SECTION 7. INNOVATIVE ECONOMY

10.46299/ISG.2022.MONO.ECON.4.7.1

7.1 New educational methods of shaping human capital for the conditions of digital transformations and postwar recovery

Modern socio-economic development of society and its transition to Industries 3.0 and 4.0 and postwar recovery requires using new innovative methods and technologies for teaching and learning. In particular, in-depth learning for students of economic specialties allows future specialists to be more competitive on the labor market.

The concept of "innovative teaching methods" is multicomponent because it combines new practical approaches to successful educational processes (acquisition, transmission, and production of knowledge) [405]. It contributes to the intensification and modernization of learning and develops creative approaches and the personal potential of graduates.

Innovations in education can be divided into psychological and pedagogical – innovations in the educational, educational, and management process; scientific and production – computer and multimedia technologies; socio-economic – legal and economic innovations [406].

Innovative technology in the higher education system is based on organizational and methodological innovations. The most popular innovative teaching methods are contextual learning, simulation, problem learning, modular complex knowledge acquisition, and distance learning. Table 1 shows the comparative characteristics of innovative teaching methods.

Table 1. Comparative characteristics of innovative teaching methods [407].

Innovative teaching models	Key characteristics	Characteristics of the traditional model
Context teaching	Integration of different types of activities: educational, scientific, and practical. Creating conditions that are as close to reality as possible	Increasing student's practical experience (internships)
Simulation teaching	The use of games and simulation forms of training	Increase the share of active teaching methods (simulations and simulation games
Problem-solving teaching	Initiating a self-search (for students) of knowledge through problematization (for tutors) of the educational material	Changing the nature of the educational task and educational work (from reproductive to productive, creative)
Modular teaching	The content of the educational material is rigidly structured with maximum assimilation, accompanied by mandatory blocks of exercises and control of each fragment.	The specific organization of educational material in the most compressed and understandable form for the student
Distance learning	With broad access to educational resources, the role of the teacher is highly mediated; the student's part is self-directed and autonomous.	The use of information and communication technologies

An interactive learning model will significantly contribute to economic students' qualitative professional and competitive preparation. The practical application of such a model proved that the teacher and students act harmoniously in a cooperative teaching-learning model (pair, group, and collective, learning in cooperation). Interactive lectures and practical classes are of high importance in the educational process.

The choice of an interactive lecture and workshop activities for economic disciplines speaks for itself because it facilitates students' thinking and behavior; provides processing of an extensive array of information; minimizes the teacher's monologue, giving preference to his dialogue with students, where he maximizes

knowledge of previous topics of the course, other subjects, general economic and scientific expertise; suggests problem-solving and decision making; facilitates quick feedback with students; creates conditions for intensive pedagogical work; ensures achievement of high educational results; activates independent acquisition of knowledge by students; encourages students' and teachers' self-development.

In-depth learning for future professionals is a radical innovation in curriculum and instruction designed to ensure that all economics students become experts during their university years [408].

Future professionals, particularly economics students, must be highly competitive in the labour market. It explains the need for employing different teaching methodologies and technics. “Learning in Depth" is the approach that ensures every student becomes familiar with specific Industry 3.0 and 4.0 issues they may choose to specialize in.

What are these specific issues? Our earlier research [409] stated that they refer to sustainable development formation in conditions of Industry 3.0 and Industry 4.0. Developing in-depth learning materials, including handouts, power point presentations, tutorial materials, video lectures, and open online courses, are part of this approach. It would allow future professionals to become real experts in modeling production/consumption nets, including those achieved by social and solidarity economies.

Originally ‘Learning in Depth (LiD) is a simple though radical innovation in curriculum and instruction, first implemented in Canada in 2008/2009 [410] and designed to ensure that all students become experts in something during their school and university years. Instead of traditional face-to-face lecturing, it implements lectures with open discussions and game simulations, targeting cross-cultural peculiarities for sustainable development fostering based on achievements of Industry 3.0 and Industry 4.0 as a result of the Third and Fourth Industrial Revolutions.

