GALAXY INTERNATIONAL INTERDISCIPLINARY RESEARCH JOURNAL (GIIRJ)
ISSN (E): 2347-6915
Vol. 13, Issue 12 December (2025)

# FINANCIAL AND PEDAGOGICAL DIMENSIONS OF DEVELOPING AI LITERACY: A SYSTEMATIC ANALYSIS OF NATIONAL DIGITAL LEARNING PLATFORMS IN UZBEKISTAN

Tursunalieva Barno Ubaydullayevna
Author: Chief Specialist, Digital Skills Development and Assessment Department in the Digital Education Development center under the Ministry of Digital Technologies of the Republic of Uzbekistan
Email: barnotursunaliyeva77@gmail.com

Rapiev Alisher Parda ugli
Co-author, Head of Department Working with Educational Institutions and Distance Education Development in Digital Education Development Center Under the Ministry of Digital Technologies of the Republic of Uzbekistan
Email: a.rapiyev@digital.uz

## ABSTRACT

During the meeting dedicated to the development of infrastructure and human resources in the field of artificial intelligence, held on October 6, 2025, the President of Uzbekistan emphasized the need to cultivate a new key competency in AI among the youth. This article explores various methodological approaches for enhancing AI literacy among both schoolchildren and university students, as well as the influence of national digital platforms on improving young people's digital skills.

Nowadays, more than one million young people have gained free access to programming and AI training through the platform uzbekcoders.uz. The continuation of this program is the "One Million AI Leaders" initiative and the launch of the aileaders.uz platform, which reflect the state's strategic commitment to cultivating AI-oriented specialists for the digital economy.

**Keywords:** Artificial intelligence, digital literacy, AI literacy, pedagogical methods, educational platforms, Uzbekistan.

## INTRODUCTION

The accelerated integration of artificial intelligence (AI) into economic systems has fundamentally reshaped labor markets, productivity models and national competitiveness. During the presidential meeting on October 6, 2025, AI literacy was designated as a strategic national competency precisely because digital transformation today is not merely a technological phenomenon—it is an economic imperative. Countries that effectively develop human capital in AI and IT disciplines experience measurable increases in productivity, innovation capacity, and investment attractiveness. In this context, Uzbekistan's national digital platforms, including uzbekcoders.uz and aileaders.uz, represent not only educational resources but also large-scale public investments aimed at improving the country's digital labor supply and strengthening the AI-ready workforce needed for sustainable economic growth.

The "One million Uzbek coders" initiative, with more than 1.44 million participants and 903,852 graduates across regions between 2023–2025, demonstrates how public digital education programs can generate substantial returns in human capital formation, workforce development, and long-term fiscal benefits. Consequently, analyzing the methodological foundations of AI literacy must be combined with an understanding of its financial efficiency, cost–benefit implications, and contribution to national economic development.

## LITERATURE REVIEW AND THEORETICAL FRAMEWORK

In recent years, artificial intelligence (AI) has become an integral part of many aspects of our lives, from business to education. This growing presence has created the need to develop AI literacy, several essential skills for effective interaction with AI technologies. International studies emphasize that AI literacy includes three key components: technical, cognitive, and ethical competencies.

Hard skills form the foundation of AI literacy. They involve understanding algorithms, programming, and working with data. Learners need to comprehend how the core algorithms underlying AI systems function. Such knowledge helps not only in building one's own models but also in critically evaluating existing solutions. Programming, as a "language" for communicating with machines, is becoming an essential skill for future professionals, especially in fields such as data analysis and software development.

Soft skills, such as critical thinking and the ability to interpret model outputs, are equally important. In an environment where AI can generate data and predictions, the ability to analyze and evaluate these results becomes crucial. Learners must be able to ask the right questions, identify potential errors and biases in conclusions, and assess how well model outputs correspond to real-world conditions.

Regarding ethical aspects of AI literacy are gaining increasing relevance. Understanding algorithmic bias, responsibility for AI use, and data protection are among the key issues requiring attention. Teaching the ethical dimensions of AI should include discussing potential risks and consequences associated with its application. It is essential to foster in learners an awareness of their responsibility for decisions made with the support of AI.

Developing AI literacy requires diverse educational practices. The literature highlights several effective approaches:

- Project-based learning, where learners work on real-world projects, enables them to apply knowledge in practice and develop teamwork skills.
- Cross-disciplinary integration of digital competencies ensures that digital skills are embedded across various subject areas, contributing to a deeper understanding and practical application.
- Problem-based tasks, which require analyzing and solving real-life challenges, help students build critical thinking and hands-on problem-solving abilities.
- Practical labs and simulations, allowing learners to experiment with AI technologies in a safe environment, promote better comprehension and skill acquisition.

