주제어: 디지털 전환, 온라인 교육, 우즈베키스탄, 포용성, 만족도
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Enhancing Digital Education Inclusiveness in Uzbekistan:

A Critical Analysis of the Nation's Digital Transformation and Online Learning Initiatives*

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목 차

국문요약

본 연구는 우즈베키스탄의 온라인 교육이 더 나은 포용성을 확보하기 위해서 무엇을 고려해야 하는가를 논의한다. 이를 위하여 본 논문은 설문조사와 통계분석을 통해 우즈베키스탄 주민들의 온라인 교육 서비스 소비 수준과 온라인 교육 서비스 만족도에 영향을 미치는 요인을 도출하고 있다. 분석 결과 첫째, 인터넷 연결 만족도는 인터넷 교육 서비스 소비 수준이나, 인터넷 교육 서비스 만족도에 유의미한 영향을 미치지 못한다는 것을 확인하였다. 둘째, 디지털 교육에 참여한 경험이 있는 사람은 그렇지 못한 사람과 비교하여 온라인 교육 서비스 만족도가 높다는 것을 알 수 있다. 셋째, 여성이 남성과 비교해 온라인 교육 서비스 소비 수준이 유의미하게 높지만, 해당 서비스에 대한 만족도가 유의미하게 높은 것은 아니다. 넷째, 러시아어를 사용하는 사람들은 온라인 교육 서비스에 대하

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여 다른 사람들보다 높은 수준의 만족을 보인다. 따라서 우즈베키스탄 온라인 교육이 더 나은 포용성을 확보하기 위해서는 기술 역량뿐 아니라 인적 역량과 사회문화 역량 개선에 초점을 맞춘 정책을 고안해야 하며, 특히 여성과 우즈벡어만 사용하는 사람들이 양질의 콘텐츠를 소비할 수 있는 콘텐츠 시장 마련이 필요해 보인다. 더불어, 디지털 특화 훈련프로그램을 통해 온라인 교육 서비스 이용자의 만족도를 높이도록 관련 정책을 마련해야 할 것이다.

Ⅰ. Introduction

The COVID-19 pandemic has significantly accelerated the digital transformation in education, reshaping our daily lives. During the pandemic, lockdowns and government initiatives to minimize educational disruptions led to a rapid shift towards online learning. This shift has catalyzed a surge in interest and adoption of remote learning, driving forward digital innovation in the education sector. As a result, a variety of educational services have emerged on online platforms, offering new learning opportunities. This digital evolution raises important questions: Who is engaging with these online educational services, and how satisfied are they with the experience? The answers to these questions are crucial for understanding the impact and future direction of not only education but also digital transformation.

A key advantage of digital transformation in education is its facilitation of remote learning opportunities. This makes education accessible to those who face difficulties in accessing conventional, in-person learning and thereby improves quality of life for many. For example, a woman from an impoverished family living in a remote area and thus marginalized from educational opportunities, can now access online entrepreneurship training, opening up new income possibilities for herself and her family.[1] Students

1) UN ESCAP, “Online Training of Women Entrepreneurs on Expanding Online Business through E-Commerce Platform and Digital Marketing. 22 to 23 June 2021,” https://www.unescap.org/events/

from isolated rural areas, previously sidelined in public education, now have access to high-quality education offered at lower costs due to widespread online learning opportunities. This may enhance their job prospects by helping them develop professional skills and thus improve their future.[2] In essence, expanding inclusiveness in digital education is crucial to ensure that more people, including those who are excluded from conventional education systems, can enjoy the benefits of diverse online educational services.

The issue of inclusiveness in digital transformation, especially in education, has been widely discussed in recent years. Initially, this discussion focused on enhancing technological and human capabilities. For example, Eastmond (2000) highlights the importance of broad access to digital education for national development, emphasizing that this requires the improvement of a nation's technological capabilities.[3] Ari et al. (2022) also highlight the importance of technology in expanding educational inclusiveness.[4] They argue that digital innovation could extend education to marginalized social and economic groups, but this requires active public sector support to make digital devices more readily accessible to a wider population.[5] Similarly, Nam et al. (2018) who explore ICT's role in achieving the United Nations' Sustainable Development Goals, propose that increasing digital device distribution and digital literacy education could advance ICT development in developing countries.[6]

2021/online-training-women-entrepreneurs-expanding-online-business-through-e-commerce# (검색일: 2023.11.15).

2) Reg Leichty, "Online Learning for Rural Students." National Association of State Boards of Education," https://www.nasbe.org/online-learning-for-rural-students/ (검색일: 2023.11.15).

3) Dan Eastmond, "Realizing the promise of distance education in low technology countries," *Educational Technology Research and Development* 48, (2000). 100-111. https://doi.org/10.1007/BF02313405.

4) Ari, Refia, Zehra Altinay, Fahriye Altinay, Gokmen Dagli, and Engin Ari, "Sustainable Management and Policies: The Roles of Stakeholders in the Practice of Inclusive Education in Digital Transformation" *Electronics*, 11-4 (2000).

5) Ibid.

6) Sang-yul Nam et al., "A Study on International Cooperation of ICT for Achieving SDGs in the Asia-Pacific Region," *Korea Information Society Development Institute*, 18-83, Seoul: KISDI (2018). [In Korean], pp. 1-108.

Shifting from the initial emphasis on technology and human capabilities, recent discussions on digital transformation are increasingly focusing on the sociocultural aspects of digital development and inclusiveness. For instance, *The Economist*'s Inclusive Internet Index (3Is) evaluates internet inclusiveness in education, taking into account factors such as the level of online education and the availability of content in local languages.[7] The index also takes into account how nations respond to online harassment, emphasizing the importance of local societies' reactions to digital transformation. This emphasis on sociocultural factors is increasingly influencing discussions on digital education as well. Mihovska et al. (2021), for instance, explore various educational strategies implemented during the COVID-19 pandemic. Their research focused on assessing the extent to which these strategies provided fair and effective learning opportunities, particularly for socially and culturally marginalized groups.[8] This shift towards considering sociocultural elements highlights a more comprehensive view of digital transformation's impact on education.

