation towards the construction of integrated innovation ecosystems in which education, research, industrial development and talent formation are pursued simultaneously.

One of the campuses we had the opportunity to observe is located at Xi'an's Western China Science and Technology Innovation Harbor mentioned above, which is part of the Qinchuangyuan also mentioned earlier. Here we could observe how the 6352 model works. We found highly intensive UII activities at XJTU's Institute of Electrical Science and Technology (IEST), operating 35 deep integration innovation platforms in cooperation with leading Chinese

[76] The C9 League is an alliance of Chinese universities with the highest ranking position in several raking systems.

[77] See the website „*Committee Member Lu Jianjun — Collaborative Cultivation of Industry-Education Integration*" [卢建军委员——产教融合协同育人] (https://sdcjrh.cn/index/index/newshow/id/629.html).
"

companies.[78] These platforms are typically laboratories (named joint research institutes, joint innovation centres, industrial technology research institutes or industrial innovation research centres) built by industry partners within IEST's building, equipped with advanced technological instruments, offices, classrooms and working areas (see the photos in *Figure 15*).

Figure 15.
Company operated laboratories of XJTU's Institute of Electrical Science and Technology

Source: photos taken by the authors

The typical form of education in these laboratories or research institute is project work under the common leadership of an industrial expert or engineer and a professor. The photos in *Figure 16* show the posters exposed in IEST's corridors, each of them presenting the details of research projects, including the names of participating students. The project description on the right side of the picture, for example, mentions the name of 1 PhD and 8 masters students participating in the New Relay Protection Joint R&D Project Team. Talent cultivation in these teams is embedded in research: master's students, doctoral students, professors and enterprise engineers work together participate in solving real technological problems and developing industrial innovations. In this highly integrated ecosystem research, innovation, talent development and industrial upgrading are pursued simultaneously.

Figure 16.
Posters presenting research project descriptions at XJTU's Institute of Electrical Science and Technology

[78] Such as, for example, Huawei, Lenovo, TBEA, CHINT, Zhengtai Group, Midea, China Southern Power Grid, Shandong Energy Group, China Telecom, PowerChina, Shaanxi Railway Group, XiRui Control and AlphaESS.

The UII model observed at Xi'an Jiaotong University differs from the teaching-centred approaches encountered at vocational and application-oriented institutions. In this model integration is organised through research and innovation platforms jointly established with leading enterprises and specific projects organised in the framework of these platforms. In this model UII-driven skills-development and research are not separated. This represents an advanced form of university-industry integration, closer to a shared innovation system than to conventional forms of academic-industry cooperation. It demonstrates how research universities and enterprises can become co-producers of knowledge, technology and high-level engineering talent through jointly governed innovation ecosystems. From this respect it is interesting to compare the UII practices of Xi'an Jiaotong University with those we saw at Lanzhou University (see *Box 5*). This comparison seems to demonstrate that that China's UII agenda is not producing a uniform model of university transformation; rather, different research universities occupy different positions along a continuum ranging from collaboration-based integration to deeply embedded innovation ecosystems.

Box 5.
Two UII models in Research Universities: comparing Xi'an Jiaotong University with Lanzhou University

Although both Lanzhou University (LZU) and Xi'an Jiaotong University (XJTU) belong to China's Double First-Class university system and both increasingly embrace industry-education integration, their approaches to talent development reveal different institutional logics and stages of development.

At Lanzhou University, UII appears primarily as a mechanism for strengthening the university's contribution to regional development, innovation, and talent cultivation through closer coordination with external actors. The university's researchers conceptualize UII as a platform connecting universities, enterprises, research institutes, and industry associations in order to integrate the education chain, talent chain, industrial chain, and innovation chain. Talent development is understood as one of several functions of this system, alongside scientific research, technology development, commercialization, entrepreneurship, and industrial cultivation.

Particular attention is devoted to the organizational and governance challenges of collaboration, such as partner selection, contract negotiation, intellectual property management, and the alignment of institutional interests. In this model, the central question is how research universities can effectively organize and govern collaboration with industry.

Xi'an Jiaotong University seems to represent a more mature and deeply embedded form of UII. Rather than focusing primarily on the establishment of collaborative mechanisms, XJTU has developed extensive innovation ecosystems in which talent cultivation, research, technological innovation, and industrial development are closely intertwined. Initiatives such as the Future Technology College, Outstanding Engineer programmes, enterprise-supported research teams, and participation in the Qinchuangyuan innovation platform illustrate a model in which industrial challenges increasingly serve as starting points for educational and research activities. Students are integrated into real research and innovation projects, while enterprises participate not only as employers but also as co-educators and co-innovators.

The two universities also differ in the role assigned to industry within the educational process. At Lanzhou University, enterprises are primarily viewed as strategic partners whose participation enhances the relevance and effectiveness of talent cultivation. At XJTU, enterprises increasingly contribute to curriculum design, project definition, research agendas, and educational environments. In some cases, the university might even learn pedagogical and organizational practices from industry, similarly to what we could see at SNPU.

From a skills-development or talent-development perspective, the comparison suggests that research-university UII in China is becoming differentiated. Lanzhou University exemplifies a coordination-oriented model in which the primary challenge is building effective collaboration mechanisms between education and industry. XJTU represents a clear ecosystem-oriented model in which education, research, innovation, and industrial development are increasingly integrated into a single talent-development system.

The institute we visited (the Institute of Electrical Science and Technology) is naturally not the only unit at XJTU showing deep integration of teaching, research and industrial innovation. According to a news published at China Education Daily the vice dean of the university's School of Future Technology said that this school "concentrated internal and external resources to form a cross-disciplinary and industry-education dual-teacher teaching team, carrying out 'multiple teachers teaching the same course, and school-enterprise experts teaching the same class,' integrating basic theory, key technologies, and practical applications".[79] XJTU's institutional practice at Western China Science and Technology Innovation Harbor seems to be an outstanding example of one of the most recent developments of China's UII policies and practices: the creation of National Industry-Education Integration Innovation Platforms.[80]

[79] See the website „*Industry-university-research "band together" to forge an innovative path! Let's look at the educational momentum of the Western China Science and Technology Innovation Port*" [产学研"抱团"闯出创新路！来看中国西部科技创新港的教育动能].
https://news.qq.com/rain/a/20251126A0255500?suid=&media_id=

[80] See the website „*The National Industry-Education Integration Innovation Platform Construction Exchange Conference was held*" [国家产教融合创新平台建设交流会召开] 2025-11-17. China Education Daily (https://www.163.com/dy/article/KF9GGA0C051496VC.html).

Summary and conclusions

This case study has examined university-industry integration policies and practices in three provinces of North-West China – Xinjiang, Gansu and Shaanxi – against the background of China's broader national strategy of moving from an investment-driven, low-skills growth model toward an innovation-driven, high-skills modernisation path. Our analysis has revealed not only significant cross-regional variation, but also a number of common challenges and similar institutional responses.

Comparing the North-West region with the two regions explored earlier

A first major finding of our third case study is that UII does not operate as a uniform national model but takes distinctly different forms depending on several factors, such as different regional economic structures, different institutional histories and governance capacities, region-specific political authorizations and also some cultural factors. In this respect the North-West region shows a very interesting pattern. On the one hand it seems to be a late adopter of the contemporary UII model, compared with the southern/eastern regions, where experimenting with advanced UII models started much earlier. Paradoxically, this might create an advantage because the building of UII has gained momentum in the new period mentioned in the introduction of this study in connection with the 2023 NDRC and the 2026 MoE policy documents (NDRC, 2023; MoE, 2026), that is in a more favourable policy environment. On the other hand, as we have seen, in this region we can see a rich tradition of integrating education with industry, going back to the era of rapid industrialisation supported by the Western Modernisation Strategy. This means that the new UII movement can build on earlier experiences accumulated especially in the vocational education sector.

When compared with the two regions explored in our earlier case studies – the Shenzhen–Greater Bay Area and the Chengdu–Chongqing economic region – the North-West region reveals a distinct configuration of university-industry integration. In the Greater Bay Area, UII is embedded in one of the world's most dynamic innovation ecosystems. Universities operate in close interaction with globally competitive technology firms, rapidly growing start-ups, venture capital networks, and highly developed industrial clusters. The dominant logic of UII is innovation-driven and market-oriented: collaboration focuses on technological development, entrepreneurship, emerging industries, and the cultivation of talent capable of operating in fast-changing, knowledge-intensive environments. The role of the state remains important, but much of the dynamism originates from dense networks of firms and innovation actors capable of acting as genuine co-creators of educational and technological innovation.

