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CURRICULUM INTERNATIONALISATION AND LOCAL ADAPTATION IN KAZAKHSTANI DUAL-DEGREE STEM PROGRAMMES

Abstract. Kazakhstan has expanded joint and dual degree provision; however, research has not to date examined how a local programme differs from its foreign-partner version within the same university. This study compares two STEM programme pairs at regional Kazakhstani universities: Biotechnology at Kozybayev University and its University of Arizona-linked version, and Electroenergy at Zhubanov University and its Heriot-Watt-linked version. The corpus comprises EPVO records, university programme pages, and partner-university webpages. Using qualitative comparative document analysis in an embedded multiple-case design, the study examines curriculum structure, content, learning outcomes, skills orientation, international integration, and local adaptation. The documents reveal contrasting curricular logics. Local programmes emphasize sector practice, national standards, regulation, and domestic labour-market needs. Dual-degree versions retain that base but reallocate emphasis toward industrial and research-oriented biotechnology, and toward digital, computational, sustainable, and project-based engineering. The paper contributes a programme-level account of curriculum internationalisation and names this pattern curriculum layering.

Keywords: curriculum internationalisation; dual-degree programmes; local adaptation; STEM education; document analysis.

Introduction

By the 2020/21 academic year, Kazakhstani universities had concluded almost 6,800 partnership agreements with educational institutions in 85 countries, and the number of joint and double-degree programmes developed on their basis has grown from 108 in the 2020/21 to approximately 245 by 2024 (Ministry of Science and Higher Education, as cited in The Astana Times, 2024; WENR, 2021). These figures take double-degree education beyond the scope of individual pilot projects. They describe a strategic component that the state purposefully implements from year to year in an increasing number of educational institutions.

Kazakhstan adheres to this component along with other but related commitments: full membership in the Bologna Process since 2010 and bringing its qualification structure in line with the European Higher Education Area (EHEA) (details in section 1.2). The bilateral partnerships with universities and the multilateral Bologna Agreement are based on different principles, but they are combined in the same universities, the same credit systems and often with the same students. Kazakhstan, as a post-Soviet country that joined the Bologna Process belatedly and which continues to align its national qualifications framework with European benchmarks, has reasons to use the bilateral partnership as a second, more targeted approach to implement international curriculum standards (Hartley et al., 2016). Double-degree programmes allow universities to import specific foreign curricula without waiting for system-wide harmonisation.

STEM fields are disproportionately important in this system. Kazakhstan's double degrees programme includes biotechnology, electroenergy, petroleum engineering, and information systems, disciplines directly related to its stated national priorities in agriculture, energy, and industrial diversification. A graduate of Biotechnology or an electrical engineer who was trained partly through a foreign curriculum enters the labour market, which the government has identified as strategically important.

This study investigates the following two programmes: the partnership in biotechnology between

Kozybayev University and the University of Arizona, and the partnership in electroenergy between Zhubanov University and Heriot-Watt University. In both cases, the foreign curriculum is combined with the existing national curriculum at a regional university that is not the parent university. In the documents describing these programmes, the foreign curriculum is not considered a substitute for the local one. The documents describe something closer to an addition: the national architecture of obtaining a degree is preserved, and content from foreign partners is added to it. The following chapters trace how this addition is presented in the official record, discipline by discipline, category by category.

National policy background: Kazakhstan's higher education reform trajectory

Kazakhstan acceded to the Bologna Process on 11 March 2010, at the Budapest-Vienna Ministerial Conference, becoming the process's 47th member and the first Central Asian state admitted in full standing (ENIC-Kazakhstan, n.d.; IQAA, n.d.). The date is of particular importance here because it sets the baseline: everything that is done within the framework of the two thematic study programmes, including the structure of credits, degree cycles and qualification levels, corresponds to the obligations of 2010.

The national Qualifications Framework, based on this commitment, provides for obtaining a bachelor's degree at level 6, which corresponds to the first cycle of the Qualifications Framework of the EHEA (European Training Foundation, 2021). Both electroenergy programmes examined in this paper carry that level-6 designation explicitly in their documentation.

The persistence of national degree architecture is also consistent with Kazakhstan's uneven move toward institutional autonomy. Sagintayeva and Kurakbayev (2015) locate this problem in Kazakhstan's long-standing "centralist model of institutional governance" (p. 197), where universities still have to comply with "standardized curriculum across bachelors, masters and doctoral programmes" (p. 201). Foreign-partner curriculum content therefore enters a regulated programme architecture rather than an empty institutional space.

Language policy adds a second layer to this structure. President Nazarbayev announced the trilingual education concept in October 2006 and set it out formally as "Trinity of Languages" in his 2007 policy address, assigning Kazakh the status of state language, Russian the role of interethnic communication, and English the function of global integration (Karabassova, 2020). The Ministry subsequently developed a dedicated implementation concept in 2012. STEM subjects were initially included in the English language curriculum because English has a competitive advantage that the other two languages cannot provide (Manan & Hajar, 2024). In both dual degree programmes discussed in this article, the language of instruction switches to English precisely where the trilingual policy presupposes such a transition: in science and engineering disciplines, in educational institutions beyond the flagship level. Thus, the transition to English can be considered as part of the process of spreading and implementing "global templates of knowledge" within the framework of the internationalisation of curricula (Shahjahan et al., 2024, p. 278).

This flagship tier belongs to Nazarbayev University, an autonomous educational institution with English as the language of instruction, which has become an international benchmark since its foundation. Kozybayev and Zhubanov universities take a different position. Government sources describe a policy of positioning foreign universities as strategic partners of regional educational institutions, expanding internationalisation beyond the flagship model in the state university system, which serves the majority of Kazakhstani students (WENR, 2021). On this basis, the Kozybayev-Arizona partnership was established in 2022 as the first University of Arizona microcampus in Central Asia, enrolling dual-degree biotechnology students alongside programmes in information systems and inclusive education (Arizona International, 2023; The Astana Times, 2025). The Zhubanov-Heriot-Watt partnership was established in 2023 and covers three double-diploma engineering programmes, including the Electrical and Electronic Systems degree discussed in this article (Heriot-Watt University, 2023). This detail distinguishes Zhubanov from the case of Kozybaev, where the documented model means dual certification from two named institutions, rather than a single global credential.

Conceptual background: internationalization of curriculum and transnational higher education

According to Knight (2004), internationalisation is the process of integrating an international, intercultural, or global dimension into the goals, functions, and implementation of higher education, distinguishing activities aimed at sending students and staff abroad from those that change what happens within the national curriculum itself. Leask (2015) focused on the second half of this distinction, defining the internationalisation of the curriculum as the incorporation of international and intercultural aspects into the

content, learning outcomes, assessment, and teaching methods separately from the informal curriculum concerning campus life and student interaction. The programmes discussed here fully comply with Leask's requirements. Their documents describe changes to course content, credit structures, and the language of instruction. They say almost nothing about the informal or extracurricular aspects of the student experience, which lie beyond their documentary scope and the requirements of this article.

