

ARTIFICIAL INTELLIGENCE READINESS AND GENDER EQUITY IN CENTRAL ASIAN HIGHER EDUCATION INSTITUTIONS

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Abstract: Over the past two decades, higher education in Central Asia has undergone a demographic transformation rarely matched elsewhere in the world: enrollment has grown nearly threefold, and the region has closed a gender gap that once left women trailing men by a wide margin, one of the genuine policy success stories of global education over this period. This achievement in access now runs alongside a second, equally significant transition: the rapid, government-led introduction of artificial intelligence (AI) into curricula, governance, and institutional infrastructure across Kazakhstan, Uzbekistan, Kyrgyzstan, Tajikistan, and Turkmenistan. This paper examines how the region's hard-won gender parity in enrollment can best be carried forward and reinforced as this new digital transformation unfolds. Drawing on national policy documents, international development data, and recent empirical studies from the region, the paper finds that Central Asian governments are already building strong foundations, through targeted grant quotas, national digital-skills programs with majority-women participation, and fast-moving AI education strategies, and identifies where these efforts could be further strengthened, particularly in technical fields such as computer science and engineering. The paper concludes with a set of constructive, policy-relevant recommendations for building on this momentum as AI becomes further embedded in higher education.

Keywords: artificial intelligence, higher education, gender equity, digital transformation, Central Asia, STEM, ICT education policy

ГОТОВНОСТЬ УЧРЕЖДЕНИЙ ВЫСШЕГО ОБРАЗОВАНИЯ ЦЕНТРАЛЬНОЙ АЗИИ К ИСПОЛЬЗОВАНИЮ ИСКУССТВЕННОГО ИНТЕЛЛЕКТА И ОБЕСПЕЧЕНИЕ ГЕНДЕРНОГО РАВЕНСТВА

Аннотация: За последние два десятилетия высшее образование в Центральной Азии претерпело демографическую трансформацию, редко встречающуюся в других частях мира: число студентов выросло почти втрое, и регион сократил гендерный разрыв, который когда-то значительно отставал от мужчин, что является одним из подлинных примеров успеха политики в области образования в мире за этот период. Это достижение в обеспечении доступа к образованию теперь происходит параллельно со вторым, столь же значительным переходом: быстрым, инициированным правительством внедрением искусственного интеллекта (ИИ) в

учебные программы, управление и институциональную инфраструктуру в Казахстане, Узбекистане, Кыргызстане, Таджикистане и Туркменистане. В данной статье рассматривается, как наилучшим образом сохранить и укрепить с трудом достигнутое гендерное равенство в количестве студентов в регионе по мере развития этой новой цифровой трансформации. Основываясь на национальных политических документах, международных данных о развитии и последних эмпирических исследованиях региона, в статье делается вывод о том, что правительства стран Центральной Азии уже закладывают прочные основы посредством целевых квот на гранты, национальных программ развития цифровых навыков с участием преимущественно женщин и быстро развивающихся стратегий в области образования в сфере ИИ, а также определяются области, где эти усилия можно было бы дополнительно усилить, особенно в таких технических областях, как информатика и инженерия. В заключение статьи предлагается ряд конструктивных, актуальных для политики рекомендаций по развитию этого импульса по мере дальнейшего внедрения ИИ в высшее образование.

Ключевые слова: искусственный интеллект, высшее образование, гендерное равенство, цифровая трансформация, Центральная Азия, STEM, политика в области ИКТ-образования