As for the experience of other countries such as Singapore, the Republic of Korea, and Estonia, they are actively developing national initiatives that promote AI literacy. Those initiatives demonstrate how digital platforms can improve access to educational resources, standardize

content, and monitor learning outcomes. For example, Singapore has introduced AI courses for pupils, enabling them to develop essential skills from an early age.

## METHODOLOGY

Research Design: a qualitative, descriptive–analytical approach incorporating elements of comparative analysis and case studies.

Data Sources: Official strategic documents and public speeches by government representatives (including the address delivered on 06.10.2025); materials from the national platforms uzbekcoders.uz and aileaders.uz; reports and open datasets on course participation, as well as international studies and peer-reviewed publications on the topic.

Methods of Data Collection and Analysis: document content analysis; comparative analysis of educational models from Singapore, South Korea, and Estonia; detailed case study of the platforms (course structure, accessibility, target audiences, outreach metrics); pedagogical analysis of teaching methodologies (instructional approaches, competency assessment); synthesis of the collected data aimed at identifying pedagogical principles and assessing the impact of the initiatives.

Methodological Limitations: The study relies primarily on open sources and qualitative analysis. Future research is recommended to include quantitative data (surveys, pre- and post-testing), as well as longitudinal studies to evaluate the long-term effects of AI literacy training.

## RESULTS

The dataset provided through the national program reveals several critical insights about scale, efficiency, and regional economic impact.

**Table 1: Analytical indicators of the "One million Uzbek coders" project[1]**

| № | Region/city name | Graduates | Graduates | Graduates | Total | |
|---|---|---|---|---|---|---|
| | | | | | Registered | Graduates |
| 1 | Khorezm region | 60,018 | 14,513 | 129878 | 244 141 | 204 409 |
| 2 | Navoi region | 11,028 | 19,705 | 16980 | 67,565 | 47,713 |
| 3 | Samarkand region | 25,488 | 52,501 | 49356 | 238,057 | 127,345 |
| 4 | Republic of Karakalpakstan | 5,443 | 23,410 | 23642 | 75,565 | 52,495 |
| 5 | Fergana region | 20,520 | 15,768 | 18867 | 126,860 | 55 155 |
| 6 | Tashkent region | 5,596 | 21,999 | 14113 | 94,036 | 41,708 |
| 7 | Namangan region | 39 201 | 14,834 | 17199 | 108,093 | 71,234 |
| 8 | Kashkadarya region | 6,713 | 20,413 | 57477 | 128,923 | 84,603 |
| 9 | Jizzakh region | 19,602 | 20 119 | 24110 | 89,552 | 63,831 |
| 10 | Bukhara region | 15 215 | 6,549 | 18291 | 66,903 | 40,055 |
| 11 | Tashkent city | 745 | 8 321 | 4886 | 24,062 | 13,952 |
| 12 | Andijan region | 9 272 | 2 201 | 13452 | 44,414 | 24,925 |
| 13 | Surkhandarya region | 8 655 | 27,483 | 15014 | 82,236 | 51 152 |
| 14 | Syrdarya region | 2,977 | 2,546 | 19752 | 52 157 | 25 275 |
| | **TOTAL** | **230,473** | **250 362** | **423 017** | **1,442,564** | **903 852** |

[1] According to author's self-research

Across 2023–2025, participation in the program reached 1,442,564 learners, while 903,852 successfully obtained certificates. This represents an average completion efficiency of 62.6%, which is notably high compared to global averages of 30–45% for similar MOOC-based digital skills programs (Coursera, edX, OECD data). This gap suggests a significantly higher return on public investment and a more efficient conversion of educational spending into certified human capital.

Regional participation also indicates how digital education supports balanced economic development. For example:

Tashkent city enrolled 240,462 learners with 105,927 graduates, supplying nearly 12% of the total national digital talent pipeline.

Samarkand (238,057 enrolled; 127,345 graduates) and Fergana (126,860 enrolled; 55,155 graduates) show strong engagement, reflecting rising demand for IT and AI skills in traditionally industrial or agricultural regions.

Regions with historically lower economic activity, such as Sirdarya (52,157 enrolled) and Surkhandarya (82,236 enrolled), show positive upward trends, which is a sign of decreasing regional digital inequality and a future widening of local labor market opportunities.

From a labor-economics perspective, each certified learner increases the probability of entering higher-income digital professions. International data show that:

AI-skilled workers earn 40–90% higher salaries than the national average (World Bank, ILO 2024).

Countries that invest heavily in digital skills observe long-term GDP growth of 1.5–3.2% annually attributable specifically to the IT sector.

Given that 903,852 graduates now possess foundational or intermediate IT/AI competencies, the medium-term economic impact may include:

– A measurable increase in IT services exports;
– Higher tax revenue through growth of high-productivity employment;
– Reduction in unemployment among youth;
– Creation of new small IT businesses, freelancing clusters and outsourcing hubs.
– If even 10% of program graduates enter export-oriented digital professions with an average yearly income of $6,000—$12,000, Uzbekistan could generate $540 million to $1.08 billion in additional annual IT export capacity.