The Chengdu–Chongqing region represents an intermediate configuration. While innovation and industrial upgrading are also important objectives, UII is more strongly embedded in broader regional development strategies and industrial transformation policies. Compared with the Greater Bay Area, the role of public coordination is more visible, and cooperation is often organized around the needs of strategic industries identified by regional development plans. At the same time, the region possesses a sufficiently diversified industrial base and a growing innovation ecosystem to support relatively sophisticated forms of collaboration, including industrial colleges, joint research platforms, enterprise-led curriculum development, and project-based learning environments. UII therefore functions simultaneously as a mechanism of innovation, talent development, and regional economic modernization.

The North-West region differs from both of these cases. Although examples of innovation-oriented collaboration can be found, particularly in Shaanxi, the dominant challenge is often not how to strengthen already existing innovation ecosystems but how to create the human, institutional, and organizational conditions necessary for future development. As a result, state coordination, public investment, and policy-driven institution building play a more prominent role. UII frequently serves workforce formation, regional problem-solving, and capacity-building functions, particularly in Xinjiang and Gansu, where industrial ecosystems are less dense and enterprise participation is often more dependent on government support and strategic planning. In this context, universities become not only contributors to innovation but also instruments of regional development and modernization.

Taken together, the three case studies suggest the existence of a developmental continuum of UII within China. At one end stand highly developed innovation ecosystems such as the Greater Bay Area, where UII primarily supports technological innovation and global competitiveness. In the middle are regions such as Chengdu–Chongqing, where UII combines innovation objectives with industrial transformation and regional development goals. At the other end are less developed regions such as Xinjiang and Gansu, where UII is often expected to create the foundations for future modernization through workforce development, institutional capacity building, and the mobilization of knowledge for local development. Across all three contexts, however, the underlying policy logic remains remarkably consistent: universities are increasingly expected to function not as isolated educational institutions but as active participants in broader socio-economic ecosystems linking talent development, innovation, industrial upgrading, and regional development.

Comparing the three North-West provinces

Our three provincial cases can be placed along a spectrum of industrial and innovation capacity. In this respect Shaanxi represents the most developed case among the three. Its GDP per capita is at or slightly above the national average, and it hosts a dense network of research-intensive universities and a strong military-industrial and engineering base. The province has built a sophisticated innovation ecosystem around the Qinchuangyuan platform, where leading enterprises co-establish research laboratories within universities, and master's and doctoral students work on industry-funded "horizontal" projects. Paradoxically, however, Shaanxi's strong research orientation may have slowed down the deeper, skills-driven forms of UII that we observed elsewhere. Modern Industry Colleges (MICs) in Shaanxi universities – such as those at Xi'an University of Science and Technology or Baoji University of Arts and Sciences – remain predominantly programmatic or virtual rather than legally and physically autonomous entities. Enterprises participate in curriculum design and dual-mentor arrangements, but the kind of structural integration where companies co-govern educational institutions, co-invest in campus facilities and treat teaching innovation as a strategic priority is less visible in Shaanxi than in some of the more dynamic south-eastern provinces we studied earlier. UII in Shaanxi is strongly research-led and innovation-focused, but the translation of industry engagement into pedagogical transformation of undergraduate degree education appears to be slower and more institutionally conservative. Xi’an International University appears to be a notable exception with it advanced skills-development oriented UII model.

Xinjiang occupies an intermediate position but exhibits remarkable dynamism. Its GDP per capita is lower (roughly 70–75% of the national average), and its economy remains dominated by resource-based and state-led industries. Yet Xinjiang has become an intensive experimental

field for UII. The province has launched a highly ambitious skills strategy ("Skill-revitalising Xinjiang") targeting nine advanced sectors, and it has produced an exceptionally high number of Industry-Education Integration Communities, covering not only manufacturing and energy but also also fields such as childcare, jade, beef cattle and live-streaming e-commerce. The special governance constellation of the Xinjiang Production and Construction Corps (Bingtuan) creates a UII-friendly environment in which educational institutions and industrial enterprises belong to the same administrative entity, making deep integration a matter of institutional DNA rather than externally imposed policy. The presence of Shenzhen-based high-tech firms (such as Yunyi Technology, a machine-translation company) also illustrates the role of east–west knowledge flows in accelerating UII in less developed regions. However, the sustainability of this model depends on continued state investment and on the ability of local enterprises to move beyond employment-driven cooperation (internships, basic training) toward innovation-driven integration (co-design of curricula, co-teaching, joint R&D).

Gansu represents the most constrained case, with GDP per capita only about half of the national average and a weak and traditional industrial base. Here, UII relies most heavily on historical institutional legacies and what we have called "institutional DNA". Lanzhou University of Technology and Lanzhou Petrochemical University of Vocational Technology have deep roots in the industrialisation period of the PRC, and their UII practices are built upon long-standing relationships with state-owned enterprises in energy, machinery and chemicals. Lanzhou University, an elite research university, has rediscovered its own historical tradition of socially embedded research (exemplified by the 1981 founding of the Grassland Ecology Research Institute) and has translated this into a broad third-mission strategy, including 17 interdisciplinary innovation classes and an expanding enrolment in professional master's programmes co-supervised by industry mentors. Yet, as one university leader admitted, the dominance of large state-owned enterprises and the absence of a dynamic SME sector make challenge-based teaching and project-based learning difficult to implement at scale. In Gansu, UII is necessarily more state-mediated, more employment-oriented and more dependent on compensatory mechanisms than in the eastern provinces. Among the three provinces, Gansu appears to display the strongest cultural imprint of its historical role along the Silk Road, where economic exchange, technological diffusion and cultural interaction were closely intertwined.

Although this case study does not allow to explore deeply culture-related regional differences beyond what was presented in the section "*Cultural diversity and the North-East UII development model*" we could assume that while in Xinjiang and particularly in Gansu the historical Silk Road legacy may encourage a view of universities as institutions serving exchange, practical knowledge, adaptation to difficult environments and connections across communities Xi'an's historical identity as an imperial capital and scientific centre seems to reinforce a stronger emphasis on elite knowledge production and national missions.

One of the central claims of our overall research project has been that contemporary Chinese UII is not merely an intensification of university-industry cooperation (internships, guest lectures, technology transfer) but a qualitatively different model in which the boundaries between education and production become systematically blurred. The present case study has provided rich empirical evidence for this claim, while also revealing the conditions under which such deep integration is – or is not – achieved. This case study also demonstrates that UII is not dependent on the prior existence of innovation ecosystems. In less developed regions it can function as a state-supported mechanism for creating the human and institutional preconditions of future industrial modernization. The dominant function of UII in the North-West appears to

shift from workforce development in Xinjiang, to societal usefulness and regional problem-solving in Gansu, and then to innovation and competitiveness in Shaanxi.

At institutions such as Lanzhou Petrochemical University of Vocational Technology, UII is operationalised at several organisational level in its training centres. Its miniaturised industrial chemical production system, is not a simulation laboratory in the traditional sense but a pedagogical device through which industrial logic becomes embedded in the educational process itself. Students learn by solving real production problems, by responding to emergency scenarios and by applying integrated knowledge from chemistry, engineering, automation and safety management – precisely the kind of competency-oriented, problem-based learning that Chinese policy documents now advocate.

Shaanxi Polytechnic University's practices demonstrate particularly high integration of industry and education. Its Six Integrations of Work and Study model operationalises UII at every organisational level: talent cultivation is aligned with enterprise needs, teachers with practitioners, theory with skills, teaching content with real work tasks, academic assessment with occupational certification, and campus culture with enterprise culture. The partnership of this university with Inovance Technology has moved well beyond resource-sharing. Enterprise engineers participate not only as guest lecturers but as co-developers of curricula, co-writers of modular teacher handbooks and co-teachers in dual-teacher classrooms. The university learns not only about technology from the company but also about pedagogy – how to organise project-based learning, how to assess competencies, how to create authentic work environments on campus. This is a striking illustration of UII as a mechanism of pedagogical transformation, where industry becomes a source of teaching innovation, not merely a destination for graduates.

These universities illustrate that in the North-West connecting education with industrial production, as mentioned, has had strong traditions. Many vocationally oriented universities in this region have a long history of being deeply integrated with industry several decades before the emergence of the new wave of modern UII policy in the 2010s. Before the decentralisation process transferring these universities to provincial governments, they were under the direct supervision of sectoral ministries and they operated in close connection with state-owned companies.

In the visited universities we could see signs of the impacts of the Western modernisation strategy. We could see photos of university professors and industrial leaders moving from the East to the West, supporting industrialisation, agricultural development and modernisation of Higher Education and we could also hear personal stories about this. Perhaps the most outstanding example of the moving to the West movement is the move of Jiaotong University from Shanghai to Xi'an in the middle of the fifties.