In the narrower literature on cross-border credential arrangements, Knight (2011) and Knight and Lee (2012) separate joint degrees, which award a single combined qualification, from double or dual degrees, which award two separate qualifications in one course of study, and from consecutive degrees, which sequence two qualifications across different periods of enrolment. This typology is important for an accurate reading of the case file: the Kozybaev-Arizona programme is documented as a double degree agreement with dual certification, while the Zhubanov-Heriot-Watt programme, according to Heriot-Watt's own description, approaches a single global credential, despite having a double degree mark at the local level. McBurnie and Ziguras (2007) propose a broader category that includes both mechanisms: transnational education, defined as including any education provided by an educational institution located in one country to students living in another, whether through branch campuses, partnership agreements, or degree programmes supported by partners. Lane and Kinser's research programme on multinational colleges and universities (Lane & Kinser, 2011) and their subsequent work on cross-border privatisation (Lane & Kinser, 2011) and on the tension between global market competition and local economic development in these arrangements (Owens & Lane, 2014) provide the empirical vocabulary this paper draws on to describe partnership structure, credit transfer, and institutional governance.

Marginson and Rhoades (2002) propose a conceptual tool suitable for solving a different problem: how to consider both local and international elements simultaneously, rather than considering one as a consequence of the other. Their glonacal agency heuristic identifies three planes, global, national, and local, that operate simultaneously rather than sequentially, with agency exercised at every scale rather than flowing downward from the global to the local alone. In relation to the educational curriculum, this heuristic defies interpretation, in which the international partner simply displaces the national content. Instead, it supports a concept in which the architecture of national diplomas, national regulatory references, and the foreign partners' curricula co-exist within the same document, while maintaining their own visible presence. A recent study on the internationalisation of curricula and the development of global curricula extends this logic directly to transnational higher education. Shahjahan et al. (2024) define "content integration" and "mobility" as recurring modes of actualisation, but their more useful aspect for this paper is that the internationalisation of curricula "contextual and nuanced" and has "political and epistemological consequences" (p. 262); Caniglia et al. (2018) describe curricula that combine elements common to the whole world with implementation at the local level, rather than replacing one with the other, and Miani (2026) describes Sino-foreign joint universities in which local, national and global elements interpenetrate and create tension, rather than combining into a single coordinated project. In this document, the multilayered curriculum is used as a working term to refer to the same phenomenon in the case of Kazakhstan: the structure of the national programme is maintained as a base level, and the content of foreign partners is added on top of it, while the two layers are displayed together in the same programme document, rather than one replacing the other.

Empirical literature on joint and double-degree programmes

The empirical literature on joint and double-degree programmes focuses on outcomes rather than curriculum content. According to a survey by the Institute of International Education conducted in 245 educational institutions in 28 countries, business and management were named as disciplines for current or planned joint and double-degree programmes by 47.3% of respondents, while engineering was 39.2%, ahead of all other fields in which the survey was conducted (Obst, Kuder, & Banks, 2011). Obst and Kuder (2012) describe business management and engineering as "mainstream" of the joint-degree at the international level. Detailed documentary studies of how a particular engineering or biotechnology curriculum is assembled at a specific regional university remain rare.

In Kazakhstan, a recent study has begun to consider double-diploma programmes as independent objects of study rather than as an element of education policy. Komekbayev, Kurmangaliyeva and Kassenov (2025) analyse joint education with a double degree as a tool for improving the quality of programmes in accordance with European quality assurance standards, comparing Kazakhstan's experience with the criteria of ESG and

the EHEA. Komekbayev, Kurmangaliyeva and Dyke (2025) are studying dual-degree programmes in connection with the results of scientific research in Kazakhstan, based on the Ministry's statistical reports on joint and dual programmes for 2022 and 2023. None of the studies uses the policy documents themselves as primary material. Both studies use aggregated data at the institutional or ministerial level. Research focused on faculty shows another limitation at the participant level: Kazakhstani teachers often support internationalisation, while expressing concern about brain drain, cultural identity, and limited opportunities for mobility and research collaboration (Kuzhabekova et al., 2022). The comparative study of Pakistan and the United Kingdom conducted by Zahid and Neary (2023) is useful as a guide for neighbouring countries, as it highlights global and local tensions in employment, labour market information, and global citizenship.

The extensive literature on higher education in the post-Soviet space and Central Asia reflects the regional context in which the examples given in this article are considered, without directly addressing dual degree programmes. Chankseliani (2022) treats internationalisation as a defining feature of post-Soviet higher education transformation rather than an accidental factor. Likewise, Silova (2011) demonstrates how global reform models are accepted, adapted, and also sometimes rejected on the margins of the former Soviet Union, which bears directly on how foreign curricula are absorbed by regional Kazakhstani universities. None of this literature examines a paired local and dual-degree programme at the level of the curriculum document.

Gap statement

Two absences run through the literature reviewed above. The empirical work on joint and double-degree programmes measures outcomes: quality-assurance compliance, research output, disciplinary distribution across institutions. It does not treat the programme document itself as a site where claims about local relevance and international standard are made, balanced, and sometimes left in tension. The post-Soviet higher education literature does the opposite: it interprets policy and institutional change at a national or system level without descending to the level of a single paired programme comparison.

No study identified in this review compares a local programme and its dual-degree counterpart within the same university and the same discipline, treating the pairing itself as the unit that makes the international addition visible. Existing accounts of Kazakhstani double-diploma programmes describe them individually, against national statistics, or against European quality benchmarks. None reads a dual-degree programme beside the local programme occupying the same disciplinary space at the same institution, which is the only vantage point from which the specific curriculum content added by the foreign partner, rather than the curriculum content already present in any Kazakhstani biotechnology or electroenergy programme, becomes separable in the documentary record.

This gap is not primarily a disciplinary one. Engineering already receives more attention in the global joint-degree literature than most other fields (Obst, Kuder, & Banks, 2011). It is a gap in comparative method, and a gap specific to regional, non-flagship Kazakhstani institutions rather than to the internationalisation literature broadly, which has produced considerable work on Nazarbayev University but comparatively little on the state universities where double-diploma programmes have expanded most recently. The paired case design adopted in this paper addresses both absences directly, by fixing discipline and institution constant across the local and dual-degree comparison and by working from the programme documents as primary material rather than as background for aggregate analysis.

Purpose, research questions, and argument

This study examines how official programme documents represent differences between local and dual-degree STEM curricula within the same universities and disciplinary fields. The main research question asks: How do local and dual-degree programme documents differ in their curricular emphasis, intended graduate competencies, international integration, and adaptation to Kazakhstan's professional context?

