INTEGRATING SCIENTIFIC AND PROFESSIONAL EDUCATION THROUGH DIGITALIZATION: FOSTERING DUAL EDUCATION IMPLEMENTATION IN UZBEKISTAN'S HIGHER EDUCATION

Jimbo H. Claver
Samarkand International University – SIUT Samarkand, Uzbekistan

Abstract. With the rapid development of technology and the increasing demand for innovative talents in society, traditional teaching models have proven inadequate in fully addressing the needs of cultivating high-quality scientific research professionals. Therefore, education models are constantly evolving. The integration of scientific and professional education, which combines scientific research with teaching and learning, not only enhances the quality of education, but also promotes the development of scientific research and technology, emerging as an important trend in contemporary education. This paper explores the importance of integrating scientific and professional education with digital competency and analyses strategies to enhance the quality of teaching in scientific research and education. Ultimately, these efforts seek to improve students' scientific knowledge, digital literacy and foster their innovation capabilities for professional education and development as a whole.

Keywords: Scientific education, professional education, digitalization, integration and innovation.

Introductions

The digital transformation of higher education in Uzbekistan needs a systemic approach with multiple components. The digital competency framework established in [1,2,3] provides the theoretical foundation for understanding and applying emerging technologies in educational institutions. As mentioned in [2,6,8] "*The digital transformation of higher education necessitates a systemic approach integrating four fundamental components: a) systematic and contextualized professional development; b) gradual and sustainable technological implementation; c) ethical framework for digital integration; and d) adaptive institutional policies.*" Similarly, the framework proposed in [2, 3,10] articulates four interrelated dimensions: the technical-instrumental competencies, pedagogical-digital capabilities, transformational management skills, and ethical-social competencies. The current Uzbek higher education system has yet to apprehend some competencies to support innovation and development of current educational system. Furthermore, the authors in [2,6,8] added that: "*The effectiveness in technological integration depends on institutional capacity to balance innovation and sustainability while maintaining learning development and the human factor as central axes."*

During the Soviet era, there were some separations between scientific education and industry; therefore, education process led to higher education mainly at academic teaching and learning. Today, in order to close this gap and solve the current problems of separation of industry and education, and the disconnection between science and education faced by Uzbekistan's higher education system, innovative approaches need to be developed. This paper analyses the general path choice of science education, digital competency integration, the deep integration mode driven by innovation, and its positive impact on improving education quality and competitiveness and proposes strategies to promote the integration of industry and education with the integration of science and education, hoping to provide some references for building a strong educational country. Regarding the integration of scientific and professional education, the following argument has been highlighted in [9,11,12] "*The mismatch between educational resources and industrial development has also become a bottleneck affecting the in-depth development of industry-education integration. Overall, the integration of industry and education has made positive progress under the vigorous promotion of national policies, but it is still necessary to face the challenges at the implementation level, actively explore innovative cooperation mechanisms, and realize the effective docking of educational resources and*

industrial demand."

Scientific Education in Uzbekistan

One of the main demands of modern society today is scientific education, where students should be equipped with fundamental scientific and digital knowledge. Uzbekistan needs scientific education that understands the natural world around us, uses scientific processes to make personal decisions, as well as deals with the scientific and technological aspects of today's education. Eventually, the new generation of Uzbek scholars needs individuals who contribute to societal productivity; they should cultivate curiosity, excitement, and positive attitudes toward science. Consequently, rather than focusing only on imparting scientific knowledge, a science program should encourage students to participate in science by highlighting the methods used to create science, structuring scientific concepts, and cultivating a scientific mindset through inquiry [2, 8]. Accountability is, therefore, established by evaluating the program's quality in accordance with its overall planned conceptual framework, taking into account its scope and well- chosen objectives, its implementation practices in accordance with planned activities, and the degree to which the objectives have been attained [2, 6, 8]. Since every program should support a society's intellectual and social development, it is also critical for the program to consider the satisfaction of different stakeholders, education policymakers, experts, and any other agency dealing with the program outcomes [9,10,11]. Therefore, assessing a research program is a dynamic process where any data regarding its quality will give ongoing input to both its conceptual framework and its implementation procedures [7,8,10].

Foundations of Professional Education

Professional education represents a structured method of specialized training within a professional school, enabling participants to gain both theoretical knowledge and practical skills [1,2,4,9]. While the primary focus is on the content that students are expected to master, this form of education fosters the development of essential competencies required for effective practice and professional conduct [4,7,9]. The key objectives of professional education include the integration of foundational knowledge and values pertinent to a specific discipline; comprehension of the core concepts, principles, and techniques utilized in practice; achieving a level of proficiency necessary for responsible entry into the profession; and embracing the obligation for ongoing professional development [10,12,14]. The ultimate aim is to cultivate accountable professionals and to support their continuous development by promoting an understanding of the importance of advancing professional knowledge and enhancing practice standards. This process emphasizes the application of learning in real-world scenarios and seeks to prevent the obsolescence of professions and practitioners [13, 14].

Digital Competencies in Uzbek Education

The information and communication technologies have strongly impacted the new global education, changing how people communicate, work, study, and do business [2,11]. They can improve education quality and accessibility, but they may also pose numerous challenges in terms of digital assessment [12]. Digital education, known as the set of knowledge (knowing), skills (know-how), and attitudes (knowing to be) that are required for the proper acquisition and development of digital competence, is an indispensable requirement to integrate technology into the teaching and learning processes for education.

The digital competency in Uzbekistan will become essential for future country's economic and social prosperity [3] and, consequently, its early development in education should be regarded as a necessity [14]. The digital competency in Uzbek educational system is referred to a set of abilities that are needed in the digital environment [5]. In this respect, it is viewed as a set of knowledge, skills, and attitudes that is required for the safe, critical, and responsible use of digital technology in the personal-individual and educational professional environments [3,7,9].

Challenges of Industry-Education Integration in Uzbekistan,

As an important strategy to promote the deep integration of scientific education and professional education, national policies are key. The authorities should strengthen the cooperation between industry, universities and research institutes to promote the deep docking

between higher education and industry, aiming to cultivate high-skilled talents in line with the market demand [13]. The Uzbek higher education and enterprises may establish multiple cooperations, such as industry-academia-research cooperation and jointly manage schools and enterprises type models [2,4]. These cooperations may involve various levels, such as curriculum, mutual construction, mutual assignment of teachers, and sharing of internship and training opportunities. However, the integration of industry and education may also face some challenges in the process of implementation. These challenges identical to those mentioned in [12,13]: "*Problems such as imprecise matching of needs and insufficient innovation in the content, the mode of cooperation are often found in the co-operation between colleges and enterprises. In addition, the depth and breadth of the integration of industry and education in some regions are insufficient, and there is the problem of unbalanced geographical development. How to balance the interests of enterprises with the fairness of education, ensure the independence and scientificity of education content, and how to ensure the rights and interests of students in practice have become urgent issues."*

Conclusion

This piece of work examines the digital transformation in Uzbek higher education by analyzing the convergence scientific and professional education. The study is grounded in a systematic analysis of institutional experiences and contemporary theoretical frameworks, highlighting the impact of scientific, educational and technological integration along with digital competencies in Uzbek educational processes with theoretical and practical contributions from several fields.

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