Building upon these broader perspectives of digital inclusiveness, this research delves into the specific context of Uzbekistan. It aims to extend the understanding of digital inclusiveness in Uzbekistan, by conducting an analysis of the technological, human, and sociocultural factors that affected online education during the COVID-19 pandemic. In so doing, this study provides academic and policy insights for enhancing inclusiveness in the process of Uzbekistan's digital transformation. Additionally, the paper offers a more nuanced and comprehensive understanding of digital inclusiveness, which encompasses not only the technological accessibility but also the user satisfaction with online education services. It argues that true

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7) *The Economist*, "The Inclusive Internet Index," https://impact.economist.com/projects/inclusive-internet-index/ (검색일: 2023.11.15).

8) A. Mihovska, D. Prevedourou, J. Tsankova, A. Manolova and V. Poulkov, "Building Adaptive and Inclusive Education Readiness Through Digital Technologies," *2021 Joint International Conference on Digital Arts, Media and Technology with ECTI Northern Section Conference on Electrical, Electronics, Computer and Telecommunication Engineering, Cha-am, Thailand*, [Proceedings] 2021, pp. 384-388, doi: 10.1109/ECTIDAMTNCON51128.2021.9425728.

inclusiveness in the realm of digital education requires the satisfactory engagement of diverse user groups. The paper further explores on national strategies to achieve such inclusiveness in Uzbekistan's digital educational sphere. This paper is based on surveys carried out during the COVID-19 pandemic. This period saw an exceptional global acceleration in digital transformation. The timing of the research offers a significant comparative advantage. It allows for a detailed analysis of how the swift changes in digital technology have affected the inclusiveness of education in Uzbekistan, set against the backdrop of a global crisis.

Section II analyzes the progress and extent of Uzbekistan's digital transformation, introducing the current state and limitations of digital transformation. Sections III and IV delve into the analysis of digital transformation in Uzbekistan's education sector. This includes examining the level of consumption and satisfaction with online education services, and implementing research design and statistical analysis to identify factors influencing these aspects. The conclusion offers recommendations for enhancing the inclusiveness of digital education in Uzbekistan, suggesting ways to improve its broader inclusiveness and effectiveness.

Ⅱ. Digital Transformation and Online Education in Uzbekistan

1. Current State of Digital Transformation in Uzbekistan

Uzbekistan is the most populous country in Central Asia. It is home to 35.6 million people whose median age is 28.7.[9] Remarkably, Uzbekistan

9) CIA, "World Factbook: Uzbekistan," https://www.cia.gov/the-world-factbook/countries/uzbekistan/ (검색일: 2023.12.21).

achieves an impressive literacy rate of 100% among its population aged 15 years and above. Additionally, it is noteworthy that 99% of individuals aged over 25 years have successfully completed at least a secondary level of education.[10] This combination of a young, educated population equips Uzbekistan with a skilled and adaptable workforce, ready for advanced training. These demographic and educational factors provide the country with substantial potential for robust economic growth, especially within the emerging digital economy. However, the country's geographic location presents a significant challenge to its digital transformation. As one of the world's few doubly-landlocked countries, surrounded by other landlocked countries of Afganistan, Kazakhstan, Kyrgyzstan, Tajikistan and Turkmenistan, it has severely limited access to the submarine fiber optic system that forms the backbone of the global internet. Additionally, much of the country's territory comprises of arid desert areas, making the construction of a national ICT backbone to connect remote rural communities across the country highly expensive. Despite these challenges, the Uzbek government has continuously put efforts to modernize its ICT infrastructure in order to harness the full potential of its youthful population.

Since its independence, the Uzbek government has demonstrated a keen interest in the development of Information and Communication Technology and its application across various sectors. Since the 1990s, the government has been instrumental in expanding the ICT market and advancing its progress through the establishment of a legal and regulatory framework. For instance, in 1992, the Law on Telecommunications was adopted, laying down the foundational principles for the development of the ICT sector.[11] This legislation marked a significant step in Uzbekistan's commitment to integrating ICT into its national agenda. In 2003, the Law on Information

10) CEIC, "Uzbekistan UZ: Literacy Rate: Youth:% of People Age 15-24," https://www.ceicdata.com/en/uzbekistan/education-statistics/uz-literacy-rate-youth—of-people-age-1524 (검색일: 2023.12.21).

11) Permanent Mission of the Republic of Uzbekistan to the UN, "ICT: an important factor of national progress," https://www.un.int/uzbekistan/news/ict-important-factor-national-progress (검색일: 2023.11.15).

was adopted, which served as a regulatory guideline for information and communication technologies development.[12] Then, the government took a more strategic approach by launching the Comprehensive Program for the Development of the National Information and Communication System (2013-2020) in 2013.[13] This program underscored the government's resolve to harness ICT as a pivotal factor in national development and to integrate it into the fabric of Uzbek society and its economic infrastructure.

Recently, there has been a heightened focus on fast-tracking the adoption of digital technologies in Uzbekistan's economic and social sectors. Moreover, the development of ICTs has gained prominence as a key component of the national development agenda. To modernize and diversify its economy heavily-reliant on energy-exports, Uzbekistan adopted a national reform program On Uzbekistan Development Strategy 2017-2021. This broad, market-focused reform initiative encompasses five key areas: 1) enhancing state and public institutions capacity; 2) strengthening the rule of law and reforming the judicial system; 3) driving economic growth and liberalization; 4) job creation and promotion of social development; 5) ensuring personal and public security, fostered by inter-ethnic and religious tolerance, coupled with a constructive approach to foreign policy. The government has vigorously supported application digital technologies in all key areas of reforms.[14] Furthermore, in 2020, the Government of Uzbekistan officially launched the "Digital Uzbekistan 2030" strategy, marking a significant commitment to this digital advancement.[15] The Digital Uzbekistan 2030 strategy outlines five key development priorities: improving digital infrastructure, advancing e-government services, expanding the digital economy, and strengthening educational initiatives

12) Ibid.