The argument developed in the Findings section is that the programme pairs represent different but connected curricular orientations. The local programmes foreground applied sectoral preparation, national professional standards, regulatory requirements, and domestic labour-market needs. The dual-degree versions retain this foundation but redistribute curricular emphasis toward industrial and research-oriented biotechnology in one case and digital, computational, sustainable, and project-based engineering in the other. Foreign-partner content, certification, joint teaching, mobility, and project components support this reconfiguration. These claims concern the formal representation of the programmes rather than curriculum-development decisions, classroom implementation, or student experience.

Methods

This study uses a qualitative comparative analysis of documents. The design is comparative because each dual-degree programme is considered alongside a local programme in the same disciplinary field and at the same educational institution. It is document-based, as empirical material consists of official programme reports, programme descriptions, and university or partner-university webpages, rather than interviews, classroom observations, survey responses, or internal institution files.

The study is organised as an embedded project with a multiple-case design. Two institutional cases are Kozybayev University and Zhubanov University. Each case contains two programme-level units: one local programme and one dual-degree programme. The Kozybaev case involves a local Biotechnology programme and a Biotechnology programme affiliated with the University of Arizona. The Zhubanov case concerns a local Electroenergy programme and an Electroenergy programme linked to the Heriot-Watt University. Thus, the unit of analysis is the educational programme, not the university. Universities provide an institutional framework for comparison, but the analysis focuses on how the programme documentation reflects the structure of the curriculum, the language of instruction, learning outcomes, skills orientation, international integration, and adaptation to local conditions.

The aim of this study is interpretive rather than evaluative. The study does not evaluate the programme quality, teaching effectiveness, the student experience, graduate outcomes, or the implementation of partnership agreements. It examines how official documents formalise the relationship between the requirements of the local curriculum and the elements of the international curriculum. This distinction is important because programme documents may show what is specified, named, retained, added, or omitted when developing an official curriculum. They cannot show how these elements are implemented in classrooms, in assessment, student mobility, or faculty collaboration.

The cases were selected purposively. The aim was not to construct a representative sample of dual-degree programmes in Kazakhstan, but to identify programme pairs that could support a direct comparison between a local curriculum and an internationalised version in the same disciplinary and institutional setting. Four selection criteria were applied. Each case had to be located in a Kazakhstani state university; include a local programme and a dual-degree or double-diploma programme in the same broad field; involve a foreign university partner; and have publicly available programme documentation detailed enough to compare structure, language of instruction, curriculum content, learning outcomes, skills orientation, international integration, and local adaptation.

Two institutional cases met these criteria. The first is Kozybayev University, where the local 6B05102 Biotechnology programme is compared with the dual-degree 6B05111 Biotechnology programme, registered on the Unified Higher Education Platform of Kazakhstan (EPVO) under 6B05100076 and associated with the University of Arizona (EPVO, n.d.-a, n.d.-b; Arizona International, 2023). The second is Zhubanov University, where the local 6B07106 Electroenergy programme is compared with the 6B07108 Electroenergy RK+UK double-diploma programme associated with Heriot-Watt University (EPVO, n.d.-c, n.d.-d; Zhubanov University, 2025).

Table 1

Cases and programme-level units included in the study

Institutional case	Local programme unit	Dual-degree programme unit	Foreign partner	Field
Kozybayev University	6B05102 Biotechnology	6B05111 Biotechnology, EPVO registration number 6B05100076	University of Arizona	Biotechnology
Zhubanov University	6B07106 Electroenergy	6B07108 Electroenergy RK+UK	Heriot-Watt University	Electroenergy

The two cases are both STEM-oriented, but they are not identical in disciplinary content. Biotechnology and electroenergy organise knowledge, skills, and professional preparation differently. That difference is useful for this study because it allows the analysis to examine whether similar patterns of curriculum layering

appear across two technical fields, rather than inside a single programme area only.

The data corpus consists of publicly available programme-level documents. EPVO records form the core source for programme registration number, programme title, degree level, programme type, language of instruction, credit volume, learning outcomes, professional standards, and lists of courses. University and partner-university webpages were used to supplement the EPVO records where they described the foreign partnership, double-degree arrangement, mobility, joint teaching, or public-facing curriculum features. Supporting public programme databases were used only where they repeated or clarified programme information available in official sources.

The EPVO records were treated as the primary programme documents because they provide structured and comparable information across all four programmes. They identify the formal programme status, credit volume, degree level, language of instruction, professional standards, learning outcomes, and course-level information. The university and partner-university webpages were treated as supplementary documents. They were used mainly for features that EPVO does not fully describe, such as the public framing of the partnership, the foreign partner's involvement, the dual-degree arrangement, and mobility or joint-teaching claims.

Table 2

Document corpus and information extracted

Programme	Main document sources	Information extracted
6B05102 Biotechnology	EPVO record; Univision programme page	Programme status, credits, language of instruction, learning outcomes, curriculum content, skills orientation
6B05111 Biotechnology	EPVO record; Kozybayev programme page; Arizona International announcement	Double-degree status, partner university, English-medium instruction, curriculum emphasis, mobility, joint teaching, international alignment
6B07106 Electroenergy	EPVO record	Programme status, credits, language of instruction, professional standards, learning outcomes, curriculum content
6B07108 Electroenergy RK+UK	EPVO record; Zhubanov-Heriot-Watt programme page	Double-diploma status, partner university, English-medium instruction, credit volume, Heriot-Watt-linked content, professional standards, curriculum emphasis

The EPVO pages were saved as PDF files before analysis. This was necessary because EPVO is a dynamic online register and programme records may be updated over time. The saved versions provided a fixed documentary corpus for coding and comparison. The analysis therefore refers to the documents as they appeared in the saved records used for this study, rather than treating the online register as a stable text.

When preparing the documents, the study used structured extraction rather than a free summary. The study used a comparative matrix with one column for each programme and rows representing the analytical categories: programme structure and degree format, language of instruction, curriculum content, learning outcomes, skills orientation, international integration and adaptation to local conditions. The study included information in the matrix only when it was present in the documents. Absences were also recorded. For instance, if the document contains a description of the language of instruction, but there is no explanation of how this language was distributed among courses, this absence was retained as a documentary limitation and not filled in by inference.

The study reviewed the source documents in the original languages. The EPVO materials were primarily in Kazakh, the university's web pages contained materials in English and Kazakh-Russian, and information about the partner university was in English. The relevant content in Kazakh and Russian has been translated into English for analysis and manuscript writing. The translation was used as an analytical step rather than to replace the source text: programme names, learning outcomes, course descriptions, and fields indicating the language of instruction were checked against the original wording when they confirmed the findings.

