

Edu-Fusion Network for Sustainable Growth: Transforming Higher Education in Kazakhstan for Labor Market Alignment and Sustainable Development

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Abstract: The EDUFUSION Project (Project ID:101179805 Call: **ERASMUS-EDU-2024-CBHE**), funded by the European Union, is a comprehensive 48-month initiative aimed at revolutionizing higher education in Kazakhstan by aligning academic outcomes with labor market demands and driving sustainable growth and job creation. The Edu-Fusion Network for Sustainable Growth (EduFusion NSG) presents an innovative, integrated framework that addresses the critical gap between academia and industry, providing a structured ecosystem that promotes collaboration, educator training, and market-relevant course offerings to enhance entrepreneurship and economic resilience on a national scale.

Introduction

The EDUFUSION Project, officially launched on December 1, 2024, is a 48-month initiative funded under the European Union's ERASMUS-EDU-2024-CBHE program (Project ID: 101179805). This project aims to address critical challenges in Kazakhstan's higher education system by bridging the gap between academia and industry, enhancing educator training, and delivering innovative, market-aligned online courses. By fostering collaboration, modernizing teaching practices, and creating new educational opportunities, EDUFUSION is poised to play a transformative role in higher education reform and sustainable economic development.

Kazakhstan's higher education sector has been undergoing significant changes, with a national emphasis on aligning academic outcomes with labor market demands. However, systemic challenges remain, including insufficient practical training for students, a lack of collaboration between universities and industries, and outdated teaching methodologies. The EDUFUSION Project directly addresses these issues through a cohesive and innovative framework designed to modernize education and support sustainable growth.

The project focuses on three main components: the Academia-Industry Collaboration Portal (AICP), the Teacher Development and Support System (TDSS), and the Virtual STEAM & Entrepreneurship Academy (VSEA). Together, these elements form a comprehensive approach to improving the quality and relevance of education while fostering entrepreneurship and sustainable practices. By integrating these components, EDUFUSION seeks to position Kazakhstan's higher education system as a model for other emerging economies.

Needs Analysis

The higher education system in Kazakhstan has changed radically in the last five years. The most significant changes primarily affect the working conditions of teaching staff, academic freedom and the independence of universities in the development of educational programs. In general, the specialist training system should switch to a model of advanced staffing. In addition, the Minister of Science and Higher Education of the Republic of Kazakhstan, by order of November 20, 2023, approved the professional standard for teachers (faculty) of higher and postgraduate education organizations.

The Concept for the Development of Higher Education and Science, adopted in 2023, defines strategic goals and directions for modernization and innovative development of higher education and sets ambitious tasks for universities. Higher education institutions should target training graduates with qualifications that match industry, business, and current demands. Higher education institutions must adapt to the ever-changing needs of consumers of educational services, which happen rapidly. The focus is shifting from a narrow professional approach to the training of specialists to the comprehensive, intellectual development of the students' personality, factoring in their individual traits. Such societal changes necessitate the formation of professional and flexible competencies among university graduates in a new manner. At present, knowledge and even skills become outdated rather quickly and the issue of employment of young specialists is very acute. One of the major issues with education in Kazakhstan is the insufficient practical knowledge of graduates from technical universities. This is a significant concern as only 65% of young individuals actually work in engineering professions that they studied during their higher education. Many graduates are compelled to undergo further training and retraining after completing their degrees due to the lack of practical skills and knowledge in working with modern production technologies. The theoretical training provided in these universities is inadequate in bridging the gap between theoretical knowledge and practical application.

The shortage of qualified personnel in priority sectors further exacerbates this problem. There is a lack of incentive mechanisms for employers to provide internships and dual training programs based on real enterprises, which are crucial for equipping students with practical skills and experience. This raises numerous questions regarding the role of higher education institutions in training personnel that are in demand and meet industry requirements.