13) Ibid.

14) Центр Стратегия Развития, "Пять стратегий действий: Итоги Реформ, 7 февраля 2022 г," https://strategy.uz/index.php?news=1478&lang=ru (검색일: 2023.12.21).

15) Президент Республики Узбекистан, "Указа Президента Республики Узбекистан Об утверждении Стратегии Цифровой Узбекистан—2030 и мерах по ее эффективной реализации (№. УП-6079)," https://lex.uz/ru/docs/5031048 (검색일: 2023.11.16).

in the national IT sector. This strategic approach demonstrates a significant investment in digital transformation, addressing both technical aspects, such as internet infrastructure expansion, and human and sociocultural dimensions, notably the enhancement of digital literacy and the broadening of educational opportunities to bolster digital usage skills. The “Digital Uzbekistan 2030” strategy outlines the execution of over 1,600 projects aimed at enhancing digital capabilities across Uzbekistan’s 12 regions, including the Autonomous Republic of Karakalpakstan. Within this framework, 29 districts have been selected for initiating various projects between 2020 and 2022. This initiative stems from the Uzbek government’s recognition that ICTs are crucial drivers of national well-being and economic growth. This understanding has spurred notable progress in the country’s digital transformation.[16)]

This paper examines digital transformation in Uzbekistan by exploring three principal dimensions: technological capabilities, human capabilities, and sociocultural capacities. Uzbekistan has made significant strides in developing its telecommunications infrastructure. From 2016 to 2020, there was a marked expansion in the country’s fiber optic network. The total length of these lines grew roughly 3.8 times, increasing from 17,900 kilometers to 68,600 kilometers.[17)] By 2021, the extensive expansion of Uzbekistan’s digital infrastructure yielded notable results. Optical communication lines reached 67% of residential areas, a marked improvement in digital connectivity since 2017. As a result, internet usage rose by 22%, mobile phone subscriptions by 29%, and fixed broadband subscriptions by 9.29% (See Table 1).

16) Там же.

17) Министерство цифровых технологий Республики Узбекистан, “Телекоммуникационная инфраструктура – на новом этапе развития,” https://mitc.uz/ru/pages/communication (검색일 2023. 11.16).

[Table 1] Indicators Related to Technological Capabilities of Digital Transformation (2017–2021)[18)]

Indicators	2021	2020	2019	2018	2017
Internet Users (% of Population)	77	71	70	55	49
Mobile Phone Subscriptions (per 100 Residents, %)	103	100	101	72	76
Fixed Broadband Subscriptions (per 100 Residents, %)	22	15.84	10.55	12.71	10.3

Additionally, the number of wireless base stations in Uzbekistan saw significant increase in 2021, with 14,150 new installations, bringing the total to 45,890 stations.[19)] With the expansion of the wireless base station network, it is estimated that 99% of Uzbekistan's population now has access to wireless communication services (2G or higher), and up to 75% can access high-speed communications (LTE/WiMax or higher).[20)] However, as of September 2023, the average internet speeds in Uzbekistan were 23.63 Mbps for wireless and 58.03 Mbps for fixed broadband downloads, as reported by Ookla's Speedtest Global Index.[21)] These speeds are significantly lower than the global average fixed broadband download speed of 85.31 Mbps and are more than half slower than Moldova, with fastest internet speed among the CIS countries with the average broadband download speed of 119.89 Mbps.[22)]In summary, while Uzbekistan faces limitations due to relatively slower internet speeds, there is clear evidence of accelerated improvements in the technical capacities of its digital transformation, with significant advancements in both the speed and extent of these developments.

18) Compiled by the author based on World Bank Data. (https://data.worldbank.org/)
19) Министерство цифровых технологий Республики Узбекистан
20) International Telecommunication Union (ITU), "ITU Data Hub: Uzbekistan," https://datahub.itu.int/data/?e=UZB&c=701&i=100095 (검색일: 2023.11.17).
21) Ookla, "Ookla Speedtest Global Index," https://www.speedtest.net/global-index#mobile (검색일: 2023.11.17).
22) Ibid.

[Table 2] Indicators Related to Human Capabilities in Digital Transformation (2017–2021)[23]

Indicator	2021	2020	2019	2018	2017
Gender Gap among Internet Users	8.0	2.4	9.0	10.4	11.4
Gender Gap among Mobile Phone Users	0.9	-5.4	n.a	2.8	n.a
Generational Gap among Internet Users	77.1	76.2	n.a	68.7	n.a.

Note: The generational gap is measured as the difference in the ratio of internet users aged between 15 and 24 years to their respective generational population, subtracted from the ratio of internet users aged 75 and above to their respective generational population.

Then, we will examine the level of digital transformation in Uzbekistan from the perspectives of human and sociocultural capacities. In terms of human capacities, the Uzbek government has focused on developing digital competencies through school curricula and plans to establish IT specialized schools in all regions. In 2021, 82 IT specialized schools were established, followed by 64 in 2022, with plans for an additional 45 in 2023.[24] Tashkent University of Information Technologies and its regional branches in particular are leading in training the country's IT professionals through various undergraduate and graduate programs. From the 2020/2021 academic year, computer skills and programing courses were introduced into the curriculum of all higher education institutions by a Presidential Decree.[25] Additionally, the IT Academy, overseeing the dissemination of IT technical education in Uzbekistan, has launched the "One Million Uzbek Coders" platform (Bir million O'zbek Dasturchilari), with the goal of providing basic programing skills education for the wider population.[26] As a result,

23) Compiled by the author based on the ITU Database (https://datahub.itu.int/data/)

24) Министерство цифровых технологий Республики Узбекистан, "В специализированных школах с углубленным изучением информатики и информационных технологий проходят отборочные тестовые испытания), 12 января 2021," https://mitc.uz/ru/news/2119 (검색일: 2023.11.18).