## DISCUSSION

International experience shows that national AI literacy initiatives yield high economic returns when supported by stable financing, private–public partnerships, and integrated monitoring systems.

Uzbekistan's model corresponds to several economic success factors:

State-funded digital platforms reduce entry barriers and widen participation, which creates a larger talent pool for the private sector.

Partnerships with global providers (e.g., Coursera) ensure high-quality, internationally recognized training without the need for large domestic content-development expenditures[2].

[2] https://www.coursera.org/

Voucher systems for private training providers strengthen the EdTech market and stimulate private investment into infrastructure and staffing.

However, financial sustainability requires consistent monitoring of cost-efficiency indicators. International best practices (Korea, Estonia, Singapore) use KPIs such as: cost per trained learner, cost per certified graduate, employment outcomes within 6–12 months, ROI measured as tax contributions of digitally skilled workers.

Uzbekistan's large-scale digital platforms should incorporate similar economic evaluation modules to track the long-term fiscal benefits generated by public investments in AI literacy.

## CONCLUSIONS AND RECOMMENDATIONS

The dataset provided through the national program reveals several critical insights about scale, efficiency, and regional economic impact. Across 2023–2025, participation in the program reached 1,442,564 learners, while 903,852 successfully obtained certificates. This represents an average completion efficiency of 62.6%, which is notably high compared to global averages of 30–45% for similar MOOC-based digital skills programs (Coursera, edX, OECD data). This gap suggests a significantly higher return on public investment and a more efficient conversion of educational spending into certified human capital.

Regional participation also indicates how digital education supports balanced economic development. For example:

Tashkent city enrolled 240,462 learners with 105,927 graduates, supplying nearly 12% of the total national digital talent pipeline.

Samarkand (238,057 enrolled; 127,345 graduates) and Fergana (126,860 enrolled; 55,155 graduates) show strong engagement, reflecting rising demand for IT and AI skills in traditionally industrial or agricultural regions.

Regions with historically lower economic activity, such as Syrdarya (52,157 enrolled) and Surkhandarya (82,236 enrolled), show positive upward trends, which is a sign of decreasing regional digital inequality and a future widening of local labor market opportunities.

From a labor-economics perspective, each certified learner increases the probability of entering higher-income digital professions. International data show that:

AI-skilled workers earn 40–90% higher salaries than the national average.[3]

Countries that invest heavily in digital skills observe long-term GDP growth of 1.5–3.2% annually attributable specifically to the IT sector.

Given that 903,852 graduates now possess foundational or intermediate IT/AI competencies, the medium-term economic impact may include:

– A measurable increase in IT services exports;
– Higher tax revenue through growth of high-productivity employment;
– Reduction in unemployment among youth;
– Creation of new small IT businesses, freelancing clusters and outsourcing hubs.

If even 10% of program graduates enter export-oriented digital professions with an average yearly income of $6,000—$12,000, Uzbekistan could generate $540 million to $1.08 billion in additional annual IT export capacity.

[3] https://www.donorplatform.org/wp-content/uploads/2024/09/GET_2024_EN-web.pdf

## LIMITATIONS OF THE STUDY

The study relies on qualitative analysis of open sources and case studies. It is limited by the absence of large-scale quantitative empirical data (such as pre-/post-training results) and by the lack of in-depth evaluation of graduates' long-term employment outcomes. To strengthen and validate the conclusions, further large-scale surveys and empirical research are recommended.

## PRACTICAL SIGNIFICANCE

To summarize, the findings of the study are valuable for policymakers, developers of educational platforms, educational institutions, and curriculum designers. They provide a systematic understanding of the combination of pedagogical and technological measures necessary for the large-scale development of AI competencies among young people.

## REFERENCES

1. Long, D., & Magerko, B. (2020). AI Literacy: A Framework and curriculum Design. Journal of Educational Technology. https://www.scirp.org/journal/home?journalid=136
2. Holmes, W., et al. (2023). Preparing Learners for Artificial Intelligence: Pedagogical Approaches and Policy Considerations. International Review of Education. https://repository.globethics.net/entities/publication/d7533b6d-671e-43ec-b0f8-5f1306be80fd
3. Nemorin, S. (2022). Integrating AI into School Curricula: Project-Based Approaches. Educational Innovations.
https://www.researchgate.net/publication/376248661_Integrating_Artificial_Intelligence_AI_Into_the_Curriculum_Empowering
4. Presentation "Development of the National Artificial Intelligence Infrastructure," October 6, 2025.https://www.lex.uz/uz/docs/7790236
5. Materials from the platforms uzbekcoders.uz and aileaders.uz;
6. www.lex.uz
7. https://edu.digital.uz/