Data analysis

In this study, the analysis used directed qualitative content analysis supported by a framework matrix. Since the study did not begin with open-ended coding of an unstructured corpus, the method of directed content analysis was chosen for the analysis. The research questions and document format already identified the

categories that needed comparison: degree structure, language, curriculum content, learning outcomes, skills orientation, international integration, and local adaptation. These categories guided the first cycle of coding, following the logic of directed qualitative content analysis in which prior concepts organise the initial coding structure (Hsieh & Shannon, 2005). The framework matrix then allowed the same categories to be applied across all four programme units in a systematic way (Gale et al., 2013).

The first stage was familiarisation. Each document was read to identify where it described the programme's formal structure, disciplinary content, learning outcomes, skills, language policy, partner involvement, and local or international reference points. The purpose of this reading was not to paraphrase the documents as whole texts. It was to locate comparable evidence across documents that were uneven in length, format, and level of detail.

The second stage was deductive coding. Text segments were coded under seven categories: programme structure and degree format; language of instruction; curriculum content; learning outcomes; skills orientation; international integration; and local adaptation.

The third stage was within-case comparison. Each local programme was compared with its dual-degree counterpart to identify immediate documentary differences: language shifts, foreign-partner status, curriculum additions, differences in learning outcomes, and retained local references.

The fourth stage consists of cross-case comparison. Two institutional cases were compared to identify recurring patterns and differences in specific cases. At this stage, a separation was made between what was in both cases and what belonged to one discipline or one partnership. For instance, both dual degree programmes were documented as English language learning programmes and foreign partner programmes, but the disciplinary additions were different. Biotechnology has focused on fermentation, industrial biotechnology, GMO-related content, and advanced research methods. Electroenergy has moved to computing, digital electronics, modelling, AI, sustainability, and project-based engineering.

Theme construction was based on a matrix comparison. The final topics were not identified as headings before the analysis. They were developed based on repeated patterns in the coded matrix and then refined according to the documents. This process produced the findings structure: programme configuration, national anchoring of local programmes, international curriculum layers, shifts in skills orientation and graduate profile, local adaptation within internationalised programmes, and cross-case curriculum layering. The theme-building process therefore combined deductive coding with comparative thematic interpretation, rather than treating themes as isolated topics detached from the programme pairs.

The final analytic construct was curriculum layering. In this study, curriculum layering refers to the documented addition of foreign-partner curriculum content, English-medium instruction, international certification, mobility or project components, and expanded graduate competencies onto programmes that retain national degree architecture and local professional reference points. The construct was used to name the cross-case pattern after within-case and cross-case comparisons had been completed. It was not used to claim that the programmes are implemented successfully or experienced in the same way by students and staff. The documents support claims about formal curriculum representation; they do not support claims about enactment.

Analytical consistency was addressed through a fixed comparison structure. The same categories were applied to all four programme-level units: programme structure and degree format, language of instruction, curriculum content, learning outcomes, skills orientation, international integration, and local adaptation. This reduced the risk of reading one case through a richer set of categories than the other. It also kept the comparison tied to information that appeared across the document corpus, rather than to isolated details available for only one programme.

Documentary silence was treated as part of the evidence. If the documents specify English as the language of instruction, but do not describe how English is taught, the analysis does not infer for conclusions about classroom practice. If the webpage mentioned joint teaching or mobility without specifying the details of assessment procedures, the analysis limited the relevant statement to the level of a formal description of the educational programme. This was particularly important because the study examined the official presentation of the curriculum, and not the quality of its implementation, student experience, or graduate outcomes.

The final themes were checked by paired comparison. Each topic should reflect both institutional cases, as well as the differences between the local-to-dual-degree within each case. Themes that described only one

programme, one partner, or one discipline were treated as case-specific evidence rather than cross-case findings. The resulting analysis therefore separates recurring patterns, such as English-medium dual-degree design and foreign-partner curriculum additions, from field-specific curriculum content, such as industrial biotechnology in one case and digital engineering in the other.

Ethical considerations

The present article uses publicly available programme documents. It does not report interview data, student data, personnel data, internal correspondence, unpublished institutional documents, or confidential curriculum materials. The analysed sources are official programme records, educational programme passports, university webpages, partner-university webpages, and public programme information pages. For this reason, the main ethical obligation in this article is not participant protection in the usual interview-based sense, but careful handling of institutional representation.

The universities and partner institutions are named because the programmes are publicly identifiable in official registers and university webpages. Anonymisation would not meaningfully protect the cases: the combination of programme field, foreign partner, programme code, and public dual-degree arrangement would make the institutions recognisable. The paper therefore names the programmes and institutions, but limits its claims to formal curriculum documentation. It does not evaluate institutional performance, programme quality, teaching effectiveness, or partnership success.

Findings

In this section, the findings are presented as a comparison of two local bachelor's programmes with their corresponding dual degree versions. The analysis examines each programme as it is represented in official documents. These documents define the degree structure, the language of instruction, curriculum emphasis, learning outcomes, as well as the links to the national and international professional context. However, they do not reflect the specifics of classroom teaching, student experience, graduate outcomes, or the quality of programme implementation. Therefore, the analysis is limited to the level of formal presentation of the curriculum.

The Kozybayev University pair is closely matched in structure. Both are four-year bachelor's degree programmes in biotechnology and provide for the completion of 240 credits. The local programme is described as a biotechnology programme implemented in Kazakh and Russian and developed by Kozybayev University. The dual-degree programme version retains the same length of study and credit volume, but its formal status is changing. It is presented as a double-degree programme with the University of Arizona, where the language of instruction is English. Thus, the differences are not in the basic structure of the educational programme, but rather in the presence of a partner reference, double-degree status, and the transition to English-medium instruction (EPVO, n.d.-a, n.d.-b; Univision, n.d.; Arizona International, 2023).

A pair of Zhubanov University programmes follow the same logic, but include one documented structural difference. Both programmes are four-year Bachelor's degree programmes in electroenergy and correspond to level 6 of the National Qualifications Framework. The local programme is defined as an active Kazakhstan educational programme without a foreign partner, providing 240 credits and training in Kazakh and Russian languages. The double diploma programme is defined as a new educational programme implemented jointly with Heriot-Watt University, taught in English and providing 243 ECTS credits. Differences in the credit notation a formal distinction between a local programme and a double-diploma version, while the degree level and the disciplinary field remain the same (EPVO, n.d.-c, n.d.-d; Zhubanov University, 2025).

Local educational programmes form the national disciplinary framework for pair comparisons. In official documents, the programmes are not presented as context-neutral versions of biotechnology and electroenergy. They are focused on Kazakh and Russian language instruction, sectoral application, professional standards, and nationally determined graduate training. Before the inclusion of a component related to a foreign partner in the comparison, the curriculum is already integrated into the regulatory system and labour market conditions of Kazakhstan.