Contribution to better understand UII

One of the key goals of our third case study has been the confirmation that advanced forms of UII are not restricted to vocationally oriented institutions or universities of applied science. This has been fully confirmed as we could see advanced UII practices also in the visited elite research universities. Although their connection with industry typically has a strong research focus, the skills-development or talent development element is not neglected. Students are actively engaged in common research programs focusing on real industrial problems and, together with their teachers they are interacting with industry on a daily basis, especially at graduate level.

An important finding of our third case study is the confirmation that China's UII policy has not only become deeply embedded in the overall national policy system and became a lasting and sustainable element of it but the process of creating its cognitive, conceptual, theoretical background is also progressing. We could find perhaps the clearest sign of this at a private university whose main profile is connected not with traditional manufacturing or with advanced technological sectors but with liberal arts, services and cultural industry. We saw the clearest expression of UII becoming a key factor of institutional survival at Xi'an International University. This is the university where we could also see the most explicit form of UII radically transforming pedagogy. Its "Apprenticeship Communities" concept and related practice moves the core element of learning outside the campus, with students participating from the beginning of their studies in real value-creating activities, organised through legally established student-run enterprises. Learning here is not separated from productive work, and assessment is based on contribution to authentic projects rather than on standardised examinations. This model, as the university's leadership argues, is not a return to traditional apprenticeship but a reinvention of the university for an era when knowledge is no longer scarce and employability depends increasingly on the ability to learn through participation and collaboration.

However, our case study also shows that such deep integration is far from universal. At many institutions – including some we visited – UII remains closer to the older cooperation model: internships are still add-on activities, enterprise involvement in curriculum design is episodic, and the core teaching process remains largely unchanged. The fact that in Shaanxi most Modern Industry Colleges exist as programmatic networks rather than as legally and physically autonomous entities suggests that institutional inertia remains a significant barrier. Deep UII requires not only policy incentives and enterprise willingness but also a fundamental shift in academic culture, faculty roles and institutional governance – a shift that is easier to achieve in vocational and applied universities than in traditional research universities, and easier in regions with dense, dynamic industrial ecosystems than in regions dominated by large, slow-moving state-owned enterprises.

Although all three provinces have embraced the national UII agenda, the forms it takes differ significantly, reflecting their distinct developmental conditions and strategic priorities. In Xinjiang, UII appears primarily as a workforce-development strategy. Collaboration between educational institutions, enterprises, and public authorities is strongly state-coordinated and focuses on building a regional skills ecosystem capable of supporting industrial development, social stability, and graduate employability. In Gansu, UII takes a more regionally embedded form. Universities are expected not only to supply labour but also to contribute directly to solving local economic, environmental, and social challenges. As a result, UII often operates as a knowledge-for-development ecosystem in which educational institutions, local industries, and communities collaborate around concrete regional needs. Shaanxi, by contrast, represents a more innovation-oriented model. Benefiting from a dense concentration of research universities and scientific institutions, UII is increasingly organised around the goal of technological innovation and industrial upgrading. Initiatives such as Qinchuangyuan seek to connect universities, research organisations, enterprises, investors, and government actors within a broader innovation ecosystem, with a strong emphasis on competitiveness, technology transfer, and the commercialization of knowledge. Taken together, these three cases suggest that China's UII policy is not implemented through a single uniform model. Rather, it is adapted to regional contexts and development strategies, producing distinct configurations that can be characterised respectively as a skills ecosystem (Xinjiang), a knowledge-for-development ecosystem (Gansu), and an innovation ecosystem (Shaanxi).

The comparison also suggests a gradual shift in the dominant function of UII across the three provinces: from employability and workforce formation in Xinjiang, through broader societal usefulness and regional problem-solving in Gansu, to innovation and competitiveness in Shaanxi. In Xinjiang, the primary role of UII appears to be the development of human resources capable of supporting economic modernization, industrial expansion, and labour-market integration. The emphasis is therefore on workforce preparation, skills development, employability, and the alignment of educational provision with the needs of major state-supported industries and regional development projects. In Gansu, while workforce development remains important, UII serves a broader developmental purpose. Universities are expected not only to prepare graduates for employment but also to contribute directly to addressing regional challenges related to agriculture, ecological sustainability, rural revitalization, public services, and the modernization of traditional industries. Here UII functions increasingly as a mechanism for mobilizing knowledge and expertise in support of regional development and societal problem-solving. In Shaanxi, by contrast, the dominant function of UII shifts toward innovation and competitiveness. Benefiting from a dense concentration of research universities, scientific institutes, and technology-intensive industries, university-industry collaboration is increasingly oriented toward technological advancement, commercialization of research, high-level talent cultivation, and the strengthening of regional innovation capacity. Initiatives such as Qinchuangyuan illustrate how UII can become part of a broader innovation ecosystem in which universities contribute simultaneously to knowledge creation, industrial upgrading, and economic competitiveness.

These differences illustrate how UII can serve distinct developmental purposes while remaining embedded within a common national policy framework. Rather than representing alternative models, the three configurations may be understood as regionally adapted manifestations of a broader national effort to align higher education more closely with economic and societal development. They also reflect different stages and forms of regional modernization: workforce formation where industrial ecosystems remain relatively weak, knowledge mobilization for regional development where societal needs are particularly salient, and innovation-driven collaboration where advanced industrial and research capacities allow universities to function as central actors within innovation ecosystems.

The three provinces can be distinguished also according to the relative importance of endogenous and exogenous drivers shaping the development of university–industry integration. Shaanxi appears as the most endogenous case: its relatively strong industrial base, concentration of research-intensive universities, and developed innovation ecosystem generate substantial internal momentum for cooperation between universities and enterprises, although national policies and external support mechanisms also continue to play an important role. Gansu occupies an intermediate position, where endogenous capacities exist but remain more limited, resulting in a stronger reliance on external policy initiatives, state support, and nationally coordinated development programs. Xinjiang represents the most exogenously driven model. Although certain local development dynamics are present, UII is shaped predominantly by central government strategies, large-scale state investments, paired-assistance arrangements, and nationally coordinated modernization efforts. Overall, the comparison suggests a continuum from relatively self-sustaining and innovation-driven forms of integration in Shaanxi to increasingly state-mediated and externally supported forms in Gansu and especially Xinjiang, highlighting the diverse pathways through which China’s UII policy is implemented across different regional contexts.

The North-West UII experiences suggest that UII is not merely an innovation and skills policy instrument but also a regional development instrument. In contexts where industrial ecosystems are weak, UII may function as a mechanism for building ecosystems rather than merely responding to them. This is particularly relevant in a context where the participation of SMEs is relatively week, there is a higher level dependence on state coordination, the quality of enterprise partners is less even, the adaptation to current industrial demand is often overemphasised and the tension between academic and industrial missions might be higher – all of these leading to UII facing stronger challenges. Taken all the observations together our preliminary assumption that China's UII policies and practices generate a major transformation of higher education in global comparison seems to be further confirmed. Similarly, our assumption that UII generates – often disruptive – pedagogical innovation also gained further confirmation.

Possible European applications

The broader aim of our research project has been to assess which elements of China's UII policies and practices might be applicable in Hungary and other European contexts. The North-West China case study offers both cautionary and encouraging lessons in this respect.

The cautionary lesson is that the most advanced forms of UII observed in China – the industry-owned laboratories within elite research universities, the legally independent Modern Industry Colleges with substantial enterprise investment, the large-scale Industry-Education Integration Communities covering entire industrial sectors – are heavily dependent on specific Chinese conditions: a strong developmental state capable of strategic coordination across policy domains, a high level of enterprise willingness to invest in long-term talent development (particularly among large private and state-owned companies), and an education system that operates under a unified national policy framework with strong local experimentation. These conditions are not easily replicable in Europe, where higher education autonomy is stronger, the private sector's engagement in education is more fragmented and policy coordination across education, industry and innovation remains weaker.

The encouraging lesson is that the underlying logic of UII as pedagogical transformation – the idea that industry can become a co-producer of education and that work-integrated learning can be systematically embedded into degree programmes – is highly relevant for European debates on higher education modernisation. The Chinese experience shows that this is not merely a matter of adding more internships or inviting more guest speakers; it requires structural redesign of curricula, institutional innovation (such as dual-mentor systems, micro-credentials and integrated bachelor-master tracks) and a redefinition of faculty roles (including enterprise placements for teachers and recognition of industry-engaged scholarship in academic careers).

Particularly relevant for European policy-makers is the Chinese experience with piloting and scaling. The national UII strategy has explicitly encouraged local experimentation, created a rich repertoire of soft policy tools (enterprise certification schemes, tax incentives, land-use benefits) and built implementation around city-level pilots that are expected to generate replicable models. While the European governance context is different, the philosophy of combining central strategic direction with local innovation – and of treating UII not as an education sector initiative but as a cross-sectoral economic development strategy – is something that European countries might consider adapting to their own circumstances.