At the same time the country's economy depends on the level of professional training. In turn, one of the aspects of high-quality training of specialists is the availability of professional competencies that they acquire during their internship, performing tasks in production conditions, etc. To achieve these competencies, it is important to fully involve production and employers in the student learning process. The objective of this project is to create an ecosystem involving close ties between industry and universities, which contributes to their effective communication. The creation of the AICP will allow to establish and maintain this cooperation, to continue the integration of Kazakhstan into the global educational space. This need is also dictated by the need to develop dual education in the country, the course for which was first announced in the State Program for the Development of Education of the Republic of Kazakhstan for 2011-2020. STEM education is the basis for training specialists in the field of high-tech manufacturing, robotics and artificial intelligence, the relevance of which was voiced in the Message of the head of state. STEM education has been actively developing in our country since 2014. It is assumed that the TDSS, planned as part of the STEAM & Entrepreneurship Academy (VSEA) project, will provide teachers and teachers with the opportunity to take accredited online courses on STEAM and entrepreneurship, and will create a unified approach to the implementation of STEM educational ideas. Obtaining modern knowledge on entrepreneurship will allow teachers to teach and guide students and their ideas to the stage of commercialization.

Participation of Kazakhstani universities in the EDUFUSION Project is a significant step towards achieving the ambitious goals set for higher education and science development. It aligns with the national strategy to enhance the quality of education, meet labor market demands, and contribute to the societal need for well-prepared graduates. This collaborative

effort promises to equip students, teachers, and the labor market with the necessary tools and competencies for sustainable growth and innovation.

This project directly addresses the critical issues highlighted in the needs analysis, such as the misalignment between educational outcomes and labor market demands, the urgency to modernize teaching methodologies, and the need to enhance the practical skills and competencies of graduates.

Project Consortium Members

The EDUFUSION consortium comprises a diverse group of partners dedicated to transforming Kazakhstan's higher education system. The project is coordinated by the Instituto Politécnico do Porto (IPP) in Portugal and includes European beneficiaries such as Universidad de Vigo (UVIGO) in Spain, and global Network: ENTER Educators Professional Development. The project unites seven leading Kazakhstani universities: Kazakh National University named after Al-Farabi (KazNU), Kazakh National Research Technical University named after K.I. Satpayev (Satbayev University), Saken Seifullin Kazakh Agrotechnical Research University (KATU), D. Serikbayev East Kazakhstan Technical University, Academician Y.A. Buketov Karaganda State University, and Kazakh National Agrarian Research University (KazNARU). Additionally, the Central Asian Association for Accreditation of Education (CAAEE) and the Ministry of Education and Science of Kazakhstan are key contributors to the project.

The EDUFUSION Project is an Erasmus+ Strand 3 initiative, emphasizing capacity building in higher education with a particular focus on broad systemic change and sustainable impact. This type of project is designed to drive large-scale reforms by fostering collaboration among higher education institutions, government bodies, and industries. Participation from a wide range of universities across Kazakhstan, in conjunction with the Ministry of Education and Science, is fundamental to achieving these objectives. This inclusive approach ensures that the project's outcomes are nationally scalable and representative of the diverse educational and economic needs of the country. By engaging stakeholders at multiple levels, EDUFUSION creates an ecosystem that not only addresses existing gaps but also lays the foundation for long-term growth and innovation in Kazakhstan's higher education system.

Objectives

The primary goal of EDUFUSION is to create a robust ecosystem that integrates academic and industry needs, fostering collaboration, professional development, and innovation. Specifically, the project aims to establish the AICP as a dynamic platform for academia-industry partnerships, train and certify 200 educators through the TDSS, and launch 10 accredited online courses in STEAM and entrepreneurship via the VSEA. These courses will emphasize gender inclusivity and climate neutrality, addressing critical societal challenges while aligning with labor market needs.