MARKAZIY OSIYO OLIY TA'LIM MUASSASALARINING SUN'IY INTELLEKTNI JORIY ETISHGA TAYYORLIGI VA GENDER TENGLIGI

Annotatsiya: So'nggi ikki o'n yillikda Markaziy Osiyodagi oliy ta'lim dunyoning boshqa joylarida kamdan-kam uchraydigan demografik o'zgarishlarni boshdan kechirdi: o'qishga qabul deyarli uch baravar oshdi va mintaqada bir vaqtlar ayollarni erkaklardan katta farq bilan ortda qoldirgan gender tafovutini bartaraf etdi, bu esa global ta'limning ushbu davrdagi haqiqiy siyosiy muvaffaqiyatlaridan biridir. Kirish imkoniyatidagi bu yutuq endi ikkinchi, teng darajada muhim o'tish bilan birga keladi: Qozog'iston, O'zbekiston, Qirg'iziston, Tojikiston va Turkmaniston bo'ylab o'quv dasturlari, boshqaruv va institutsional infratuzilmaga sun'iy intellekt (SI) ning hukumat tomonidan tezkor ravishda joriy etilishi. Ushbu maqolada mintaqada qiyinchilik bilan qo'lga kiritilgan o'qishga qabul qilishdagi gender tengligi ushbu yangi raqamli transformatsiya rivojlanib borishi bilan qanday qilib eng yaxshi tarzda davom ettirilishi va mustahkamlanishi mumkinligi ko'rib chiqiladi. Milliy siyosat hujjatlari, xalqaro rivojlanish ma'lumotlari va mintaqadagi so'nggi empirik tadqiqotlarga tayanib, maqolada Markaziy Osiyo hukumatlari maqsadli grant kvotalari, aksariyat ayollar ishtirokidagi milliy raqamli ko'nikmalar dasturlari va tez rivojlanayotgan sun'iy intellekt ta'limi strategiyalari orqali allaqachon mustahkam poydevor yaratayotgani aniqlangan va bu sa'y-harakatlarni, ayniqsa, kompyuter fanlari va muhandislik kabi texnik sohalarida yanada kuchaytirish mumkin bo'lgan joylarni aniqlagan. Maqolada sun'iy intellekt oliy ta'limga yanada chuqurroq kirib borishi bilan ushbu sur'atni rivojlantirish bo'yicha bir qator konstruktiv, siyosatga oid tavsiyalar berilgan.

Kalit so'zlar: sun'iy intellekt, oliy ta'lim, gender tengligi, raqamli transformatsiya, Markaziy Osiyo, STEM, AKT ta'limi siyosati

INTRODUCTION

Artificial intelligence has moved, within the span of roughly three years, from a peripheral topic in Central Asian higher education policy to a central pillar of national development strategy. Kazakhstan's government signed a decree in May 2026 mandating AI integration across the entire secondary school system by 2029, following a 2025 joint ministerial order that established the country's first national framework for AI ethics, data protection, and academic integrity in education. Uzbekistan's Ministry of Higher Education, Science and Innovation has established an Advisory Council on AI and is investing in the development of large language models tailored to the national context. Turkmenistan has signed a bilateral roadmap with Chinese universities to accelerate digital transformation in its higher education sector. These are not isolated pilot projects; they represent a coordinated regional shift in how governments imagine the future of learning.

At the same time, and largely in parallel rather than in dialogue with this AI agenda, Central Asia has been quietly closing one of the most persistent gaps in global education: the gender gap in higher education enrollment. According to UNESCO, the region moved from 68 women enrolled per 100 men in 2000 to full gender parity by 2023, one of the fastest rates of convergence recorded in any world region during that period. Uzbekistan alone reported a fivefold increase in women's higher education enrollment following reforms announced by the President's office in 2023.

These two trends, accelerating AI adoption and closing gender gaps in enrollment, are rarely examined together, yet doing so reveals a story of genuine regional achievement with clear opportunities ahead. Enrollment parity is a strong and necessary foundation for gender equity in an AI-driven higher education system, and Central Asian governments deserve credit for reaching it faster than most of the world. Building on that foundation, the more forward-looking question is how the region can extend this success into the technical fields and governance structures that will shape AI's future, an area

where the evidence below points to real momentum already underway, alongside room to grow.

METHODOLOGY AND DATA SOURCES

This paper adopts a comparative policy-analysis approach, synthesizing three categories of evidence across the five Central Asian republics. The first category consists of primary national policy documents, ministerial orders, presidential decrees, and admissions regulations, obtained from government portals and official press services in Kazakhstan, Uzbekistan, Turkmenistan, Kyrgyzstan, and Tajikistan. The second category comprises international development and statistical data, principally from UNESCO, the World Bank, and the United Nations Development Programme, which provide the cross-nationally comparable enrollment, completion, and digital-skills figures used throughout this analysis. The third category draws on recent peer-reviewed and institutional research literature specific to gender and STEM education in the region, including comparative surveys of educators and sector-specific case studies.