25) Президента Республики Узбекистан. "Постановление Президента Республики Узбекистан, от 06.10.2020 г. № ПП-4851. О мерах по дальнейшему совершенствованию системы образования в области информационных технологий, развитию и интеграции научных исследований с IT-индустрией," https://lex.uz/docs/5032131 (검색일: 2023.11.18).

26) "Dasturiy Ta'minotni Yaratish va Kelajakni Shakllantirish Haqida Ma'lumot Oling / One Million

Uzbekistan exhibits a conducive environment for enhancing human capacities in its digital transformation process. The population capable of using copy-paste functions increased from about 19% in 2017 to 24% in 2021, and those able to use basic arithmetic formulas in spreadsheets rose from 10% to 14% in the same period.[27] However, the gender gap among internet users in 2021 was 8.0, indicating a need for improvement. However, the generational gap (77.1 in 2021) is significantly more severe than the gender gap (refer to Table 2).

In terms of sociocultural capacities, the diversification of internet use languages and the increasing routine use of internet media indicate that digital transformation is significantly impacting everyday life in Uzbekistan. For example, the number of websites broadcasting news in the local language has increased, and online platforms broadcasting entertainment and information programs in Uzbek have emerged as strong alternatives to traditional TV. Influential social groups, such as bloggers on platforms like YouTube, Telegram, and TikTok, are expanding their audience. In summary, while improvements in digital capacities for women and the elderly are still needed, overall, digital transformation in Uzbekistan is progressing effectively in terms of human and sociocultural capacities.

2. Digital Transformation in Education

At the onset of the COVID-19 pandemic, when over 81% of schools in Uzbekistan were closed for more than four months, the government of swiftly initiated measures to continue education for students during the lockdown.[28] However, as of 2018, just a year before the pandemic, a mere

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Uzbek Coders," https://uzbekcoders.uz/ (검색일: 2023.11.18).

27) International Telecommunication Union (ITU), "Data Hub: Individuals with ICT Skills, by Type of Skills, Uzbekistan," https://datahub.itu.int/data/?e=UZB&i=100082 (검색일: 2023.11.18).

28) UNESCO, *The Impact of the COVID-19 Pandemic on Education*, (Paris: UNESCO, 2021), https://www.iea.nl/sites/default/files/202201/UNESCO%20IEA%20REDS%20International%20Report%2021.01.2022-FINAL%20for%20digital.pdf (검색일: 2023.11.18).

7% of primary and secondary educational institutions in Uzbekistan had stable internet access. This fact highlighted a considerable shortfall in digital preparedness within the public education sector.[29] In the initial stages of remote education, the online learning provided by authorities suffered from shortcomings such as lack of digital devices, slow internet speeds, and a deficiency of expertise in teaching methodologies suited for online learning. However, prior to the pandemic, all standard course textbooks were available as e-books through eduportal.uz and ziyou.uz, and in 2019, the online learning management platform Kundalik was established for public schools, facilitating a relatively smooth digital transition.[30]

From March 30, 2020, the Uzbek government began broadcasting TV lessons for grades 1-11 and started providing lesson videos on the Ministry of Education's social media channels. In April, as remote classes seemed likely to extend due to lockdown, the government launched web-sites including "https://tube.edu.uz" and "online-maktab.uz" (now, online.uzedu.uz) to provide lecture videos and supplementary learning materials. For higher education support, a unified platform, "https://dist.edu.uz", was established to consolidate online learning resources from all higher education institutions.[31] Furthermore, to enhance the capabilities of educators in developing remote learning materials, the government supported training through "http://mk.bimm.uz/". Webinars were also organized for university faculty and administrative staff on using various online learning platforms and uploading educational and learning materials.[32] As a result of these efforts, over 6,000 online educational resources were upgraded in 2020, and more than 1,000 new resources were created.[33]

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29) Yusuf Absoatov and Soliha Allayarova, "The State of Digitalization of Higher Education in Uzbekistan: Successes, Problems, and Future Tasks," *Higher Education in Russia and Beyond* no. 2-27 (2021), 26-28.

30) "Kundalik: подключение школ продолжается," *UzDaily*, 29 Апреля, 2020, https://www.uzdaily.uz/ru/post/51407 (검색일: 2023.11.18).

31) Absoatov and Allayarova, op., cit.

32) Ibid.

33) Ibid.

According to a survey by IEA, 95% of teachers reported receiving adequate support from the government for remote teaching, and most schools provided either internet access (85% of respondents) or digital devices (61% of respondents) necessary for remote learning to all or some of their students.[34] Additionally, domestic telecom companies collaborated with educational institutions to minimize disruptions in learning, providing temporary special traffic to facilitate easy access to educational resources and database systems.[35] For example, UMS offered a service allowing all internet service subscribers free access to public educational content and academic management systems during the pandemic.[36]

Consequently, while students in areas with stable internet access were provided with high-quality interactive educational opportunities combining video, audio, and text, those in areas with unstable internet connections were marginalized, depending on television lessons or being excluded from multifaceted media learning activities.[37]

However, the assessment of educational services provided during the COVID-19 pandemic period is mixed. While the pandemic accelerated the digital transformation in education, it simultaneously amplified the gap in educational opportunities due to the digital divide between urban and rural areas. For instance, educational content provided by the state, requiring high-capacity data transmission through video-based platforms, posed challenges for users in rural areas who primarily rely on lower-capacity mobile data.[38] Additionally, the predominance of video lectures as a mode

34) Syedah Iqbal and Harry Patrinos, *IZA DP No. 16232 Learning during the Pandemic: Evidence from Uzbekistan. IZA Institute of Labour Economics*, (Bonn: Institute of Labour Economics, 2023) https://docs.iza.org/dp16232.pdf (검색일: 2023.11.18).