Kazakhstan's economy is composed of 19 types of economic activity, which are distributed among 20 regions, in various proportions. The key task of the industrial-innovative economy of the country is the development of high-tech production, with the aim of making it on par with the leading economies of the world. However, this lofty goal cannot be attained solely through monetary infusions and technical upgrades without addressing the issue of appropriately skilled personnel. At the state level, adjustments have been made in legislative

and regulatory-methodical documents concerning educational and innovative activities of higher education institutions that promote the development of engineering education. The nationwide project 'Quality Education - Educated Nation' is currently underway. Its fifth task focuses on enhancing Kazakhstani universities' competitiveness. The Ministry of Science and Higher Education of the Republic of Kazakhstan places high importance on the 'System of advanced staffing - as the main priority of higher education'. Nowadays, there's a noticeable lag between what the educational system offers and what the job market needs. Education struggles to keep up due to its lengthy programs, like the typical 4-year bachelor's degree or a quicker 1-year EMBA program. Companies are taking matters into their own hands, boosting employees' skills through certifications, in-house training, and workshops. Often, specialized education centers or even universities provide these corporate training sessions. Considering all these factors, we're missing a cohesive ecosystem to handle these processes and systems.

The Edu-Fusion Network for Sustainable Growth (EduFusion NSG) project directly addresses the priorities by implementing strategies that are closely aligned with the socio-economic recovery, growth, and prosperity of Kazakhstan. It is aimed at responding to recent trends in economic globalization and human development and contribution to increase the capacities of Higher Education Institutions (HEIs), and competent authorities such as the Ministry of Higher Education. This enhancement is achieved through their active participation in the definition, implementation, and monitoring of reform processes aimed at creating an ecosystem involving tight links between industry and academy, training and certification of educators and providing online courses relevant to market needs to ensure sustainable growth and entrepreneurship rise at national level in Kazakhstan.

The project's relevance and main ideas are as follows:

1. **Improving Higher Education Quality and Relevance:** EduFusion NSG aims to enhance the competitiveness of Kazakhstani universities by aligning higher education outcomes with labor market demands. This alignment is achieved through the Academia-Industry Collaboration Portal (AICP), which facilitates partnerships between educational institutions and the business sector, ensuring that educational programs are directly relevant to market needs. Through the Teacher Development and Support System (TDSS) and the Virtual STEAM & Entrepreneurship Academy (VSEA), the project ensures that the curricula and teaching methodologies adhere to the highest quality standards. This approach not only elevates the standard of education but also enables these institutions to contribute to the national framework for quality assurance in higher education.
2. **Reforming Governance in Higher Education:** By fostering close collaboration between academia and industry through the Academia-Industry Collaboration Portal (AICP), EduFusion NSG promotes a governance model that is responsive to market needs and societal changes. This model encourages HEIs and governing bodies to adopt more flexible, dynamic, and inclusive governance structures that can effectively respond to the evolving demands of the labor market and the economy.
3. **Developing New, Innovative Education Programs:** The project introduces the Virtual STEAM & Entrepreneurship Academy (VSEA) that offers accredited online courses in STEAM and entrepreneurship. These courses are designed to be gender-inclusive and climate-neutral, addressing current societal needs and trends. The VSEA ensures that students acquire competences and skills that are directly relevant to the evolving job market.
4. **Enhancing Teacher Training and Professional Development:** The Teacher Development and Support System (TDSS) provides accredited training for educators, focusing on

modern teaching methodologies. This system ensures that teachers are internationally certified and equipped to implement contemporary and effective pedagogical approaches.

5. **Stimulating Institutional Cooperation and Capacity Building:** EduFusion NSG encourages cooperation between educational institutions and the private sector through the AICP. This initiative fosters the exchange of good practices, capacity building, and the development of innovative projects and internships.
6. **Promoting Innovation and Entrepreneurship:** The project strengthens the link between academia and the private sector, thereby promoting innovation and entrepreneurship. This is achieved through the practical training and real-world experience provided by the AICP and VSEA.
7. **Aligning Academic Programs with Labor Market Needs:** EduFusion NSG focuses on training graduates with qualifications that match industry and business demands, ensuring their employability and addressing the gap between theoretical knowledge and practical application.
8. **Fostering Initiative and Entrepreneurship Among Students:** The VSEA and AICP are designed to increase students' sense of initiative and entrepreneurship by providing them with practical skills and exposure to real-world challenges and opportunities.