Finally, the North-West China case study also reminds us that UII is not a panacea. In regions with weak industrial ecosystems and limited enterprise capacity, UII easily becomes employment-driven rather than innovation-driven, and its impact on pedagogical transformation remains limited. Context matters enormously. The transportability of Chinese UII models to Europe will therefore depend not on copying specific institutional forms (Modern Industry Colleges, Industry-Education Integration Communities) but on understanding the underlying principles – systemic alignment of education, innovation and industrial policies; enterprise engagement as co-producers of education; pedagogical transformation as the ultimate goal – and adapting these principles to local conditions.

This third case study has confirmed and deepened the findings of our earlier work on Shenzhen and the Chengdu-Chongqing region. The shift from episodic cooperation to systemic integration is real and is reshaping Chinese higher education, particularly in the vocational and applied sectors. But the pace and depth of this shift vary significantly across regions, institutional types and industrial sectors. North-West China – with its combination of a strong developmental state, uneven industrial development and rich historical traditions of connecting education with work – offers a particularly valuable laboratory for observing both the transformative potential and the structural limits of the UII model.

For Hungary and Europe, the most valuable lesson is perhaps this: UII is not primarily about technology transfer or employability statistics. It is about reimagining the university as an institution that learns from the society it serves. The Chinese experience shows that when universities and enterprises become genuine co-producers of knowledge and skills, teaching itself is transformed – and that transformation, not the number of partnership agreements, is the true measure of success.

The North-West China case is particularly relevant from a development perspective. This case shows that UII can be used as a development tool adapted to the specific development stage of different regions. It can be used to create ecosystems (beyond connecting existing actors) and can also operate simultaneously as an economic and pedagogical transformation mechanism. One important condition for this development function to work is strong coordination. In China this is assured by the powerful developmental state, in Europe this can probably be created by strengthening existing national and regional development institutions and mechanisms. This might require also stronger EU level development coordination in the framework of structural and cohesion policies.

The experiences observed in North-West China may offer valuable lessons for the European Union, particularly in the context of its Structural and Cohesion Policies supported through the European Social Fund Plus (ESF+) and the European Regional Development Fund (ERDF). While European university-industry (business) cooperation policies have traditionally focused on innovation, research commercialisation and regional competitiveness, the Chinese experience suggests a broader developmental role. In less-developed regions such as Xinjiang and Gansu, UII functions, as mentioned above, not only as a mechanism for supporting existing economic activities but also as an instrument for creating future development capacity. Educational institutions are mobilised to contribute simultaneously to skills formation, institutional modernisation, workforce development, entrepreneurial activity and the strengthening of local innovation ecosystems.

This perspective may be particularly relevant for European regions facing structural disadvantages, industrial decline, demographic challenges or peripheral geographic positions.

Rather than treating universities primarily as research actors and recipients of innovation funding, cohesion policies could place greater emphasis on their role as regional development institutions capable of mobilising knowledge, talent and partnerships in support of local transformation. The Chinese experience demonstrates the potential value of combining investments in educational infrastructure, curriculum reform, teacher development, industry participation and regional economic planning within a coherent strategic framework. Such an approach could complement existing Smart Specialisation Strategies by placing stronger emphasis on human capital formation and institutional capacity building. In this sense, UII can be understood not only as an innovation policy instrument but also as a mechanism of territorial cohesion, helping less-developed regions build the social, organisational and knowledge capacities necessary for long-term economic and social development. Hungary, as a recipient of European development funds, could design development programs inspired by the North-West China experiences presented in this case study.

References

Bao, Y. (2018). The Xinjiang Production and Construction Corps. An Insider's Perspective. BSG Working Paper Series. Blavatnik School of Government, University of Oxford

Bao, F. (2026). Shifting engagement: Education lending by the World Bank and ADB in China (1980s–2020 s). International Journal of Educational Development, 121, 103487.

Berger, J. B., Hudson, K. E., & Ramírez, G. B. (2013). How universities work: Understanding higher education organization in northwest China. Education Policy Analysis Archives/Archivos Analíticos de Políticas Educativas, 21, 1-21. ISSN: 1068-2341

Chen (2018) Adhere to the principle of taking the foundation and promote the four returns to build a first-class undergraduate education with Chinese characteristics and world standards. [坚持以本为本 推进四个回归 建设中国特色、世界水平的一流本科教育]. Ministerial Speech at the „National Conference on Undergraduate Education in Colleges and Universities in the New Era" (http://www.moe.gov.cn/jyb_xwfb/gzdt_gzdt/moe_1485/201806/t20180621_340586.html?utm_source=chatgpt.com)

CCCP – SC (2020) Guiding Opinions of the Central Committee of the Communist Party of China and the State Council on Promoting the Development of the Western Region in the New Era to Form a New Pattern [中共中央 国务院关于新时代推进西部大开发形成新格局的指导意见]. Central Committee of the Communist Party of China and the State Council Xinhua News Agency (https://www.mee.gov.cn/zcwj/zyygwj/202005/t20200518_779611.shtml).

CCTV (2026). The Ministry of Education answered reporters' questions on the "Opinions on Deepening the Reform of Key Elements of Vocational Education and Teaching" [教育部就《关于深化职业教育教学关键要素改革的意见》答记者问]. China Central Television February 12, 2026 10:05:08 (https://news.cctv.com/2026/02/12/ARTIweaR2cE2NbKDFGJw92YJ260212.shtml).

CPC – SPG (2024). The General Office of the CPC Shaanxi Provincial Committee and the General Office of the Shaanxi Provincial People's Government issued the "Notice on Several Measures to Comprehensively Deepen the 'Three Reforms' in the Transformation of Scientific and Technological Achievements." SPG Innovation System and Policy and Regulations Division. [中共陕西省委办公厅 陕西省人民政府办公厅印发《关于全面深化科技成果转化"三项改革"的若干措施》的通知]. Shaanxi Provincial Department of

Science and Technology. (https://kjt.shaanxi.gov.cn/kjdt/tzgg/202409/t20240914_3383441.html).
Ding, Z., Chai, J., Xie, P., Sun, W., Guo, W., & Wang, H. (2020). Exploration of intelligent mining talent cultivation in mining engineering under the background of New Engineering [新工科背景下采矿工程专业智能开采人才培养探索]. *煤炭高等教育 (Meitan Higher Education)*, 38(6), 79–84.
Dunhuang Academy (n.d.). Introduction to Dunhuang Academy. Available at: https://www.dha.ac.cn/jggk.htm.
Dunhuang Academy (2026). Dunhuang Academy and Lanzhou University sign a strategic cooperation framework agreement. https://www.dha.ac.cn/info/1019/7532.htm (Accessed: 10 August 2026).
Dunhuang Municipal People's Government. (2025). Statistical bulletin of national economic and social development of Dunhuang City in 2024. Dunhuang Municipal People's Government. https://www.gcs66.com/document_detail/133676.html.
Finegold, D. (1993) Breaking Out of the Low-skill Equilibrium, Education Economics, 1:1, 77-83, DOI: 10.1080/09645299300000010.
Gansu MoE (2023a). Policy Interpretation: "Implementation Opinions on Accelerating the Reform of the Province's Modern Vocational Education System" [政策解读：《加快推进全省现代职业教育体系建设改革的实施意见》]. Gansu Provicial Ministry of education. Department of Vocational and Adult Education (https://jyt.gansu.gov.cn/jyt/c107274/202312/173810126.shtml).
Gansu MoE (2023b). Notice from the Gansu Provincial Department of Education and nine other departments on issuing the "Implementation Opinions on Accelerating the Reform of the Construction and Reform of the Modern Vocational Education System in the Province." [甘肃省教育厅等九部门关于印发《加快推进全省现代职业教育体系建设改革的实施意见》的通知] Gansu Provincial Ministry of Education. (https://jyt.gansu.gov.cn/jyt/c110634/202312/173824332.shtml).
Gansu Provincial Department… (2021). Notice on Issuing the "Gansu Province Skilled Talent Team Construction Plan (2021-2023)" [关于印发《甘肃省技能人才队伍建设规划（2021-2023 年）》的通知] Gansu Provincial Department of Human Resources and Social Security (https://www.bypc.gov.cn/zfxxgk/bmdwxzjd/bmdw/qrsj/fdzdgknr/ghjh/art/2023/art_1fdfc8f6cc1a4c169c15bac12f762330.html).
Gansu Provincial Cultural Heritage Administration. (2022). “Digital Dunhuang” revitalizes traditional culture: Blossoming online and bearing fruit offline. Gansu Provincial Cultural Heritage Administration. https://www.gswbj.gov.cn/a/2022/12/26/15985.html.
General Office… (2019). Notice on Printing and Distributing the National Pilot Implementation Plan for the Integration of Industry and Education [国家产教融合建设试点实施方案]. General Office of the National Development and Reform Commission Development and Reform Society [2019] No. 1558 (https://www.ndrc.gov.cn/xxgk/zcfb/tz/201910/t20191009_1181933_ext.html).
Geng, Lele & Zhang Meng (2025). The challenges and breakthroughs in industry-education integration in "Double First-Class" universities [“双一流”建设高校产教融合的困境与突破]. Chongqing Higher Education Research, Issue 4 (https://www.cqgjxh.com/upload/file/202507/%E8%80%BF%E4%B9%90%E4%B9%90.pdf).
Halász G. & Huang, M. (2025a). University-industry integration policies and practices in China: exploring policy documents and literature. Manuscript