35) "Предоставляемые в течение долгих лет удаленно услуги во время пандемии за считанные дни перешли в онлайн-режим," *UzDaily,* 20 Мая, 2020 https://www.uzdaily.uz/ru/post/52044 (검색일: 2023.11.18).

36) "Мобильный оператор UMS предоставил своим абонентам возможность пользоваться электронными ресурсами системы народного образования без расхода Интернет-трафика," *UzDaily,* 3 Августа, 2019 https://www.uzdaily.uz/ru/post/45506 (검색일: 2023.11.18).

37) USAID, "Digital Ecosystem Country Assessment (DECA): Uzbekistan, 2022," https://www.usaid.gov/sites/default/files/2023-05/USAID_Uzbekistan-DECA.pdf (검색일: 2023.11.18).

38) UNICEF, *Education Continuity in COVID-19 Pandemic Times: Impressions on Introducing Distance*

of instruction limited students' opportunities for active participation, leading to reduced concentration and motivation. According to an interview, online classes, unlike face-to-face sessions, diminished students' motivation to concentrate or engage earnestly in learning activities, and this demotivation led to instances of unabashed cheating in remote examinations.[39)]

In summary, a limited number of people consumed limited services, and those who did access the services reported relatively low satisfaction. This raises questions about why the digital transformation in education is exposing problems despite being effectively underway. What considerations should be made to enhance the inclusiveness of education in digital transformation? This study aims to answer these questions through conducting surveys and statistical analysis.

Ⅲ. Research Methodology

This study explores what factors need to be considered for improving the inclusiveness of online education in Uzbekistan. In this context, greater inclusiveness implies a scenario where a large number of individuals engage with a variety of online educational services and experience high satisfaction levels. Therefore, the research questions are focused on identifying factors that influence the consumption of online educational services and the satisfaction derived from them. Answering these questions aims to pinpoint improvements that can enhance the inclusiveness of online education.

To address the first research question regarding the factors influencing the consumption of online educational services, the dependent variable is defined as the level of consumption of these services. The independent

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Learning in Basic Education in Uzbekistan, (Tashkent: UNICEF Uzbekistan, 2020); Zahra Zarrati, Jamila Ermetova, and Shahodat Azadovna, "COVID-19 and Higher Education in Uzbekistan: Lessons from Two Universities," *Journal of Higher Education Policy and Leadership Studies* vol 3-2 (2022), doi: 10.52547/johepal.3.2.144.

39) Zarrati, Ermetova, and Azadovna, op., cit.

variables are derived from *The Economist*'s Internet Inclusiveness Index (3Is), adapted to an individual level, encompassing technological, human, and sociocultural capabilities.[40] Here, we use the 3I data because of its comprehensive coverage of factors relevant to digital transformation, as discussion in the introduction. These factors include technological, human, and sociocultural aspects. These index is used to develop the hypotheses of this paper, which is that the extent of online service usage is influenced by technological, human, and sociocultural capabilities. Additionally, we propose that specific elements within each of these factors will affect the sage of online education differently. This also reflects the prevailing discourse that these capabilities are central to digital transformation. This study seeks to verify the assumption that these capabilities significantly impact online education consumption. The research specifically focuses on identifying which specific sub-factors or variables have a meaningful impact on the consumption of online educational services.

For the second research question which explores the factors affecting the satisfaction with online educational services, the dependent variable is set as the satisfaction level with these services. The independent variables, mirroring those in the first question, encompass technological, human, and sociocultural factors. This configuration of variables is designed to examine the hypothesis that these factors influence not only the consumption levels but also the satisfaction levels with online educational services. However, it should be noted that this research design is based on the assumption that technological, human, and sociocultural capabilities are directly connected not only to the level of online education consumption but also to satisfaction levels. The study specifically investigates which particular factors or variables significantly influence satisfaction with online educational services. Additionally, individual characteristics such as age, income, and residence are included as control variables in the analysis.

40) *The Economist*, op. cit.

The data for this study was gathered through a survey conducted among 300 residents of both urban Tashkent City and rural Tashkent District in Uzbekistan, from September 1 to October 30, 2022. The interviews, conducted in Uzbek and Russian, were face-to-face. The survey population was segmented by gender and included individuals aged 16 to 56, excluding those below 16 and above 56 years old. The sample size was set at 150 respondents from each region.

In order to assess the first independent variable, the respondents' technological capabilities, internet connection satisfaction was chosen as the indicator. This measure encompasses considerations of internet speed, cost, and the locations of internet use. The mean satisfaction score for internet connection was determined to be 6.37, with a minimum of 0 and a maximum of 10, indicating that a majority of respondents experience a moderate to high level of satisfaction.

The second independent variable, the respondents' human capabilities, was assessed by examining their general level of education and experiences with digital education programs. Among the respondents, 36% had received higher education, and 13% held a master's degree or higher. When asked about participation in digital education programs, most respondents reported no experience, with the values ranging from 0 (no experience) to 1 (experience), and an average value of 0.15.