The Kozybayev University biotechnology programme is described as a four-year bachelor's degree programme implemented in Kazakh and Russian. Its curriculum focuses on applied agricultural biotechnology and life sciences, including crop production, animal breeding, feed biotechnology, plant protection, biosafety,

ecology, mathematics, law, research methods, microbiology, cell biology, molecular biology, chemistry, genetics, and general biotechnological processes. The programme description is linked to the agro-biotechnological sector of Kazakhstan and the needs of the regional labour market. The learning outcomes retain the same focus: graduates are expected to know local production processes, apply quality control based on GOST standards, work in accordance with biosafety requirements, and develop managerial and communication competencies necessary for professional activity in a domestic context (EPVO, n.d.-a; Univision, n.d.).

The programme's skills profile is also close to applied production and laboratory practice. The documents focus on laboratory and field skills, biotechnological production, farming practices, and product testing. Public speaking, teamwork, and civic awareness skills are also present. Still, they are considered as elements of the learning outcomes of the local programme, rather than as international graduate characteristics. Thus, the graduate represented as a specialist in biotechnology, prepared to work in the agricultural, food, environmental and regional employment sectors of Kazakhstan, possessing technical and civil competencies formulated in a national context (EPVO, n.d.-a; Univision, n.d.).

The electroenergy programme at Zhubanov University belongs to a different sector, but shows a similar structure. It is defined as an operating Kazakhstani educational programme without a foreign partner. The programme is implemented in Kazakh and Russian, includes 240 credits and corresponds to level 6 of the National Qualifications Framework. The curriculum focuses on mathematics, physics, electrical theory, electrical machines, heat and thermal systems, power generation, as well as the design of power distribution. The programme also presents disciplines and topics focused on the national context, including General Energy, energy systems of Kazakhstan, Kazakh cultural studies and the discipline "Ulttyk Rukhaniyat" (EPVO, n.d.-c).

Practical training in the local Zhubanov University programme is described more directly in the Kozybayev University case. The document lists installation, diagnostics, maintenance, commissioning, repair, electrical measurements, power-system calculations, equipment design, testing and safe operation. The learning outcomes link these skills to local standards, national regulatory requirements, and the operation of power facilities. Transversal competencies are also presented in a national context and include teamwork, leadership, legal and ethical norms, financial literacy, environmental responsibility, Kazakh language and adherence to national regulatory requirements. In the documents, the graduate is presented as an engineer prepared to work in the energy infrastructure of Kazakhstan and in accordance with national professional standards (EPVO, n.d.-c).

The dual-degree programmes add international elements at several points in the curriculum documents. Partner names are only one part of this change. The documents also record changes in language arrangements, degree certification, curriculum content, teaching organisation, mobility options, disciplinary specialisation, and the skills attached to graduate preparation. These additions become visible because each dual-degree programme can be read beside a local programme in the same university and field.

In the Kozybayev case, the dual-degree biotechnology programme changes the programme's formal identity. The local programme is identified as a bachelor's biotechnology programme developed by Kozybayev University. The dual-degree version is identified as a Kazakhstan-US programme with dual certification involving the University of Arizona. Its language arrangement changes from Kazakh and Russian in the local programme to English in the dual-degree programme. The credit volume and four-year structure remain unchanged, but the programme is documented as an English-medium curriculum connected to a US partner and a double-degree arrangement (EPVO, n.d.-a, n.d.-b; Arizona International, 2023).

The Arizona-linked programme also reorders the disciplinary emphasis. The local biotechnology programme foregrounds agriculture-focused content: crop production, animal breeding, feed biotechnology, plant protection, biosafety, and local quality standards. The dual-degree programme foregrounds fermentation, industrial biotechnology, food and beverage technologies, biologically active preparations, insect-resistant crops, GMO risk assessment, analytical chemistry, leadership, innovation, and advanced research techniques. The programme description states that the curriculum is aligned with University of Arizona standards and prepares specialists for industry areas linked to fermented food and beverages, biologically active preparations, insect-resistant crops, and fundamental research (EPVO, n.d.-a, n.d.-b; M. Kozybayev North Kazakhstan University, n.d.; Arizona International, 2023).

The Arizona component is organisational as well as curricular. The documents mention courses developed jointly by Kozybayev University and the University of Arizona, taught with the participation of representatives of both universities, as well as the possibility of studying for one semester at the University of Arizona. These features integrate the international component into the documented structure of the programme implementation. The presented information does not show how joint teaching is conducted in classrooms or implemented in assessment procedures. Instead, they reflect a formal programme design based on the shared curriculum development, cross-institutional teaching, academic mobility and dual certification (Arizona International, 2023; M. Kozybayev North Kazakhstan University, n.d.).

The Zhubanov-Heriot-Watt programme adds a different international level. The local educational programme on electroenergy is described as an operating Kazakhstani programme with no foreign partner, implemented in Kazakh and Russian. In turn, the double diploma programme is presented as a new educational programme implemented jointly with Heriot-Watt University, taught in English and leading to diplomas from KZ and the UK. From a formal linguistic perspective, the Zhubanov-Heriot-Watt case repeats the Kozybayev-Arizona model: the local programme is documented in Kazakh and Russian, while the double diploma programme is in English (EPVO, n.d.-c, n.d.-d; Zhubanov University, 2025).

The curriculum of Heriot-Watt is clearly manifested in technical modules. The double-diploma programme retains the basic content of the electroenergy, including circuits, electronics, machines, and power systems. Then, it includes modules on advanced digital electronics, FPGA-based design, signals and systems, power system modelling, computing for engineering, sustainable energy, artificial intelligence, and senior project courses. The documents also explicitly mention modules related to Heriot-Watt, including the course “Computing for Engineering (Heriot-Watt)”. Compared to the local programme focused on power equipment, diagnostics, installation, maintenance, and Kazakhstan’s energy systems, the double-diploma version shifts the curriculum towards digital engineering, modelling, sustainable development, artificial intelligence, and project-based learning (EPVO, n.d.-c, n.d.-d; Zhubanov University, 2025).

The Zhubanov documents also link internationalisation to academic and professional skills. The double-diploma programme focuses on the development of communication and academic English, research skills, numerical methods, software tools, intercultural teamwork, inclusion and diversity, sustainability, and engineering management. The local programme pays more attention to the Kazakh language, national legislation, national ethics, legal norms, financial literacy and environmental responsibility in the Kazakhstani professional context. This distinction is descriptive rather than evaluative: one programme defines professional preparation through national industry practice, while the other complements it with an English-medium engineering profile based on the components of the Heriot-Watt curriculum and the global engineering agenda (EPVO, n.d.-c, n.d.-d; Zhubanov University, 2025).

The documents define different sets of skills for local and dual-degree programmes. Local programmes focus on applied competencies in Kazakhstan's sectoral conditions. The dual degree programmes expand a graduate's documented profile through English language proficiency, research skills, digital or advanced technical tools, project work, leadership, innovation, and international professional references.