To ensure the project's relevance, quarterly labor market analyses will be conducted to refine the VSEA curriculum based on feedback from over 100 industry stakeholders. Furthermore, the project seeks to achieve a 25% increase in course enrollment per semester, with a special focus on increasing female participation in STEM fields by 30%. By the project's conclusion, EDUFUSION aims to deliver a strategic plan for scaling its framework across Kazakhstan, ensuring long-term sustainability and impact.

Expected Results

The EDUFUSION Project is expected to deliver transformative results across several key areas. First, the AICP will facilitate robust academia-industry collaboration, enabling the development of joint projects and internships that prepare students for the workforce. Second, the TDSS will enhance the professional capabilities of educators, with at least 50% of participants achieving international certification standards. Third, the VSEA will provide accessible, market-relevant online courses that integrate sustainability and inclusivity, helping students develop skills aligned with current and future labor market demands.

Additionally, the project anticipates significant increases in course enrollment, particularly among women in STEM fields. By fostering a culture of innovation and entrepreneurship, EDUFUSION will contribute to Kazakhstan's socio-economic development while addressing critical gaps in education and employment. Through its strategic initiatives, the project aims to create a scalable model for higher education reform that can be replicated in other emerging economies.

Sustainability and Future Directions

Sustainability is a core focus of the EDUFUSION Project. The EDUFUSION project will ensure the continuity of its initiatives through the sustained operation of key platforms such as the Academia-Industry Collaboration Portal, Teacher Development and Support System, and Virtual STEAM & Entrepreneurship Academy. Leveraging the digital infrastructure established during the project, these platforms will continue to provide their services, facilitating ongoing collaboration between academia and industry, empowering educators

with professional development opportunities, and offering accredited online courses in STEAM and entrepreneurship. This sustained operation will be facilitated by the readiness and commitment of partner universities to maintain these initiatives, supported by direct participation and endorsement from the Ministry of Education and Science.

Future directions for EDUFUSION include expanding its framework to other Central Asian countries and fostering international collaboration to share best practices. By leveraging its successes, the project seeks to drive broader regional reforms in higher education, contributing to global efforts to enhance education and economic resilience.

Conclusion

The EDUFUSION Project represents a transformative approach to addressing systemic challenges in Kazakhstan's higher education system. By fostering collaboration between academia and industry, enhancing teacher training, and aligning academic outcomes with labor market demands, the project aims to modernize education and drive sustainable economic growth. Through its focus on innovative pedagogical methods, integration of gender inclusivity and climate neutrality, and the development of market-relevant online courses, EDUFUSION sets a benchmark for educational reform in emerging economies.

The project's inclusive design further amplifies its transformative potential. The selection process for project participants will actively promote the inclusion of minority groups, immigrant populations, and individuals from remote areas. Transparent and equitable criteria will guide this process, ensuring that diverse voices are represented and that the benefits of the project reach all segments of society. This emphasis on inclusion is pivotal in addressing systemic inequalities and creating an environment where individuals from diverse backgrounds can thrive.

Equitable resource allocation will also be a cornerstone of the project's implementation. The distribution of resources among partner Higher Education Institutions (HEIs) will be guided by a commitment to addressing disparities. Recognizing that institutions vary widely in terms of infrastructure, capacity, and access to opportunities, the project will work to rectify these differences, ensuring all participants can benefit equally from the initiative. This approach aims to level the playing field, enabling HEIs from diverse regions and contexts to fully engage in and contribute to the project's objectives.

By fostering inclusion, promoting equity, and prioritizing diversity, EDUFUSION not only addresses the pressing needs of Kazakhstan's education system but also serves as a model for equitable and sustainable reform in higher education globally. Its innovative framework and holistic approach ensure that the project's impact will endure long after its conclusion, creating a legacy of collaboration, innovation, and inclusivity.

As EDUFUSION progresses, its outcomes will provide valuable insights for policymakers, educators, and international stakeholders. By demonstrating the potential of inclusive, equitable, and collaborative reform, the project has the potential to influence broader efforts to modernize education systems and foster sustainable development in emerging economies worldwide. The legacy of EDUFUSION will be a more inclusive and resilient higher education system that empowers individuals, strengthens institutions, and contributes to the socio-economic advancement of Kazakhstan and beyond.

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