(https://wsne.hu/media/dokumentumok/uii_dokumentumok/revised_literature_review_2025_06.pdf).
Halász, G. & Huang, M., & (2025b). Using knowledge to enhance policy innovation: the case of integrating education with industry in China. *European Journal of Education Policy & Practice*, 1(1), 1-27. (https://www.aup-online.com/content/journals/10.5117/EJEP2025.1.002.HALA).
Halász, G. & Huang, M., & (2026a). Maintenance and university-industry collaboration. A paper presented at the 38th. International Maintenance Conference (2026.04.23-24). Veszprém. (https://wsne.hu/media/dokumentumok/uii_dokumentumok/maintenance-paper-en.pdf).
Halász, G. & Huang, M., & (2026b). The sustainability of higher education and the contribution of university-industry cooperation. Forthcoming.
Huang, M., & Halász, G. (2024). Education driven university-industry cooperation: A comparative analysis of European Union and Chinese policies and practices with special focus on the creative industry sector. *Education and Lifelong Development Research*, 1(4), 204-214.
Kirby, W. C., Chen, M. S., Manty, T., & Wong, K. C. H. (2009). Xi'an International University: The Growth of Private Universities in China (Harvard Business School Case No. 309-074). Harvard Business School
Lee, J. C. K., Yu, Z., Huang, X., & Law, E. H. F. (2016). Educational development in Western China: Towards quality and equity. In Lee at al (eds). *Educational development in Western China: Towards quality and equity* (pp. 1-20). Rotterdam: Sense Publishers.
Li, Y. , Lin J. & Wang G. (2012). Xi'an International University – Transforming Fish into Dragons. In: Hayhoe, R., Li, J., Lin, J., & Zha, Q. (eds). Portraits of 21st Century Chinese Universities:: In the Move to Mass Higher Education (pp. 400-421). Springer Science & Business Media.
Liu. M. (2025) Research on the Path of High Quality Modern Vocational Education System Construction in Shaanxi Province from the Perspective of Multi-Dimensional Collaborative Governance. International Journal of New Developments in Education. Vol. 7, Issue 9: 39-46, DOI: 10.25236/IJNDE.2025.070906.
Luo Y. & Shi Ch. (2015) - China Xinjiang Technical and Vocational Education and Training Project Social Analysis Report. IPP764 V5. World Bank
Ma, H. W. (2024). The practice of iterative innovation of modern industry colleges in DGUT: Logic and approach [现代产业学院迭代创新的‘莞工实践’: 逻辑与进路]. Research in Higher Engineering Education..(03), 98–102+193.
Ma, X, Roshazlizawati M. & Ma, K. I. (2024). Industry-University-Research Collaboration in Gansu Province: Addressing Challenges and Leveraging Opportunities. *International Journal of Academic Research*, *14*(4). http://dx.doi.org/10.6007/IJARAFMS/v14-i4/23120 DOI:10.6007/IJARAFMS/v14-i4/23120.
Marginson, S. (2011). Higher education in East Asia and Singapore: Rise of the Confucian model. Higher education, 61(5), 587-611. DOI 10.1007/s10734-010-9384-9
MoE (2018). Opinions of the Ministry of Education on Accelerating the Construction of High-level Undergraduate Education and Comprehensively Improving the Ability to Cultivate Talents [教育部关于加快建设高水平本科教育全面提高人才培养能力的意见] (http://www.moe.gov.cn/srcsite/A08/s7056/201810/t20181017_351887.html).
MoE (2019b) Opinions of the Ministry of Education and the Ministry of Finance on the implementation of the plan for the construction of high-level vocational schools and majors with Chinese characteristics
[教育部 财政部关于实施中国特色高水平 高职学校和专业建设计划的意见]

(http://www.moe.gov.cn/srcsite/A07/moe_737/s3876_qt/201904/t20190402_376471.html?utm_source=chatgpt.com),
MoE (2020). Guidelines for the Construction of Modern Industrial Colleges (Trial) [教育部办公厅 工业和信息化部办公厅关于 印发《现代产业学院建设指南（试行）》的通知]. Notice of the General Office of the Ministry of Education and the General Office of the Ministry of Industry and Information Technology (http://www.moe.gov.cn/srcsite/A08/s7056/202008/t20200820_479133.html).
MoE (2025) Lanzhou University vigorously promotes the positive interaction between independent scientific and technological innovation and talent cultivation. [兰州大学大力推进科技自主创新和人才自主培养良性互动]. Ministry of Education Bulletin. Issue 33 (http://www.moe.gov.cn/jyb_sjzl/s3165/202510/t20251024_1417919.html).
MoE (2026) Opinions of the Ministry of Education on deepening the reform of key elements of vocational education and teaching [教育部关于深化职业教育教学关键要素改革的意见]. Ministry of Education. 2026-02-06. Teachers' Professional Development Document No. 1 of 2026 (https://hudong.moe.gov.cn/srcsite/A07/zcs_zhgg/202602/t20260212_1428773.html).
MoE – GPPG (2020). Opinions of the Ministry of Education and Gansu Provincial People's Government on Promoting the Development of Vocational Education Across the Province and Building a 'Skilled Gansu' [教育部甘肃省人民政府 关于整省推进职业教育发展 打造“技能甘肃”的意见]. Ministry of Education - Gansu Provincial People's Government (https://gov.gscn.com.cn/system/2020/08/03/012433562.shtml).
MoST (2020). The Ministry of Science and Technology issued the notice on several measures to eliminate the negative orientation of 'paper-only' in science and technology evaluation (trial). [科技部印发《关于破除科技评价中“唯论文”不良导向的若干措施（试行）》的通知]. Guo Ke Fa Jian [2020] No. 37. Ministry of Science and Technology. https://www.most.gov.cn/xxgk/xinxifenlei/fdzdgknr/fgzc/gfxwj/gfxwj2020/202002/t20200223_151781.html.
NDRC (2020). The relevant person in charge of the National Development and Reform Commission answered reporters' questions on the "Guiding Opinions of the Central Committee of the Communist Party of China and the State Council on Promoting the Development of the Western Region in the New Era to Form a New Pattern" [国家发展改革委有关负责人就《中共中央 国务院关于新时代推进西部大开发形成新格局的指导意见》答记者问]. National Development and Reform Commission. (https://www.ndrc.gov.cn/xxgk/jd/jd/202005/t20200521_1228547.html).
NDRC (2021). Outline of the 14th Five-Year Plan for National Economic and Social Development and the Long-Term Goals for 2035 of Xinjiang Uygur Autonomous Region [新疆维吾尔自治区国民经济和社会发展第十四个五年规划和 2035 年远景目标纲要]. National Development and Reform Commission of the People's Republic of China (https://www.ndrc.gov.cn/fggz/fzzlgh/dffzgh/202106/t20210611_1283166.html).
NDRC (2023) Vocational education industry-education integration empowerment and enhancement action plan (2023–2025) [职业教育产教融合赋能提升行动实施方案（2023—2025 年)]. National Development and Reform Commission
Peters, M. A. (2021). The ancient Silk Road and the birth of merchant capitalism. Educational Philosophy and Theory, 53(10), 955-961.
Robinson, B, (2016). The Contribution of International Aid to The Development of Basic Education in Western China. In Lee at al (eds). *Educational development in Western China: Towards quality and equity* (pp. 325-346). Rotterdam: Sense Publishers.State Council