Our 'Learning in Depth' approach would ensure that every student becomes familiar with a particular EU-related issue they may choose to specialize in. We would achieve this by employing different teaching methodologies and technics. The courses

related to sustainable development, solidarity economy, etc. may start from developing in-depth learning materials, including handouts, power point presentations, tutorial materials (including game simulations), video lectures, and open online courses. Specifically, instead of traditional face-to-face lecturing, we would implement lectures connected with open discussions and game simulations, targeting cross-cultural peculiarities for sustainable development fostering based on the achievements of the Third and Fourth Industrial Revolutions. We already have collected a large bank of data and materials gathered within the EU on high levels of international standards and managing cross-cultural peculiarities of relevant social, economic, and ecological issues.

Karl Popper's debate should focus on the core elements of controversial issues; emphasize tolerance for multiple points of view, emphasize the development of analytical thinking skills; provide students with the opportunity to debate many kinds of resolutions [410].

Its extended format with Government and Opposition as two confronting parties is preferable, modeled by debates with NGO participation, local government, business, developers, and active citizens.

Each student is given a topic to learn about through a university course. Within the framework of the research on the development of the fundamental bases of the reproductive mechanism of socio-economic development during the Third Industrial Revolution #0118U003578 we suggested the economic analysis on phase transition to Industry 3.0 and 4.0 [412]. The scope of topics will refer to basic concepts and principles of Industry 3.0 and Industry 4.0 as the main results of The Third and Fourth Industrial Revolutions, which bring the necessity of socio-cultural, socio-economic, and technological transformations for sustainable development on the local level.

University students have used the following simplified format to generate thrilling debates in the auditorium and the classroom. There are two teams, an Affirmative Team, and a Negative Team, and there is a Proposal. For example, the Proposal for a debate might be "Industry 3.0 and Industry 4.0 bring the necessity of socio-cultural, socio-economic, and technological transformations for sustainable

development on the local level". The Affirmative Team would agree with the Proposal as written. Their stance, then, is that Industry 3.0 and Industry 4.0 bring the necessity of socio-cultural, socio-economic, and technological transformations for sustainable development on the local level. The Negative Team will oppose the Proposal, arguing that Industry 3.0 and Industry 4.0 do not bring the necessity of socio-cultural, socio-economic, and technological transformations for sustainable development on the local level. The Proposal is the boundary for the debate; it is the Proposal being argued, not the broad topic of transformations for sustainable development in general. Each team has three members, and each person must take both a research and a speaking role. Roles can be assigned according to individual strengths and preferences. One student may want to handle the first cross-examination while another takes the opening speech. In the schedule of rounds that follows, each team member is assigned a number: 1, 2, or 3.

For future professionals, date learning materials are essential. These refer to qualitative transformations of the economic system. The components of the triad of system-forming groups of factors (material, energy, information, and synergetic) should correspond with the goals and objectives of such transformations.

The historical background of the Third Industrial Revolution aims to return to harmony with nature through transforming production systems, greening economy and lifestyle, and ensuring a new level of social and energy development. In these circumstances, industries must strive not to increase scale and forms of social production but to increase productivity, functionality, and economic systems efficiency [413, 414, 415, 416, 417].

The Fourth Industrial Revolution (known as "Industry 4.0") introduces cyber-physical systems in production processes. It is foreseen that cyber-physical systems will be combined into a single network to form unique local "eco-systems" to maintain a particular house, company, or city.

The Third and Fourth Industrial Revolutions facilitate achieving sustainable development. We can expect two critical transformations in socio-economic activity:

1. Changes in consumption: transition from individual products and services to the formation of complexes for creating comfortable conditions for human biological needs, development of social needs, and the realization of human creativity.

2. Changes in production: transition from "torn" production cycles to the formation of nature-friendly labor, display, and consumption organized according to closed processes.

Based on the analysis of several publications [418, 419, 420], the authors formulated the most important functions of cyber-physical systems carried out without any human participation: information exchange in real-time; monitoring of external and internal parameters; self-activation and stopping under specific information signals; self-tuning for optimal operating conditions; forecasted systems self-service; interaction with produced goods; adaptation to the new needs of consumers; definition of the needed equipment to make the required products or meet new demands; self-learning of new work methods.

The Third and Fourth Industrial Revolutions prepared a solid basis for ensuring sustainable development in local communities. In this way, they must progress in three basic transformations: socio-cultural, socio-economic, and technological. Necessary transformations are the following:

The Sociocultural Transformations develop a "culture of sustainability" based on equal access to municipal services for all citizens, nurturing the "sharing economy", "collaborative economy" or "civic economy" and other approaches that combine the ideas of entrepreneurship, civic engagement and societal transformation [421].