Because national statistical agencies in the region publish gender-disaggregated data at different levels of granularity and on different reporting cycles, figures cited here should be read as indicative of direction and magnitude rather than as strictly synchronized cross-national comparisons. Where more than one source reports a related statistic, this paper prioritizes the most recently published figure and notes the year of reference in the corresponding citation. This mixed-source approach reflects a broader limitation of research on Central Asia: national AI policy is moving faster than the region's research and statistical infrastructure can systematically track it, which is itself one of the structural findings this paper reports rather than merely a methodological constraint to work around.

The scale of higher education growth in Central and Southern Asia over the past two decades is difficult to overstate. UNESCO data show that the number of students enrolled in the region increased by 268 percent between 2000 and 2020, the highest rate

of growth among all world regions, raising the region's share of global higher education enrollment from 13 to 21 percent. Globally, women now outnumber men in higher education, with 114 women enrolled for every 100 men in 2024, and gender parity has been achieved in every world region except sub-Saharan Africa.

Uzbekistan's national admissions data illustrate how this expansion is being institutionalized through policy. For the 2026/2027 academic year, the state is funding more than 46,000 students through government grants, including over 36,000 places in full-time bachelor's programs. Within this allocation, the government has created a dedicated quota of 4,000 grant places reserved specifically for women, alongside quotas for private and foreign-institution admissions and places for compatriots studying abroad. The 2024 shift to a "test-first, choice-second" admissions model, in which applicants sit standardized examinations before selecting an institution and field of study, rather than the reverse, has also been framed domestically as a transparency reform intended to reduce the influence of family pressure and informal negotiation on women's enrollment decisions.

Despite this progress, UNESCO's most recent global higher education report cautions that enrollment growth has outpaced completion. The global gross graduation ratio rose only from 22 percent in 2013 to 27 percent in 2024, and women, while now the majority of entrants in most regions, remain underrepresented at the doctoral level and hold only about one-quarter of senior leadership positions in academia worldwide. Central Asia is not exempt from this pattern, and the region's own research literature increasingly frames it as the "next frontier" of the gender equity agenda: not access, but advancement.

A closer look at field-of-study data shows where the region's remarkable progress on overall enrollment parity can be extended further into technical disciplines. Research on Kazakhstan finds that women's overall enrollment in higher education (55 percent) already exceeds men's, and the country's next opportunity lies in growing women's

representation in STEM majors, which currently trail behind fields such as healthcare and education, a pattern also reflected in a wage gap in which women earn about 68.6 percent of men's wages, underscoring why expanding access to higher-paying technical careers matters. A 2018 UNESCO estimate found that close to 30 percent of students enrolled in STEM programs in Kyrgyzstan were women, a share that regional governments and international partners have since made a specific focus of investment, with a similar emphasis emerging in Tajikistan. The information and communications technology (ICT) sub-field, closely tied to a country's future AI workforce, is where this opportunity is most visible. According to UNDP regional data, women make up nearly a third of ICT tertiary students in Kazakhstan and are an emerging presence among ICT tertiary graduates in Uzbekistan, at 17.8 percent. These figures, read alongside the region's overall parity achievement, point to ICT and STEM as the clear next frontier for the same policy energy that already closed the broader enrollment gap. Researchers studying this pattern highlight several practical, addressable factors: the value of visible women role models in STEM and technology fields, evolving expectations about career paths for women, and what has been described in the literature as a "confidence gap", a tendency for women to underestimate their readiness for technical careers even when their measured skills are comparable to men's, and one that targeted mentorship has been shown to address effectively. Research on Kazakhstani STEM educators similarly points to specific, well-identified transition points, particularly between study and employment, where light-touch institutional support could have an outsized positive effect.