(2003). History and Development of Xinjiang. Information Office of the State Council of the People's Republic of China (http://www.china.org.cn/e-white/20030526/)
Ruixia, J. (2024). Research on the Path of Industry-Education Integration in Xinjiang Universities to Promote Xinjiang's Economic Development [新疆高校产教融合助推新疆经济发展路径研究]. Journal of Xinjiang Open University. 6(12). Doi:10.20110/j.cnki.cn65-1323/g4.2024.03.002.
Shi, D., & Ge, Y. (2019). Academic Engagement and Commercialization in an Institutional Transition Environment: Evidence from Shanghai Maritime University. arXiv preprint arXiv:1901.07725. https://doi.org/10.48550/arXiv.1901.07725.
Shu, F., Liu, S., & Larivière, V. (2022). China's research evaluation reform: What are the consequences for global science?. Minerva, 60(3), 329-347.
SPDoE (2022). Notice of the General Office of the Shaanxi Provincial Department of Education on carrying out the application and construction of Future Technology Colleges and Modern Industry Colleges (陕教高办〔2022〕42 号) [陕西省教育厅办公室关于开展未来技术学院、现代产业学院申报与建设工作的通知]. Shaanxi Provincial Department of Education.
SPDoE (2025). Notice on the 2025 Shaanxi Provincial Industry-Academia Collaborative Education Project Recognition Application and the Adjustment of Industry-Academia-Research Operation Models. [关于开展 2025 年度陕西省产学合作协同育人项目申报工作及产学研运营模式变更的通知] Shaanxi Provincial Department of Education. (2025). [Provincial policy document].
SPG (2019) Notice from the Shaanxi Provincial Department of Human Resources and Social Security on Issuing the "Shaanxi Province Medium- and Long-Term Vocational Skills Training Plan (2019-2025)" [陕西省人力资源和社会保障厅关于印发《陕西省中长期职业技能培训规划（2019-2025）》的通知]. Shaanxi Provincial Government. Human Resources and Social Affairs, Shaanxi Social Security [2019] No. 34.
SPG (2025). Notice on Issuing the "Shaanxi Province 'Skills Illuminate the Future' Action Implementation Plan."[关于印发《陕西省"技能照亮前程"行动实施方案》的通知] Shaanxi Provincial Department of Human Resources and Social Security, Shaanxi Provincial Department of Finance. August 8, 2025 (https://rst.shaanxi.gov.cn/sy/tzgg/202508/t20250819_3556340.html).
State Council (2015a) Notice of the State Council on the Publication of Made in China 2025. Abridged translation. Center for Security and Emerging Technology (CSET|). Georgetown University's School of Foreign Service.
State Council (2015b). The General Office of the State Council on deepening colleges and universities on implementation opinions on innovation and entrepreneurship education reform [国务院办公厅关于深化高等学校 创新创业教育改革的实施意见] The General Office of the State Council (http://zw.china.com.cn/2016-05/19/content_38488611.htm).
State Council (2017). Several opinions of the General Office of the State Council on deepening the integration of industry and education (国务院办公厅关于深化产教融合的若干意见). State Council [2017] No. 95. General Office of the State Council (online: https://www.gov.cn/zhengce/content/2017-12/19/content_5248564.htm).
Świstak, M. (2022). *Regional Policy in China: Development and Strategic Challenges*. V&R Unipress.
The World Bank & DRC of State Council (2013). China 2030. Building a Modern, Harmonious, and Creative Society. The World Bank and the Development Research Center of the State Council, P. R. China
UNESCO. (2014). Silk Roads: the Routes Network of Chang'an-Tianshan Corridor. World Heritage Convention. https://whc.unesco.org/en/list/1442/ (accessed on 24 June 2026)

XJUAR – DHRSS (2026a). Large-Scale Targeted Vocational Skills Enhancement Training Action for Strengthening the Foundation and Dreams, Developing Xinjiang with Skills." [关于印发《"强基筑梦技能兴疆"大规模精准化职业技能提升培训行动实施方案》的通知]. Xinjiang Uygur Autonomous Region Department of Human Resources and Social Security. Release date: 2026-02-10. https://rst.xinjiang.gov.cn/xjrst/zcwj/202602/8882a99e941149d4a184c897e4bbeeda.shtml.

XJUAR – DHRSS (2026b). Xinjiang: Launched the "Strengthen the Foundation and Build Dreams, Skills Revitalize Xinjiang" campaign [新疆：启动"强基筑梦 技能兴疆"行动]. Xinjiang Uygur Autonomous Region Department of Human Resources and Social Security. Date of Publication: 2026-02-26. https://www.mohrss.gov.cn/SYrlzyhshbzb/dongtaixinwen/dfdt/202602/t20260226_567554.html.

XNA (2026). 2025 Xinhua Net College Entrance Exam Information Bureau | Lanzhou University: Admissions plan is precisely tilted toward strategic fields, industry-education integration deepens government-university-enterprise collaborative education, and pioneers interdisciplinary innovation. [2025 新华网高考情报局|兰州大学：招生计划向战略领域精准倾斜 产教融合深化政校企协同育人 首创跨学科创新班] Xinhua News Agency (https://www.news.cn/edu/20250617/d91f24a991e1477ca734ef123f0695ef/c.html).

Yang, Z. T. (2013). Analysis on basic models of collaborative innovation in local colleges [地方高校开展协同创新基本模式探析]. 科技管理研究 (Science and Technology Management Research), 33(21), 83 – 86, 90. https://doi.org/10.3969/j.issn.1000-7695.2013.21.018a.

Wang, P., Ben, Ch. & Wang, J. (2023) Application Research on the Integration of Production and Education in the Professional Construction of Vocational Colleges—Taking the College of Urban Construction and Management as an Example. [产教融合在职业院校专业建设的应用研究——以城市建设与管理学院为例] Advances in Education. 13(11), 8185-8189. Doi: 10.12677/ae.2023.13111268.

Wartmann, F. M., & Purves, R. S. (2018). Investigating sense of place as a cultural ecosystem service in different landscapes through the lens of language. Landscape and Urban Planning, 175, 169-183.

Wilkinson, R. H. (1963). The Gentleman Ideal and the Maintenance of a Political Elite: Two Case Studies: Confucian Education in the Tang, Sung, Ming and Ching Dynasties; and the Late Victorian Public Schools (1870-1914). Sociology of Education, 9-26.

Wong, D. (2008). Chinese ethics.

Yu, J., Safarov, B., Yi, L., Buzrukova, M., & Janzakov, B. (2023). The adaptive evolution of cultural ecosystems along the Silk Road and cultural tourism heritage: A case study of 22 cultural sites on the Chinese section of the Silk Road World Heritage. Sustainability, 15(3), 2465. https://doi.org/10.3390/su15032465.

Zhang, H. (2021). An institutional dilemma in China's skills-development system: evidence from two apprenticeship reforms. The China Quarterly, 248(1), 1103-1128. Doi:10.1017/S030574102100059X.

Zhang, N. (2005). Introduction to Lanzhou University's Institute of Dunhuang Studies[兰州大学敦煌学研究所简介]. *Dunhuang Research*, (4), 22–24.

Zhang X. (2025). Reform and Discussion of Animal Production Practice under the Background of New Agricultural Science [新农科背景下动物生产实习改革与探讨]. China Feed. 16. Doi: 10.15906/j.cnki.cn11-2975/s.2025030052-06.

Zhuang, Tengteng & Peng, Yabing (2026). University-industry integration in Different Types of Universities in China ——Case Studies of Dongguan University of Technology and Xi'an Jiaotong University. WIU/MCC UII project. WIU. Manuscript.

Annexes

Annex 1 – Bilingual case study program description

高校调研说明(中文翻译)

中国西北地区调研任务
2026 年 5 月 22 日 – 6 月 13 日

在研究项目"中国产学融合政策与实践——在匈牙利的潜在应用"框架下，将在中国西北三省（新疆、甘肃和陕西）开展案例研究调研任务。本项目为期两年，于 2025 年 5 月启动，由匈牙利政府资助，由布达佩斯的维克勒国际大学牵头实施，并同匈牙利马蒂亚斯·科维努斯学院学习研究所合作开展。

本项目旨在探索中国在产学融合方面的政策与实践经验，以评估其在匈牙利及欧洲的可应用性。在项目框架下，将开展一系列具体活动，包括系统的政策与文献分析、专家背景研究报告的撰写、基于实地调研的案例研究、专题研讨会以及多种形式的公共知识分享活动。同时，项目还致力于推动中匈高校之间新的合作关系的建立。项目的战略指导由该项目下的国际顾问委员会提供支持。有关项目的详细信息——包括预期成果、已取得成果以及国际顾问委员会的构成——可参见项目网站：https://wsne.hu/en/about-us/uii-research。