In the Kozybayev University biotechnology case, the local educational programme represents the graduate as a specialist in applied biotechnology for agriculture, production, and laboratory work. The list of declared competencies includes laboratory and field practice, biotechnological production, farming practices, product testing, biosafety, and quality control. The learning outcomes also include knowledge of local production processes and GOST-based quality standards. Communication skills, teamwork, public speaking, and civic awareness are present in the programme description, but they are considered within the framework of local professional and social expectations, rather than through the prism of international mobility or certification by foreign partners. According to the documents, the graduate is characterised as a technically trained, practice-oriented specialist focused on the agrobiotechnological sector of Kazakhstan (EPVO, n.d.-a; Univision, n.d.).

The Biotechnology programme, implemented jointly with the University of Arizona, maintains a disciplinary foundation in microbiology, cell biology, molecular biology, chemistry, genetics, and biotechnological processes. It is complemented by two areas of competence development. The first is related to specialised industrial biotechnology and includes fermentation, food and beverage biotechnology, biologically active compounds, GMO risk assessment, analytical chemistry, and advanced research

techniques. The second area covers broader professional preparation: English language proficiency, leadership competencies, innovation management, project teamwork, data analysis, and internationally recognised industry standards. The graduate is still positioned as a biotechnology specialist, but the documented profile of his competencies is shifting towards industrial processes, research techniques, English-mediated communication, and mobility provided by partnership with the University of Arizona (EPVO, n.d.-b; M. Kozybayev North Kazakhstan University, n.d.; Arizona International, 2023).

The Zhubanov local electroenergy programme constructs a different sectoral profile. Its graduate is prepared for electrical measurements, power-system calculations, equipment design, testing, installation, commissioning, repair, diagnostics, maintenance, and safe operation of power facilities. The document also lists teamwork, leadership, legal and ethical norms, financial literacy, environmental responsibility, Kazakh language, and commitment to local regulations. Technical competence is paired with professional conduct defined through Kazakhstan's energy sector and regulatory environment (EPVO, n.d.-c).

The Heriot-Watt-linked programme keeps the electrical engineering base, including circuits, electronics, machines, and power systems, but gives more space to digital and analytical competence. The document names digital signal processing, programming, FPGA-based design, numerical methods, modelling, simulation, software tools, AI, sustainable energy, and engineering management. Senior project courses make design, creation, and problem-solving more visible in the programme description. English communication and academic study skills also enter the profile, including learning strategies, motivation, time management, reading strategies, and communication techniques. The graduate represented in this document is an electroenergy specialist whose competence is described through English-medium engineering knowledge, digital tools, project work, sustainability, and research-oriented preparation (EPVO, n.d.-d; Zhubanov University, 2025).

The dual-degree documents do not detach the programmes from Kazakhstan's educational and professional setting. Foreign-partner elements enter the curriculum, but local reference points remain: national qualification requirements, sectoral needs, domestic employment fields, regulatory knowledge, and Kazakhstan-specific professional standards. The form differs by case. In the Kozybayev documents, local adaptation appears mainly through sectoral aims, biotechnology applications, and Kazakhstan-facing regulatory references. In the Zhubanov documents, local adaptation appears through licensing, professional standards, labour-market references, and national energy priorities, even though the Heriot-Watt-linked programme is documented as English-medium.

The Arizona-linked biotechnology programme keeps several Kazakhstan-facing elements inside the internationalised curriculum. The programme addresses local needs, including insect-resistant crop development, and requires knowledge of Kazakhstan's biotechnology regulations and industries. The documents also place both biotechnology programmes within Kazakhstan's biotechnology-related employment sectors. The international additions expand the curriculum toward fermentation, industrial biotechnology, GMO-related content, and international standards, but the local sectoral reference remains present in the programme description (EPVO, n.d.-b; M. Kozybayev North Kazakhstan University, n.d.; Arizona International, 2023).

The Zhubanov-Heriot-Watt programme uses a different model. The double diploma programme is taught in English and includes content developed in collaboration with Heriot-Watt, such as computing for engineering, sustainable energy, artificial intelligence, power-system modelling, and project-based courses. Local adaptation is manifested through compliance with the licensing system of Kazakhstan, compliance with the requirements of educational legislation, national labour market needs, professional standards and consideration of national goals in the sustainable energy field. The documents indicate that both electroenergy programmes prepare graduates for professional work in Kazakhstan. Additionally, they note that the Kazakh component is less pronounced in the double diploma programme than in the local programme (EPVO, n.d.-c, n.d.-d; Zhubanov University, 2025).

The differences between Zhubanov University's two programmes are explicit. The local programme taught in Kazakh and Russian and includes the study of Kazakhstan's energy systems, national values through "Ulttik ruhaniyat," and practical preparation for local power equipment. The programme, implemented jointly with Heriot-Watt, maintains compliance with national licensing requirements and labour market needs, but focuses more on English, global engineering content, sustainability, AI, digital systems, and international

professional preparation. The comparison also shows that Kazakh and Russian language preparation is reflected in the documentation of the double diploma programme to a lesser extent than in the documentation of the local programme (EPVO, n.d.-c, n.d.-d; Zhubanov University, 2025).

Cross-case pattern: curriculum layering across both cases

The cross-case pattern is addition, redistribution, and selective retention. The dual degree programmes are not presented in the documents as a substitute for local educational programmes. The basic bachelor's architecture remains visible: in both cases, the programmes retain their affiliation to the same subject areas, the four-year structure and compliance with the requirements of the education regulation of Kazakhstan. The changes relate to those components that are being added to this structure: English instruction, partner certification, specialised disciplinary content, academic and professional skills, mobility or project components, as well as international reference points.

In both cases, four levels are repeated. The first is linguistic: local programmes are implemented in Kazakh and Russian, while dual degree programmes are documented as English language programmes. The second is disciplinary: the biotechnology programme is expanding with content related to fermentation, industrial biotechnology, and GMO-related content, while the electroenergy programme is complemented by computing, AI, digital electronics, modelling, and sustainability. The third level is organisational: dual certification, joint teaching, academic mobility, Heriot-Watt modules and curriculum elements based on the UK model link the programme with a foreign partner university. The fourth level is professional: international standards, research skills, project work, leadership, innovation, English communication, as well as intercultural or sustainability-oriented competencies are added to the graduate's profile, which is still focused on the national labour market.

The local component is unevenly preserved in the programmes. In the case of the Kozybayev-Arizona programme, local and international elements are combined through Kazakhstan-oriented biotechnology applications, links to the local industry, and regulatory knowledge, rather than by preserving the Kazakh/Russian-language profile of the programme. In the case of Zhubanov and Heriot-Watt universities, English-language instruction and the content developed jointly with Heriot-Watt form a clearer distinction between the local programme and the double diploma programmes. The documents of the Zhubanov University continue to associate the double diploma programme with the licensing system of Kazakhstan and the needs of the national labour market, but also note a less pronounced attention to disciplines focused on Kazakhstani specifics, as well as the possible need for additional language support in Kazakh and Russian. (EPVO, n.d.-b, n.d.-d; M. Kozybayev North Kazakhstan University, n.d.; Zhubanov University, 2025).