The Socio-Economic Transformations are targeted at the formation of decentralized renewable energy production, local food production, innovative transportation concepts, new approaches to social services and many other innovations, development towards a circular economy, to reduce the need for natural resource consumption and the production of waste, as well as the increase of eco-efficiency.

The Technological Transformations apply new and smart technologies that support the necessary socio-cultural and socio-economic transformations and serve the

interest of the citizens and the public good, as well as form “Internet of things” and “Internet of citizens”.

Currently, humanity is in a phase transition to a new socio-economic formation, which in the scientific literature is called by various terms, in particular digital, sustainable, information, knowledge, network society. This transition is accompanied by a wave of transformational processes, which, as a rule, are summarized by the concepts of modern industrial revolutions (Industry 3.0, 4.0, 5.0).

These transformations inevitably lead to changes in the basic foundations of the existence of human civilization, in particular key principles of human-society interaction, energy base, production and consumption of products, organizational foundations, management methods, social relations, communications, settlements, lifestyle, and public institutions.

The social consequences of the mentioned transformational processes are reinforced by other phenomena of social life that occur in the world, particularly socio-economic crises that inevitably accompany the processes of restructuring society and the destructive processes of Russian aggression against Ukraine. People lose loved ones, health, comfortable living conditions, everyday work, and financial security. They are forced to change their place (often country of residence), social environment, usual occupations, connections, and communications.

The above conditions are the need for a radical restructuring of educational processes. The general purpose is to prepare youth and adult representatives of society for life in new socio-economic conditions. Critical tasks that ensure the realization of the specified goal can be considered anticipatory formation of worldview principles, knowledge and skills necessary for the active life of a person in the future society; reproduction of the ability of self-learning and self-development of a person; formation of human adaptation skills to changes occurring in production, consumption, communications, and social environment; reproduction of the ability to self-organize one's labor activity and determine directions for the formation of influential spheres of activity; provision of timely and adequate to current circumstances retraining (retraining) of human capital (human resources); rehabilitation (restoration of the

ability to full-fledged productive activity) of population groups that were negatively affected by the mentioned processes and phenomena (persons who lost loved ones and health; ex-military personnel; persons who lost their jobs and standard working conditions; persons who were forced to change living conditions and social environment).

In terms of form, educational processes aimed at transforming the educational environment should include the transfer of worldview knowledge necessary for the formation of general concepts about the specifics of the processes and phenomena taking place, provision of necessary knowledge about specific theoretical and practical issues of retraining and rehabilitation of the specified contingent; formation of skills in the contingent that would ensure the practical implementation of the stated goals of the retraining and rehabilitation processes.

Educational institutions of Ukraine, as well as European countries, not only solved the complex issues of implementing modern industrial revolutions (Industries 3.0, 4.0, 5.0), but also had to undertake liquidation or to alleviate the consequences of armed Russian aggression and solve the problems of post-war reconstruction.

In university education, the variety of innovative teaching and learning technology helps future specialists stay competitive in the labour market. In-depth learning helps to organize a learning process through a dialogue, or debate, e.g., Karl Popper debate that will help students learn to express their thoughts, analyze problem situations and find effective ways to solve them. Such methods increase the level of education, develop students, and form skills that will be used in their different professional activities. Future professionals must understand how technical progress and new forms of communication create new opportunities for the existence and development of Industry 3.0 and 4.0, which bring the emergence of a new reality. One of the most burning problems of humanity is the formation of sustainable development prerequisites. It is essential to involve students in solving this problem by applying progressive teaching-learning methods and in-depth learning. In the nearest future, they will have to find answers to the question of which future they will live tomorrow. Integration and solidarity, in combination with competition, this very instrument that

can efficiently solve the most urgent economic, social and environmental problems of social and economic development.

Acknowledgment. The paper is prepared within the scientific research projects "Sustainable development and resource security: from disruptive technologies to digital transformation of Ukrainian economy" (№ 0121U100470) and "Fundamentals of the phase transition to the additive economy: from disruptive technologies to institutional sociologization of decisions" (No. 0121U109557).