To assess the third independent variable, the respondents' sociocultural capabilities, the primary language spoken at home and general internet usage levels were chosen as indicators. The majority of respondents primarily spoke Uzbek at home, with 229 using Uzbek and, among them, 162 using only Uzbek, while 42 used both Uzbek and Russian. The respondents' usual internet usage level was determined based on their engagement in various activities listed in the survey over the past three months.[41] The scale ranged

41) a) Sending / receiving e-mails; b) Making calls (including video calls; c) Participating in social networks; d) Using instant messaging; e) Reading online news; f) Seeking health-related; g) Finding information about goods or services; h) Playing; i) Listening to music; j) Watching internet; k) Watching video; l) Watching video content from sharing services; m) Looking for a job from job

from 1 to 14, with a higher score indicating engagement in a greater variety of activities, and the average value was 5.03. Additionally, gender was considered as one of the indicators of sociocultural capabilities in this study, acknowledging that sociocultural capabilities in Uzbekistan might be influenced by gender differences.

To measure the dependent variables, questions were posed regarding the level of utilization of online education and satisfaction with it. The level of online education utilization was measured similarly to internet usage level, based on the variety of activities participated in over the past year, with a scoring system that assigned higher scores for involvement in more activities. The values ranged from 0 to 10, with an average of 1.36, suggesting that most respondents participated in one to two activities. The satisfaction level with online education was assessed on a scale from 0 to 10, with an average score of 3.89, indicating a relatively low level of satisfaction.

To reflect the personal characteristics of respondents, questions about age, income, and residence were included. An overview of the respondents' characteristics revealed that the survey included 72 women and 66 men from urban Tashkent City and 65 women and 66 men from rural Tashkent Province. The average age was 34.3 for women and 33.2 for men. Regarding income, 26.4% of respondents earned between 900,001 to 1,500,000 Uzbek Som (approximately 80 to 135 USD, average middle income), 32.8% earned between 1,500,001 to 3,000,000 Som (approximately 135 to 270 USD, upper-middle income), and 24.1% earned over 3,000,000 Som (more than 270 USD, upper income).[42] The descriptive statistics for the survey items and variables are presented in Tables 3 and 4 below.

webs; n) Looking for a job from social media.

42) 네이버 환율, https://m.stock.naver.com/marketindex/exchangeWorld/USDUZS (검색일: 2023.11.20).

[Table 3] Summary of Survey Questions

	Questions
Q1	What is your age?
Q2	What is your household average monthly income?
Q3	Where do you live?
Q4	How satisfied are you with your internet connection?
Q5	What is your highest educational attainment?
Q6	Have you had any education or training in using online tools?
Q7	What is your gender?
Q8	What language do you primarily use?
Q9	Which of the following online activities have you participated in during the last 3 months?[43]
Q10	What online educational activities have you engaged in during the last 12 months?[44]
Q11	How satisfied are you with online educational services?

[Table 4] Descriptive Statistics

Variable	Cases	Average	Deviation	Min.	Max.
Age	268	33.74627	10.67475	16	56
Income	265	3.566038	1.175982	1	5
Residence	268	.4925373	.5008797	0	1
Internet Connection Satisfaction	268	6.365672	2.301412	1	10
Education Level	268	6.391791	1.056214	2	8
Participation in Digital Education	267	.1460674	.353837	0	1
Gender	267	.4906367	.5008511	0	1
Primary Language-Russian	268	.3059701	.4616793	0	1
Level of Internet Usage	268	5.033582	2.883959	1	14
Level of Online Education Consumption	268	1.358209	1.602447	0	7
Level of Online Education Satisfaction	268	3.891791	3.519801	0	10

43) a) Doing an online course using educational web-sites; b) Using online learning material other than a complete online course; c) Communicating with instructors or students using Zoom; d) Online examination; e) Online school; f) Education pages on social networks; g) Online application.

44) a) Sending / receiving e-mails; b) Making calls (including video calls; c) Participating in social networks; d) Using instant messaging; e) Reading online news; f) Seeking health-related; g) Finding information about goods or services; h) Playing; i) Listening to music; j) Watching internet; k) Watching video; l) Watching video content from sharing services; m) Looking for a job from job webs; n) Looking for a job from social media.

Ⅳ. Results and Discussion

The aforementioned research questions are analyzed through linear regression analysis. Firstly, the analysis of factors determining the level of online education service consumption is presented in Table 5. A sequential approach was employed, introducing technological, human, and sociocultural capabilities individually into the models, followed by a comprehensive model integrating all capabilities. The results reveal several key findings. First, across all four models, personal background factors such as age and place of residence significantly influence the consumption of online education services (Model 1, Model 2, Model 3, Model 4). Specifically, younger individuals and those residing in the capital city are more likely to consume a diverse range of online education services. However, income level does not significantly impact the consumption of online education services. Second, internet connection satisfaction, which was use as a measure of technological capability, does not significantly influence the level of online education service consumption (Model 1). Third, educational level, a measure of human capabilities, positively and significantly impacts online education service consumption (Model 2, Model 4). However, the effect of participation in digital education becomes insignificant when technological and sociocultural capabilities are also included in the model (Model 4). Fourth, sociocultural capabilities, measured by gender and level of internet usage, are significant factors affecting online education service consumption (Model 3, Model 4). It was found that women consume online education services at a higher level than men, and individuals who use the internet for a wide variety of activities are more likely to utilize a diverse range of online education services. On the other hand, the influence of language use, specifically speaking Russian, on online education service consumption was not found to be significant.