The five Central Asian republics are pursuing AI integration in higher and secondary education at markedly different speeds and through different institutional models. Kazakhstan has moved fastest and most formally. Beyond the 2025 joint ministerial order establishing AI ethics and data-protection standards, the government has committed to enrolling 100,000 students in advanced AI programs and has built a national AI infrastructure that includes a supercomputer and a Kazakh-language large

language model (KazLLM). The May 2026 presidential decree extending AI integration across the entire secondary system by 2029 signals that Kazakhstan intends AI literacy to become a universal, not elective, component of public education. Uzbekistan, by contrast, has concentrated its efforts on foundational research infrastructure and the development of national-language educational platforms rather than rapid classroom rollout. Officials from the Ministry of Higher Education, Science and Innovation have described the country's approach as prioritizing the investment required to build large language model capacity domestically, alongside governance frameworks intended to align distance and generative-AI-assisted learning with international standards. Turkmenistan has pursued AI integration through international partnership, signing a cooperation roadmap with UNESCO's Institute for Information Technologies in Education and Chinese university experts for the 2024–2025 period, with an explicit focus on digital transformation of higher education institutions. Kyrgyzstan and Tajikistan are, by comparison, in earlier stages of formal AI policy development, though both are participants in the broader regional digital-skills infrastructure discussed below, and analysts note that procurement and platform decisions made in Kazakhstan's schools are likely to shape choices made across the wider region over the coming decade. A comparative study surveying 966 geography teachers across Kazakhstan and Uzbekistan found that Kazakhstan demonstrates especially active integration of AI into school curricula, while Uzbekistan's emphasis on foundational research and platform-building reflects a deliberate, infrastructure-first strategy; both countries identified educator training and infrastructure investment as the natural next steps for their fast-moving reform agendas. As these national AI strategies continue to mature, an encouraging next step would be to pair their already ambitious infrastructure targets with explicit, quantified gender-equity benchmarks, following the model Uzbekistan has already set with its dedicated admissions quota for women, so that the same intentionality that closed the overall enrollment gap is applied to technical fields as well. Set against the STEM enrollment

data, one part of the regional picture offers a genuinely encouraging counter-trend: adult and community-level digital skills programming, where women's participation rates are unusually high. A World Bank-supported digital skills initiative spanning Europe and Central Asia, with an expanding pipeline most recently in Uzbekistan, trained 32,000 citizens and 1,000 librarians in basic digital skills between 2023 and 2026, delivering 60,000 training hours across more than 560 libraries. Sixty-five percent of citizen participants and 80 percent of trained librarians were women, a proportion the World Bank describes as demonstrating the model's potential to close gender digital gaps at national scale. Targeted interventions at the sub-national level tell a similar story. A UNDP accelerator program in Kazakhstan's Mangystau region, the "Alga!" bootcamp, brought young women in resource-dependent communities into two-week intensive digital and leadership training explicitly designed to build pipelines into ICT and STEM employment, on the premise that community-embedded, women-only cohorts can counteract the confidence gap and lack of visible role models identified elsewhere in the literature. Regional gatherings such as the International Day of Girls in ICT convene women technology leaders from all five Central Asian republics specifically to build cross-border professional networks in a field where national talent pools remain thin. Taken together, these two sets of findings, strong women's participation in basic digital-skills training, and a growing, if still developing, presence in formal ICT and STEM degree programs, tell an encouraging story: women's interest and aptitude are clearly not the limiting factor. The clearest opportunity now is to connect these two levels more deliberately, extending the reach of entry-level digital literacy programming into the more selective pathways, competitive STEM admissions, doctoral study, technical employment, that lead into the AI workforce. Digital literacy training is already reaching women at scale; the next step is building stronger bridges from that foundation into advanced technical study.

Institutional AI readiness is not solely a matter of infrastructure or curriculum; it is also a matter of governance capacity, and this is an area where universities worldwide — not only in Central Asia — are still developing their approach. A global UNESCO assessment found that as of 2025, about one in five universities worldwide had adopted a formal institutional policy on artificial intelligence, reflecting how new this governance challenge is everywhere; Central Asian institutions, many of which have already shown strong adaptability in expanding access and digital-skills training, are well positioned to build such frameworks as international best practice continues to develop.