本次中国西北案例研究是该项目的第三个案例研究。此前已完成两项案例研究：一是深圳及粤港澳大湾区，二是成渝经济区（相关报告均可在项目网站下载）。前两个案例聚焦于中国两个中高度发达、充满活力地区的产学融合过程与制度机制，**而西北地区案例研究则旨在理解在特定发展条件下、正处于快速经济转型过程中的区域，其产学融合的特征与制度机制。研究团队尤其关注高校在区域经济转型、技术升级和人才培养中的作用。该案例研究的准备工作已通过对相关政策文件和学术文献的系统梳理完成。**

本次调研由项目组中的小型研究团队实施，包括项目学术负责人 Gábor Halász 教授以及项目研究助理黄敏。在为期三周的实地调研过程中，研究团队将访问西北三省的多所高校，并与高校管理者、教师及学生开展深入交流（具体访谈主题见附件 1）。除总体发展议题外，**研究团队还特别关注产学融合在教学改革、教师工作方式以及学生学习过程中的影响机制。**与前两次案例研究相似，本次交流将采取较为非正式的方式，以促进开放的知识分享、相互学习、比较性理解以及深入的学术反思。参与者将被邀请分享具体的个人经验与机构实践。

如接待院校有意，研究团队也可参与相关知识分享活动，例如面向学术群体开展讲座，介绍欧洲在产学合作方面的战略、项目与制度经验，或探讨西方视角下的产学融合实践。根据项目目标，研究团队还将探索中匈高校之间未来合作的可能性，并在潜在合作伙伴之间提供协调与对接支持，帮助识别共同兴趣领域及可行的合作形式。如接待院校有需求，研究团队还可提供基于数据的比较分析，探讨学生对产学融合参与对教师教学质量影响的感知，以及学生相关态度与期望。

本次调研的所有费用均由研究项目组自行承担。本研究访谈内容将进行匿名处理，并在发表前提交相关高校审核，获得同意后方予发布。

具体访谈话题见附件 1， 行程安排见附件 2，研究团队成员简历见附件 3，项目原始说明见附件 4。

附件一 主要访谈话题

以下内容列出了围绕中国高等教育机构在产学融合方面经验的访谈主题（包括半结构化访谈和焦点小组讨论）。根据接待院校的具体需求，该主题列表可进一步扩展及调整。

（1） 与产学融合相关的地方/区域发展的主要战略政策及实施措施
（2） 产学融合在区域发展中的作用，以及高校对经济转型的贡献
（3）产学融合在以创新驱动和技能驱动（人才发展导向）现代化中的作用
（4）产学融合相关的机构层面（大学、学院、系部）的规划与战略
（5）产学融合相关的机构层面（大学、学院、系部）的具体实践策略及经验
（6）产学融合相关活动的主要成果
（7）教师在产学融合中的个人经验
（8）学生在产学融合中的个人经验
（9）产学融合对教学与学习质量的影响
（10） 产学融合对教学法（pedagogy) 的影响
（11）企业导师在教学中的作用
（12）与企业合作过程中面临的挑战
（13）对产学融合的相关期望
（14）研究型大学与应用型大学在产学融合参与与活动方面的比较
（15）支持产学融合的制度性与地方发展干预措施
（16）对产学融合相关活动质量的评价
（17）对中国未来产学融合政策与实践发展的看法
（18）可获取的有关产学融合经验的资料/文件（用于展示或分析）

附件二 行程安排

日期	星期	活动
2026.05.23	星期六	从布达佩斯出发前往西安
2026.05.24	星期日	自由活动
2026.05.25	星期一	从西安前往乌鲁木齐

2026.05.26	星期二	新疆第 1 个工作日
2026.05.27	星期三	新疆第 2 个工作日
2026.05.28	星期四	新疆第 3 个工作日
2026.05.29	星期五	新疆第 4 个工作日
2026.05.30	星期六	从乌鲁木齐前往兰州
2026.05.31	星期日	开展案例研究写作工作
2026.06.01	星期一	甘肃第 1 个工作日
2026.06.02	星期二	甘肃第 2 个工作日
2026.06.03	星期三	甘肃第 3 个工作日
2026.06.04	星期四	甘肃第 4 个工作日
2026.06.05	星期五	从兰州前往西安
2026.06.06	星期六	开展案例研究写作工作
2026.06.07	星期日	自由活动
2026.06.08	星期一	陕西第 1 个工作日
2026.06.09	星期二	陕西第 2 个工作日
2026.06.10	星期三	陕西第 3 个工作日
2026.06.11	星期四	陕西第 4 个工作日
2026.06.12	星期五	陕西第 5 个工作日
2026.06.13	星期六	返回匈牙利

附件三. 部分研究者简历

高博. 哈拉斯是匈牙利科学院博士。自 2022 年退休以来, 他一直在厄特沃什. 罗兰大学教育与心理学院担任荣休教授，同时也是布达佩斯 马蒂亚斯·科维努斯研究所“向亚洲学习项目”学术带头人。此前，他曾领导匈牙利国家教育研究院负责匈牙利基础教育课程研发工作。他还曾作为专家顾问为多个国际组织提供咨询，包括经合组织、欧盟委员会、世界银行和欧洲委员会。此外，他还在经合组织教育研究与创新中心的理事会任职 25 年。他曾担任中国“一带一路教育对话”计划首席专家，该计划由中国教育科学研究院协调。他还领导过多个大规模的调研为基础的实证研究项目，涉及发展性干预、教育创新和教师学习等领域。目前，他正在开展中国与匈牙利的比较研究，研究产教融合对高校教师发展的影响。如需更多信息，请访问高博. 哈拉斯个人主页：(http://halaszg.elte.hu/English_index.html).

黄敏，中共党员，现为匈牙利罗兰大学教育博士学院三年级博士研究生，就读项目为教师教育与高等教育研究，同时为罗兰大学教育与心理学院教育研究所下设高等教育与创新研究小组成员。现任“中国产学融合政策与实践—在匈牙利的潜在应用”项目研究助理，该项目由匈牙利政府资助。个人研究课题包括大学的第三使命、校企合作、教师发展以及中欧比较研究。博士研究在 Gábor Halász 教授的指导下，重点关注校企合作对中匈两国高校教师的影响，以及校企合作对教师发展的影响机制。在攻读罗兰大学博士学位之前，在诺丁汉大学宁波校区完成了高等教育研究硕士学位。此后，在浙江纺织服装职业技术学院中英时尚学院担任教务主任一职。

附件四. 中国产学融合政策与实践——在匈牙利的潜在应用 项目简介

该研究项目“中国产学融合政策与实践——在匈牙利的潜在应用”探讨了中国（国家/省级）层面的政策以及（地方/院校）层面的产学融合实践，特别关注如何利用产学合作来支持高校的制度发展与改革。

该为期两年的项目由维克勒商学院实施，资金由匈牙利政府通过“知识空间基金会”（Tudás-Tér Alapítvány）提供，并与马蒂亚斯·科尔维努斯学院学习研究院合作开展。研究在一位马蒂亚斯·科尔维努斯学院高级研究员的专业指导下进行，并得到一个国际顾问委员会的支持。

该项目旨在协助匈牙利高等教育领导者设计战略与工具以加强产学合作，推动高校的发展； 同时该项目还致力于深化中匈高校之间的学术合作，促进在科技创新领域的双边合作与相互学习。此外，项目还支持维克勒商学院的提升——作为匈牙利唯一一所中资高等教育机构，维克勒商学院将在吸引国际学生和推动匈牙利高等教育国际化方面发挥更大作用。

在理论框架上，本研究以知识转移、高校“第三使命”、三螺旋与四螺旋模型，以及“知识三角”等相关理论为基础，同时融合中国在高校与产业融合方面形成的特色路径与实践经验。项目尤其强调产教融合在高校现代化中的战略作用，重点探讨“反向知识转移”和“双向知识流动”等机制，即不仅高校向产业输送知识，产业也可反哺高校的科研与教育体系。

项目所界定的“产业”范围广泛，除传统制造业外，还涵盖新兴服务业、创意产业等多个领域，全面契合高校“第三使命”的功能定位。在研究方法上，项目采用定性研究方法，综合运用政策文件与文献分析、机构案例研究、线上线下结合的工作坊与学术会议等形式。通过对中国多个城市（重点聚焦商科、工程学与创意产业领域）中产学融合政策与实践的深入案例研究，为本项目提供坚实的实证支撑。同时，引入行动研究方法，推动研究成果直接服务于维克勒商学院的机构发展需求。

项目不仅致力于产出新的学术知识，更注重成果的现实转化与实践应用。项目预期成果包括：专家咨询报告、案例研究、综合分析报告、学术论文、高校管理者产教融合策略工具，以及旨在推动中匈高校深度合作的结题会议。这些成果将为构建可持续的产学融合模式提供理论与实践支持，助力高等教育改革与中匈双边合作的深入发展。