[Table 5] Analysis of Factors Affecting Online Education Service Consumption

	Technological Capabilities (Model 1)	Human Capabilities (Model 2)	Sociocultural Capabilties (Model 3)	Combined (Model 4)
Internet Connection Satisfaction	-0.049			-0.065
	-1.32			-1.79
Educational Level		0.196		0.206
		(2.34)*		(2.47)*
Participation in Digital Education		0.523		0.467
		(2.16)*		-1.95
Gender			0.384	0.363
			(2.26)*	(2.17)*
Primary Language - Russian			0.329	0.355
			-1.66	-1.83
Level of Internet Usage	0.224	0.215	0.207	0.207
	(7.04)**	(6.91)**	(6.41)**	(6.51)**
Age	-0.017	-0.022	-0.019	-0.023
	(2.06)*	(2.75)**	(2.37)*	(2.89)**
Income	0.053	0.049	0.033	0.032
	-0.72	-0.66	-0.44	-0.44
Residence	-0.563	-0.53	-0.529	-0.462
	(3.14)**	(2.99)**	(2.92)**	(2.59)*
_cons	1.2	-0.209	0.818	-0.04
	(2.50)*	-0.34	-1.84	-0.06
R^2	0.27	0.3	0.29	0.33
Observations	265	264	264	263

*p<0.05; **p<0.01

Subsequently, the analysis of factors determining satisfaction with online education services is presented in Table 6. Similar to the aforementioned analysis, the study diversified its approach by introducing technological, human, and sociocultural capabilities individually, followed by an integrated model including all capabilities. Initially, all four analytical models commonly revealed that personal background factors such as age and place of residence significantly influence satisfaction with online education

services (Model 1, Model 2, Model 3, Model 4). Specifically, younger individuals and residents of the capital city tend to have higher satisfaction levels. However, income level does not significantly affect satisfaction with online education services. Secondly, the measure of technological capability, internet connection satisfaction, was found not to significantly influence satisfaction with online education services (Model 1). Thirdly, human capability factors, namely educational level and participation in digital education, both positively and significantly impact satisfaction with online education services (Model 2, Model 4). Higher educational levels and experience in digital education are associated with higher satisfaction. Fourthly, sociocultural capabilities measured by the level of internet usage and language use significantly influence satisfaction, but gender does not have a significant impact (Model 3, Model 4). Russian speakers, compared to those who speak other languages, show higher satisfaction with online education services, and individuals who utilize a variety of internet services tend to have higher satisfaction levels.

[Table 6] Analysis of Factors Affecting Online Education Service Satisfaction

	Technological Capabilities (Model 1)	Human Capabilities (Model 2)	Sociocultural Capabilities (Model 3)	Combined (Model 4)
Internet Connection Satisfaction	0.027 -0.3			-0.002 -0.03
Educational Level		0.493 (2.47)*		0.506 (2.52)*
Participation in Digital Education		1.279 (2.21)*		1.213 (2.10)*
Gender			0.559 -1.37	0.424 -1.05
Primary Language - Russian			0.94 (1.98)*	0.972 (2.08)*
Level of Internet Usage	0.214 (2.80)**	0.204 (2.75)**	0.182 (2.34)*	0.168 (2.20)*

	Technological Capabilities (Model 1)	Human Capabilities (Model 2)	Sociocultural Capabilities (Model 3)	Combined (Model 4)
Age	-0.046	-0.058	-0.049	-0.061
	(2.37)*	(2.99)**	(2.55)*	(3.15)**
Income	-0.191	-0.185	-0.227	-0.227
	-1.07	-1.04	-1.27	-1.27
Residence	-1.486	-1.373	-1.301	-1.188
	(3.44)**	(3.25)**	(2.99)**	(2.76)**
_cons	5.643	2.825	5.536	2.595
	(4.88)**	-1.91	(5.18)**	-1.7
R^2	0.12	0.17	0.14	0.18
Observation	265	264	264	263

*p<0.05; **p<0.01

The study highlights human and sociocultural capabilities as key drivers influencing both the level of use and satisfaction with online education services. Interestingly, technological capability, particularly in relation to internet-based education service usage and satisfaction, doesn't show a substantial effect. This underlines the need for policies focused on enhancing human and sociocultural skills in the long term. A notable finding is that higher education levels are linked to both varied use of online education services and increased satisfaction. It's crucial to acknowledge that while engagement in digital education doesn't significantly boost usage, it positively affects satisfaction. Therefore, providing basic digital skills training is crucial to help users effectively search for and utilize educational content that suits their needs.

During the pandemic in Uzbekistan, the proportion of internet users under 14 years of age increased dramatically from 36.2% in 2018 to 66.2% in 2021, accompanied by a sharp increase in the demand for online education.[45] This surge resulted in not only a proliferation of national online education

45) International Telecommunication Union (ITU). "ITU Data Hub: Uzbekistan: Individuals Using the Internet by Age," https://datahub.itu.int/data/?e=UZB&c=701&i=11624&d=Age (검색일: 2023.11.20).

offerings but also a vibrant market for online private education platforms such as Coursera. However, without adequate digital literacy, users are unable to fully utilize these services.[46] An expert in the local online private education sector highlighted this key issue: while many people participate in online learning activities, there is a significant lack of deeper digital literacy skills. This includes not only the ability to use digital services but also self-motivation and active participation in using digital resources. This shortfall often results in online education being less effective than traditional face-to-face learning, both in terms of learner satisfaction and educational outcomes.[47] Hence, it is vital to incorporate compulsory training in essential digital skills into the national curriculum at all educational levels, beginning from primary school. This early integration ensures that students develop these critical skills from a young age, laying a solid foundation for their future digital literacy and competence in an increasingly digital world. This foundational approach sets the stage for their future digital literacy and proficiency in our rapidly evolving digital landscape. With earlier exposure to e-learning services, students will be better equipped to navigate and select the online educational programs they need, enhancing their ability to learn and adapt to increasingly digitalized world.

The study also reveals two key insights regarding sociocultural capabilities. First, it was observed that women engage more with online education services than men, though this does not necessarily translate to higher satisfaction levels. This discrepancy might imply that women, despite their higher usage rates, may not find these services completely fulfilling. This trend could be influenced by societal factors, particularly in traditional contexts like Uzbekistan where women often assume the primary caregiver role. During the COVID-19 lockdowns, many women likely found

46) Диана Ахмеджанова, “Как изменится онлайн-обучение в Узбекистане после карантина,” *Spot,* 18 Ноября 2020, https://www.spot.uz/ru/2020/11/18/education/ (검색일: 2023.11.20).