As institutions begin drafting these AI governance frameworks, there is a natural opportunity to bring more women into senior academic leadership roles — building on the fact that women already form the majority of students at many of these same institutions. Since AI policy is typically shaped by rectors, senior administrators, and heads of digitalization departments, deliberately including more women in these bodies would help ensure that governance structures reflect the same demographic balance already achieved in the student body, while also drawing on the perspectives of the generation of women who benefited most directly from the region's enrollment gains.

DISCUSSION

First, Central Asia's achievement of gender parity in overall higher education enrollment is a genuine and historically significant accomplishment, and it provides exactly the kind of strong foundation on which further gains in technical fields can be built. The disciplines most relevant to AI readiness, computer science, engineering, and ICT, currently show more room for growth than the region's higher education system overall, with women's representation in Uzbekistan's ICT graduate cohort at 17.8 percent even as the country's overall higher education enrollment has become gender-balanced, a clear, well-defined target for the next phase of policy.

Second, national AI strategies across the five republics are, understandably, in an early and fast-moving stage focused on infrastructure, curriculum sequencing, and

international benchmarking. As these strategies mature, there is a natural and low-cost opportunity to layer in explicit gender-equity targets, following the precedent Uzbekistan has already set in its general admissions policy.

Third, and most encouragingly, the region has already demonstrated, through community-level digital skills programming, that women's participation in digital learning is strong and enthusiastic wherever it has been made accessible. This is the most important finding of this paper: the region does not need to solve a demand-side problem, only to extend an already-proven model further along the pipeline, toward competitive STEM admissions, mentorship, and institutional leadership access.

Building on the strong foundation already in place, four directions offer particularly promising next steps for ministries of education and higher education institutions across the region. First, as national AI-in-education strategies continue to develop, incorporating explicit, measurable gender-equity targets for STEM and ICT enrollment, retention, and graduation would extend the same successful, specific-benchmark approach that Uzbekistan has already used to good effect through its dedicated grant quota for women in general admissions. Second, the demonstrated success of community-level digital skills programming in reaching women is a genuine regional strength that could be connected even more deliberately to formal STEM and ICT degree pathways. Bridging programs that convert basic digital literacy participation into competitive STEM admissions preparation would build directly on the momentum already established in Section 6. Third, as institutional AI governance structures, advisory councils, digitalization departments, ethics committees, continue to take shape, encouraging gender-balanced composition would bring the same demographic strength already present in the student body into these leadership bodies as well. Fourth, the regional coordination mechanisms already convening ministries of education and digitalization officials from across Central Asia are well placed to include gender equity in AI readiness as a regular agenda item, building on the region's strong track record of

coordinated policy learning, including the influence that Kazakhstan's fast-moving AI framework is already having on procurement and policy choices in neighboring states.

CONCLUSION

Central Asia's rapid progress toward gender parity in higher education enrollment is a genuine and well-documented achievement, arrived at faster than in almost any other world region, and it stands as one of the strongest foundations any region has built for an equitable digital transformation of higher education. This paper has shown that this foundation is already visible in the region's AI-era policy: targeted grant quotas, fast-moving national AI frameworks, and digital-skills programs reaching women at rates of 65 to 80 percent all point to governments that are taking gender-inclusive digital transformation seriously. The clearest opportunity now is to extend that same intentionality into technical fields, where women's representation in Uzbekistan's ICT graduate cohort, at 17.8 percent, still has considerable room to grow, and into the governance structures that will shape how AI is used in the region's universities. The region's own recent experience with community digital-skills programming is the most encouraging evidence available: it demonstrates clearly that women's interest and capability are not the limiting factor, only the reach of the pipeline connecting basic digital literacy to advanced technical study and institutional leadership. Extending that pipeline is a natural and achievable next chapter in a story that, so far, Central Asia has told better than most of the world.

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