The finding is quite specific: dual degree programmes preserve the national architecture of educational programmes and their connection to the local professional context, while simultaneously supplementing this framework with the curricula of a foreign partner university, English-medium instruction, international certification, and expanded graduate competencies.

Discussion

This study aimed to identify how the official documents of educational programmes reflect the combination of international curriculum with national regulatory requirements, linguistic and labour market needs of Kazakhstan in two dual-degree STEM programmes. The answer is neither curriculum replacement nor simple curriculum transfer. In both cases, the documents considered to preserve the basic architecture of the Kazakhstan bachelor's programme and complement it with content developed by a foreign partner university, English-medium instruction, partner certification, components of academic mobility or project activities, as well as an expanded set of graduate competencies. A pair comparison makes this pattern visible. Each dual-degree programme could be interpreted as an international partnership. However, a comparison with the corresponding local programme makes it possible to determine what elements have been added, what remains, and what becomes less visible.

The findings locate internationalisation inside the formal curriculum record. This is where Leask's (2015) distinction becomes useful. The documents do not give much evidence about informal student experience, intercultural campus life, or everyday teaching. They name courses, outcomes, credits, language of instruction, partner involvement, professional standards, and intended graduate competencies. Curriculum internationalisation is therefore represented through what the programme document lists and reorganises.

Shahjahan et al. (2024) identify content integration and mobility as recurrent ways of actualising curriculum internationalisation. The Kozybayev-Arizona programme records a semester exchange option and joint teaching, yet its larger documentary change is curricular, in the shift toward industrial biotechnology and English-mediated professional preparation. The Zhubanov-Heriot-Watt programme names a stronger project-based partner-curriculum structure, and its most visible changes are likewise curricular. Mobility appears, but the curriculum document itself is the main site where internationalisation is made legible.

For Kazakhstan, this difference shifts the focus from a simple counting of international partnerships to a reading of the changes in the curriculum that these partnerships bring. In policy and public reports, the presence of foreign branches, double diploma programmes, and academic mobility of students is often seen as an indicator of internationalisation. However, the documents examined in this study point to a more specific mechanism: internationalisation is included in the structure of the educational programme through the redistribution of disciplinary content, language certification, and graduate attributes. It does not remain an external sign of international partnership in relation to the curriculum. It also does not displace the local educational programme. Thus, in the official documentation, internationalisation is presented as a layered curricular arrangement.

The content of the curriculum developed by a foreign partner university is recorded in the official documentation of educational programmes administered in the national system. Dual degree programmes remain bachelor's degree programmes embedded in Kazakhstan's qualification structures, credit systems, professional standards, licensing references, and employment fields. This finding empirically confirms the concept of the glonacal reading of higher education proposed by Marginson and Rhoades (2002), according to which the global, national and local levels function simultaneously, rather than in a single downward sequence. A foreign partner university does not stand outside the national system. Its curriculum is registered through national categories of educational programmes.

The analysis of Kazakhstan's limited transition to institutional autonomy presented by Sagintayeva and Kurakbayev (2015) helps explain the same pattern. The national architecture remains clearly represented in the documents, as dual-degree programmes are created in a system where universities may develop new partnerships and curricula, but registration of educational programmes, the level of degree awarded, educational standards and official documentation are still under significant regulatory influence. Therefore, the finding of the study is not that internationalisation weakens the national curriculum. On the contrary, the documents show that it is embedded in it.

The international curriculum layer is not generic. In biotechnology, it is built through industrial fermentation, food and beverage technologies, biologically active preparations, insect-resistant crops, GMO risk assessment, analytical chemistry, research techniques, leadership, and innovation. In electroenergy, it is built through computing, digital electronics, FPGA design, modelling, AI, sustainable energy, senior projects, engineering management, and academic study skills. The partner universities do not add the same international vocabulary to both programmes. Each field receives a different international layer.

That disciplinary difference is analytically useful for the study of STEM curriculum internationalisation. Shahjahan et al. (2024) caution that curriculum internationalisation takes shape through disciplinary and regional conditions. The present cases support that claim at programme-document level. Biotechnology is internationalised through industrial and research-oriented life-science content linked to agriculture, food, biosafety, and biotechnology industries. Electroenergy is internationalised through digital engineering, modelling, sustainability, and project-based design. These additions fit the internal logic of each field. They also show why programme-level comparison is needed. A national count of dual-degree programmes cannot show which content travels into which discipline, or which local references remain attached after the international layer is added.

The STEM setting also creates a certain epistemological tension. The technical content presented in the documents is often described as universal and portable. These elements include AI, modelling, fermentation, analytical chemistry, sustainable energy, and advanced research techniques. Local adaptation manifests itself through application, regulations, employment sectors, professional standards, and national infrastructure. At the same time, the documents do not consider Kazakhstani and international knowledge as equivalent categories. The international component is mainly related to advanced technical, digital, research, and English-medium terms, while the local component is related to regulatory, sectoral, linguistic, and

employment terms. However, such a structure should not be interpreted as a judgement of the quality of one of these components. This is a documented distribution of authority and functions.

The stable signs of local markers remain outside the language profile of educational programmes. Both dual degree programmes are switching to English-medium instruction, and this transition increases the distance from the Kazakh and Russian language basis of local programmes. However, the documents on the dual degree programmes do not separate the programmes from Kazakhstan. The Arizona-linked programme maintains links with biotechnological applications focused on the needs of the domestic sector, including insect-resistant crops, biologically active preparations, industry references, and knowledge of Kazakhstan's biotechnology regulations. The Heriot-Watt-linked programme keeps national licensing system, professional standards, labour market needs and national energy priorities.

This asymmetry can be seen clearly. Local significance is still present in the documents, but it is expressed primarily through sectoral and regulatory components, rather than through the language of instruction. This is especially noticeable in Zhubanov University programmes, where the Kazakh-specific content, training in Kazakh and Russian, Kazakhstan's energy systems and national values are presented more fully in the local programme than in the double-diploma programme. The Heriot-Watt-linked programme retains its stated focus on the needs of the national labour market, but the curriculum content is more organised around English, digital systems, AI, sustainability, project work, and UK-linked engineering components.

This does not mean that local adaptation is poorly implemented in practice. The presented data cannot support that conclusion. They only indicate that local adaptation is reflected unevenly in the official documentation. Some of its elements are clearly represented by standards, licensing, regulations, and employment fields. Others are less well covered: language support, assessment mediation, professional terminology in Kazakh and Russian, and the relation between English-medium technical content and local workplace communication. Such documentary omission is one of the findings of the study. The documents identify English as the language of instruction, but do not explain how students transition from English-medium academic content to professional settings in Kazakhstan.