马俊凯，现任维克勒国际大学首席执行官、中东欧中国科技交流协会副会长、Slugu 创新教育学院合伙人、Slugu 西安交通大学商学院联管会主任及中国产教融合项目研究顾问。深耕东南亚与中欧高等教育领域逾十年，具备丰富的跨文化机构管理与国际战略推进经验。任职维克勒国际大学期间，主导推动该校完成从私立商学院到国际认证大学的历史性跨越，成功构建覆盖欧洲、亚洲及非洲 50 余个国家的国际招生与合作网络，并获批匈牙利教育部产教融合科研项目资助，以研究顾问身份深度参与项目推进，有力提升了学校的学术声誉与国际影响力。此前曾任职于马来西亚英迪国际大学，主导建立逾百家代理及机构合作网络，创立并领导国际合作中心，担任首任中心主任，统筹推进多国大规模跨境学术交流与联合办学项目。马俊凯长期致力于推动中欧高等教育深度合作与产教融合创新实践，持有英国赫特福德大学与英迪国际大学联合授予的工商管理硕士（MBA）学位，精通中英双语，是中欧教育交流与国际化办学领域的重要推动者与实践者。

Program description （English）

Research mission to North-West China
22 May – 13 June, 2026

In the framework of the research project „*University-industry integration policies and practices in China - potential applications in Hungary*” a case study mission is conducted in three North-West provinces of China (Xinjiang, Gansu and Shaanxi). This two-year long research project, started in May 2025 and funded by the Hungarian government, is hosted by *Wekerle International University* (Budapest) and is implemented in cooperation with the *Learning Institute of Mathias Corvinus Collegium* (Budapest).

The aim of the project is to explore China’s University-Industry Integration (UII) policies and practices for possible applications in Hungary and Europe. In the framework of the project

several concrete activities/programs are realised, such as extended document and literature analysis, preparation of expert background studies, case studies based on fact finding missions to various regions of China, thematic workshops and various public knowledge-sharing events. The project also aims at supporting the establishment of new inter-university cooperations between Chinese and Hungarian higher education institutions. The strategic steering of the project is supported by an international advisory board. Detailed information about the project – including the excepted and achieved outcomes and the composition the international advisory board – can be found on the project's website at https://wsne.hu/en/about-us/uii-research).

The North-West China case study will be the third of such studies. Two case studies have already been completed: the first on *Shenzhen and the Great Bay Area*, the second on the *Chongqing-Chengdu economic area* (both can be downloaded from the project website). While the first two case studies analysed UII processes and institutional mechanisms in two moderately or highly developed, dynamic regions of China, the North-West aims at understanding the specificities of these processes and institutional mechanisms in a region undergoing rapid economic transformation under specific developmental conditions. The researchers are particularly interested in understanding how universities contribute to regional economic transformation, technological upgrading, and talent development in the special context of North-West China. The preparation of the case study has been preceded by an intensive exploration of relevant policy documents and academic literature.

The case study mission is conducted by a small team composed by professor Gábor HALÁSZ, the academic leader of the project and Ms. Min HUANG, the project's research assistant. During a three-weeks long fact finding mission to the three provinces of North-West China the researchers visit several universities and conduct intensive conversations with university leaders, academic staff and students (the suggested thematic focus of these conversation is presented in *Annex 1*). Besides the overall developmental aspects the researchers also have a special interest in understanding the potential of UII to transform pedagogy, teachers' work and students' learning. The researchers' intention is that the conversations – similarly to the approach used in the two first cases studies – will be rather informal, encouraging open knowledge-sharing, mutual learning, comparative understanding and deep academic reflection. Participants will be invited to share concrete personal and institutional experiences.

In case of an interest from the receiving institutions, the researchers are open to engage in knowledge-sharing activities, such as, for example, delivering lectures to academic audiences about strategies, programs and institutional experiences related to university-industry cooperation in Europe or about Western perspectives in university-industry cooperation. In accordance with the project goals they – as it happened during the previous case study missions – they also explore future possibilities for inter-university cooperation between Chinese and Hungarian higher education institutions and offer mediation services between potential partners, supporting them to identify areas of common interest and forms of possible cooperation.

In case the receiving institutions are interested in this, the researchers can offer a data-based comparative analysis of students' perceptions of the impact of UII engagement on the quality of the work of teachers and of students' related attitudes and expectations.

All expenses of the case study mission are covered from the project's own budget.

The travel schedule is presented in *Annex 2* and the short CVs of the researchers in *Annex 3*. *Annex 4* presents the original project description

Annex - Suggested themes for conversations

The list below presents the suggested thematic focus of conversations (interviews, focus group conversations) about the experiences of Chinese higher education institutions related to university-industry integration (UII). This thematic list can be extended according to the needs of the receiving institutions.

- UII related local/regional strategies and programs.
- The role of UII in regional development the contribution of universities to economic transformation.
- The role of UII in innovation- and skills-driven (talent-development-driven) modernisation.
- UII related institutional (university, faculty, department level) plans and strategies
- UII related institutional (university, faculty, department level) concrete experiences
- The major outcomes of UII-related activities.
- UII-related personal experiences of teachers.
- UII-related personal experiences of students.
- The impact of UII on the quality of teaching and learning.
- The impact of UII on pedagogy.
- The role of industry mentors in teaching.
- Challenges encountered in cooperation with companies.
- UII related expectations.
- Comparing the UII engagement and activities of research and applied universities.
- Institutional and local development interventions supporting UII.
- Evaluation of the quality of UII-related activities.
- Ideas about the future development of UII policies and practices in Chine
- Available resources/document presenting/analysing UII related experiences.

Annex 2 – Travel schedule

Date	Day	Activity
2026.05.23	Saturday	Departure from Budapest to Xi'an
2026.05.24	Sunday	Free
2026.05.25	Monday	Travel from Xi'an to Ürümqi
2026.05.26	Tuesday	1st working day in Xinjiang
2026.05.27	Wednesday	2nd working day in Xinjiang
2026.05.28	Thursday	3rd working day in Xinjiang
2026.05.29	Friday	4th working day in Xinjiang
2026.05.30	Saturday	Travel from Ürümqi to Lanzhou
2026.05.31	Sunday	Working in the case study
2026.06.01	Monday	1st working day in Gansu
2026.06.02	Tuesday	2rd working day in Gansu
2026.06.03	Wednesday	3rd working day in Gansu
2026.06.04	Thursday	4th working day in Gansu
2026.06.05	Friday	Travel from Lanzhou to Xi'an
2026.06.06	Saturday	Working on case study
2026.06.07	Sunday	Free
2026.06.08	Monday	1st working day in in Shaanxi
2026.06.09	Tuesday	2nd working day in Shaanxi
2026.06.10	Wednesday	3rd working day in Shaanxi
2026.06.11	Thursday	4th working day in Shaanxi
2026.06.12	Friday	5th working day in Shaanxi
2026.06.13	Saturday	Departure back to Hungary

Annex 3 – List of visited institutions

Universities (schools)	Province
Xinjiang University	Xinjiang
Xinjiang Normal University	Xinjiang
Xinjiang Institute of Engineering	Xinjiang
Xinjiang Vocational University	Xinjiang
Xinjiang Vocational and Technical College of Science and Technology	Xinjiang
Changji Vocational and Technical College	Xinjiang
Urumqi Urban Science and Technology Technical School	Xinjiang
Xinjiang Tianshan Snow Lotus Vocational Skills Training School	Xinjiang
Lanzhou University	Gansu
Lanzhou Petrochemical University of Vocational Technology	Gansu
Lanzhou University of Technology	Gansu
Lanzhou University of Agriculture	Gansu
Lanzhou University	Gansu

Baoji University of Arts and Sciences	Shaanxi
Xi'an University of Science and Technology	Shaanxi
Shaanxi Xueqian Normal University	Shaanxi
Shaanxi Polytechnic University	Shaanxi
Xi'an International University	Shaanxi
Xi'an Jiaotong University	Shaanxi
Companies/NGOs	
Pinwei (Xinjiang) Supply Chain Service Co., Ltd.	Xinjiang
Xinjiang Tengyisheng Biotechnology Co., Ltd.	Xinjiang
Beijing Tom's Cabin Technology Development Co., Ltd.	Xinjiang
European Xinjiang Cultural Association	Xinjiang
Urumqi Northwest Translation Industry Co., Ltd.; Shenzhen Yunyi Technology Co., Ltd	Xinjiang
Inovance Technology Co., Ltd.	Shaanxi
Industrial College, Jingdiao Technology Group	Shaanxi

Note: The institutions in coloured rows were not physically visited but we met people (leaders) representing them.