47) Александр Климов, “Онлайн-обучение это хорошо, но не все в Узбекистане готовы к нему» — как работает в кризис учебный центр,” *Spot,* 22 Апреля 2020, https://www.spot.uz/ru/2020/04/22/education/ (검색일: 2023.11.20).

themselves more involved in managing and supporting their children's remote learning, which could explain the increased engagement with online education services. According to a UNICEF survey, about 43% of parents reported consistently participating in their children's remote education during the initial lockdown, with another 33% doing so occasionally.[48] Such involvement might have made women more acutely aware of the limitations and challenges of online education compared to men.

Moreover, there is a possibility that women are accessing online educational content but not engaging in more complex or advanced activities. This could be partly due to the gap between national policies that aim to reduce gender disparities in science and programming, and the prevailing societal view that IT and other STEM fields are predominantly male domains. Such perceptions may lead to doubts about the benefits of IT education for women in terms of socio-economic advancement.[49] Consequently, it becomes essential to develop strategies that draw women into the ICT field, such as offering education content specifically tailored for them and fostering supportive online communities for women. This approach is highlighted as a necessary step to encourage female participation in the IT sector.[50]

To enhance the participation of women in online education and IT fields, a multifaceted approach is needed. First, develop educational content that resonates with women, focusing on areas like financial literacy, entrepreneurship, and STEM subjects, which are often seen as male-dominated. This content should align with women's interests and career goals, addressing their unique learning requirements. Secondly, establish supportive online communities and mentorship programs for women in online education. These platforms can provide peer support, enable

48) UNICEF, op., cit.

49) "Не бойтесь стать 'айтишницей': возможности и перспективы в IT для женщин Узбекистана." *UzDaily,* 9 Сентября 2023, https://www.uzdaily.uz/ru/post/79585 (검색일: 2023.11.20).

50) Ibid.

knowledge exchange, and help overcome the sense of isolation that women might experience in male-centric online learning environments. Lastly, address the societal biases that deter women from IT fields. This involves launching awareness campaigns and educational programs that challenge existing cultural stereotypes and inspire girls and women to explore and excel in technology-related careers.

Lastly, the study finds an intriguing aspect regarding language use. Although Russian speakers do not necessarily engage more actively with online education services than non-Russian speakers, they report greater satisfaction with these services. Russian-speaking users have access not only to local educational content in Uzbekistan but also to a more robust online education market in Russia and Kazakhstan, enabling access to a broader and higher quality range of educational resources. As of 2023, Russian is the third most-used language on the internet, suggesting that resources available in Russian significantly surpass those in local languages like Uzbek, Tajik, and Karakalpak in both quantity and quality.[51] Therefore, it is essential for Uzbekistan to revitalize its content market to ensure that speakers of local languages also have access to high-quality educational content. To enhance educational inclusiveness, it is crucial to support the translation and localization of existing educational materials from Russian and other languages into Uzbek, Tajik, and Karakalpak, thereby expanding the diversity of accessible content. Simultaneously, promoting the use of these local languages in online education platforms and interfaces will greatly improve accessibility and ease of use for non-Russian speakers.

51) W3Tech. Usage Statistics of Content Languages for Websites 2023. https://w3techs.com/technologies/overview/content_language (검색일: 2023.11.20).

V. Conclusion

This paper focuses on the intensification of digital transformation and its varied implications in the education sector. Specifically, this paper aims to investigate what needs to be considered to enhance the inclusiveness of online education by analyzing the factors affecting both the consumption level and satisfaction with online education services among residents of Uzbekistan. To this end, a survey was conducted with 300 Uzbek residents.

The analysis yielded several key findings. First, it was observed that satisfaction with internet connection does not significantly influence either the level of internet education service consumption or satisfaction with these services. Second, individuals with experience in digital education exhibit higher satisfaction with online education services compared to those without such experience. Third, women demonstrate a significantly higher level of online education service consumption than men, but this does not translate into a correspondingly higher level of satisfaction. Fourth, Russian speakers show a higher level of satisfaction with online education services than non-Russian speakers. Therefore, to achieve better inclusiveness in Uzbekistan's online education, policies need to focus not only on technological capabilities but also on enhancing human and sociocultural capabilities. Importantly, there should be a development of a content market that allows women and solely Uzbek-speaking individuals to access quality content. Additionally, policies should aim to increase user satisfaction with online education services through specialized digital education.

This paper contributes to academic discourse in two significant ways. Firstly, by synthesizing existing research implications and examining factors influencing the inclusiveness of online education, it contributes to expanding academic diversity. Moreover, the academic contribution of this paper is clear, given the scarcity of research analyzing online education in Uzbekistan. However, given the insufficient examination of the operational

mechanisms of the extracted factors, it will be necessary to explore these mechanisms in greater depth in future research. Secondly, the statistical analysis conducted through surveys offers relatively concrete policy implications, providing a comparative advantage to the study. However, further discussion is required to practically implement the policy implications suggested by the analysis findings.

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Abstract

Enhancing Digital Education Inclusiveness in Uzbekistan: A Critical Analysis of the Nation's Digital Transformation and Online Learning Initiatives

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This research investigates the enhancement of inclusiveness in Uzbekistan's online education system. It examines, through surveys and statistical analyses, how various factors influence the usage and satisfaction levels of online educational services among Uzbek internet users. Key findings include the negligible impact of internet connectivity on service usage and satisfaction, higher satisfaction levels among individuals with prior digital education experience, and notable differences in service consumption and satisfaction across gender and language groups. The study underscores the necessity for comprehensive policies that address not just technological aspects, but also sociocultural capacities. It highlights the importance of creating content markets tailored to women and Uzbek-only speakers and suggests implementing specialized digital training programs to elevate user satisfaction with online educational services.

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