This study complements the existing work on the internationalisation of higher education in Kazakhstan. Existing studies have focused on issues of institutional autonomy, system reform, internationalisation of scientific activity, quality assurance alignment, faculty perception, as well as general trends in the development of dual degree programmes. These studies help to understand the policy and institutional setting, but only rarely reveal the internal curriculum arrangements through which international components become part of a named educational programme.

The main methodological contribution of the research is the paired design. While keeping the institute and broad discipline constant, it separates the additions offered by foreign partners from the content already present in local biotechnology and electroenergy programmes. Without the local counterpart, elements such as fermentation, AI, sustainability, project work, or English-medium could be perceived as a common design of an educational programme. A paired comparison shows them as added components, redistributions, and reweightings. In addition, this approach prevents considering the local programme only as a passive background for analysis. The local programme provides a baseline for the national sector that makes the international level clear.

For curriculum internationalisation scholarship, this study makes a modest conceptual gain. Curriculum layering refers to a documented structure in which global, national and local levels are simultaneously represented in an educational programme record. This term is useful since it avoids two weak interpretations: the first, according to which the foreign partner completely transfers its curriculum to Kazakhstan, and the second, according to which local adaptation absorbs the foreign curriculum, so that its international component fully disappears. The documents show neither. They show layered programmes with retained national architecture, added foreign-partner content, English-medium delivery, partner certification, mobility or project components, and local professional references.

Conclusion

This study examined how official documents represent the relationship between local and international curriculum elements in two Kazakhstani dual-degree STEM programme pairs. The documents present curriculum internationalisation as layering: the national programme architecture remains visible, while

foreign-partner content and forms of academic organisation are added to it.

The local and dual-degree programmes therefore represent different but connected curricular orientations. The local programmes foreground applied preparation for Kazakhstan's biotechnology and energy sectors, national professional standards, regulation, and domestic employment needs. The dual-degree versions retain these foundations but redistribute disciplinary content toward industrial, research-oriented, digital, computational, sustainable, and project-based preparation. Local adaptation remains selective: it appears through sectoral applications and biotechnology regulation in one case, and through licensing, professional standards, employment fields, and energy-sector priorities in the other. Curriculum layering names this combination of retained national foundations, redistributed disciplinary content, foreign-partner organisation, and expanded graduate competencies.

Implications for policy and institutional practice

The first implication concerns the national register of educational programmes. The Register already functions as the public documentary site where programme title, credit volume, language of instruction, learning outcomes, professional standards, and programme status become publicly available. The Rules for maintaining the Register define it as the official mechanism for listing educational programmes implemented by higher and postgraduate education organisations (Minister of Science and Higher Education of the Republic of Kazakhstan, 2022). For dual-degree and joint programmes, this register could require a short curriculum-internationalisation mapping field. That field should not be a promotional description. It should ask for four items: the foreign-partner curriculum elements added to the local programme base; the Kazakhstan-specific standards, sectoral references, and professional requirements retained in the programme; the language model, including any planned support for Kazakh and Russian professional terminology; and the certification, mobility, joint-teaching, or assessment arrangements attached to the foreign partner. Such a requirement would not create a new quality label. It would make the curriculum relation more transparent for students, employers, regulators, and researchers. It would also fit Kazakhstan's current policy direction, since the Concept for the Development of Higher Education and Science for 2023-2029 names internationalisation, joint and double-degree programmes, and partnerships with foreign universities as part of the sector's development agenda (Government of the Republic of Kazakhstan, 2023).

The second implication concerns programme teams at Kazakhstani universities. English-medium dual-degree STEM programmes should contain an explicit local-adaptation note in the programme documentation. This note should explain how the programme connects English-medium disciplinary content to Kazakhstan's professional standards, local regulatory vocabulary, workplace communication needs, internships or applied projects, and sectoral employment contexts. The need is clearest in programmes where Kazakh and Russian disappear from the language-of-instruction field but the graduate is still expected to work in Kazakhstan. The requirement can be written at course-team level. A biotechnology programme could specify how students encounter Kazakhstan's biosafety, agro-biotechnology, product-quality, and regulatory terminology across English-medium courses. Similarly, the electroenergy programme can specify in which disciplines students work with Kazakhstan's energy legislation, grid terminology, safety rules, technical documentation, and employer-facing communication in Kazakh or Russian. The aim is not to reduce the international English-medium component of the programme. It is to document the relationship between this layer and the national professional environment in which many graduates are likely to move.

Limitations

The first limitation is the corpus of documents used. The study is based on the public EPVO records, university educational programmes pages and the websites of foreign partner universities. The study does not include internal curriculum maps, syllabi, assessment assignments, moderation records, academic mobility agreements, faculty workload documents, teaching materials, student work, and employer feedback. Therefore, the study can show how educational programmes are presented in the official documentation. It cannot show how the teaching of courses is implemented, how assessment standards are applied, how students perceive learning in English, and how teaching is coordinated between foreign and local faculty.

The second limitation is the case scope. The study considers pairs of two STEM programmes implemented at two regional universities in Kazakhstan. This design allows for a detailed comparison of biotechnology and electroenergy programmes, but does not reflect the full diversity of dual-degree programmes in Kazakhstan. Educational programmes in medicine, pedagogy, IT, business, social sciences and

humanities may combine international and local components in other ways. In addition, leading national and private universities may demonstrate different models of documenting such programmes. Therefore, the results obtained should be considered as analytically transferable and not as statistically generalisable.

Future research could be conducted within the same programme pairs framework that goes beyond publicly available documents. The next direction may be to study the chain of curriculum implementation from registration in the EPVO to syllabus, assignment brief, assessment rubric, teaching language, mobility record, and student work. Such a research design will make it possible to determine whether the programme levels identified in this article remain separate in the teaching process, merge through assessment, or generate tensions for students and faculty. In addition, it will help to directly explore the language aspect: how students of English-medium STEM programmes of a dual-degree master the professional terminology in Kazakh and Russian necessary to work in the national professional space, and at what stages of the implemented curriculum this learning is reflected.

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Conflict of Interest Statement

The authors declare that they have no conflicts of interest with respect to the research, authorship, or publication of this article.

Author Contributions

Askat Tleuov led the conceptualisation and methodological design of the study, supervised the data collection, wrote the original manuscript, interpreted the findings, and developed the study's conclusions and implications. Temirlan Tursynbayev collected and organised the documentary data, developed the comparison matrix, conducted the comparative analysis, reviewed and revised the manuscript, and formatted it for publication. As the corresponding author, he also managed the journal submission. Both authors reviewed and approved the final version of the manuscript.

Declaration of Use of Generative AI and AI-Assisted Technologies

The authors declare that no artificial intelligence (AI) tools were used in the preparation of this manuscript.

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