

- (2) “Ideal Profiles” are transformed into “Real Profiles” in the process of specifying real district site zones by innovative interactive “2TMap” tool integrating topography-typology;
- (3) “Synergetic profile” is developed via original “Cognitive schemes overlaying technique”;
- (4) the best solutions are selected as a result of multiscale economic-ecologic-social-human evaluation of solutions; relevance to NEB & New European paradigm; workability of proposed solutions by means of original interactive “Evaluation toolkit” including “Multiscale filter”, “Existential mind-map”, “Changes visualization”;
- (5) transformation of the best solutions into action plan is performed by original interactive “Planning toolkit” including “Continuum of sequential tasks” and “Matrix of specified tasks/responsibilities”;
- (6) multiplication of acquired experience and products is realized via creating “Lighthouse” as interactive “2TMaps Atlas” of real sites.

## **MULTIDISCIPLINARY SCALE OF E-LEARNING WITHIN UNIVERSITY INNOVATIVE DIGITALIZED ECOSYSTEM**

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### **Abstract**

The research presents a multidisciplinary scale of e-learning in the context of digital transformations, caused by the system of modern crises. A proposed innovative approach considers e-learning as a component integrated into the holistic process of students’ cognitive and personality development or self-development. The synergetic interaction of the student with the developmental environment as innovative ecosystem involves a big variety of e-training activities based of the model of real project development. The complexity of the ecosystem determines the diversity of interaction modes. The system-forming factor is the profile of student as agent of positive changes.

Changes of traditional curricula development are driven by the need of rethinking and renewing HEIs in the context of the challenges of a quickly changing world: digital transformation, climate change, aging population, global health crisis and economic fall-out. To respond challenges HEIs need to unlock full potential as promoters of skills and knowledge as well as the engine for innovation. E-learning plays a key role in this process

Modern education based on innovative technologies can contribute to post-war recovery by shaping sustainable and resilient society and economy. In the current crisis situation, efficient education can become a driving force in overcoming the economic and social problems of society through the qualitative development of competent HRs as agents of sustainable development. E-learning can essentially expand this audience and opportunities for students, regardless of natural, geographical, gender and social restrictions.

Universities poses the following prerequisites for this: 1) learning environment that can be transformed into multidisciplinary high-tech developmental ecosystem simulating real work and life conditions; 2) experts who can be united into multidisciplinary teams for creating and integrating into curricula high-quality e-modules relevant to the tasks of sustainable development in the target area of professional activity; 3) IT specialists who are capable of educational process digital transformation, supporting communication, management, creating databases, website and network; 4) teachers who are able to master the innovative methodology of students' cognitive and personality development and to carry out the pilot phase of training; 5) service structures that will be able on the basis of special training to carry out high-quality management, evaluation, dissemination and ensure the sustainability

In order to test experimentally the range of e-learning opportunities in the context of the complex problem of developing students as agents of sustainable development, special research was conducted under conditions of real international project aimed at increasing the capacity of the university through the development of multidisciplinary innovative curricula.

The research uncovered a number of multidisciplinary issues that are not usually taken into account in the practice of developing e-learning courses. These include: managing e-learning process, developing human resources, developing learning materials, infrastructure, databases and networks, pilot training and practice, results evaluation, dissemination and sustainability.

Research strategic aim concerns study of the process of creating multidisciplinary curriculum for educating students as agents of sustainable

development (ASD) within university innovative digitalized ecosystem synergistically interacting with ecosystems relevant to local sustainable development. This research project is relevant to regional, national and European priorities.

The most efficient outputs of the project aimed at developing capacity of e-learning curriculum are: 1) Team profile package including: problem and task trees for multidisciplinary multicultural team; list of competences of HR identified by brain-storm technique; key competences descriptors for all categories of e-course developers; team profile; questionnaire for selecting balanced team; methodology of team profile transformation into training trainers' program; 2) Graduates competences profile package including: list of labor market and society requirements in the context of specialty; professional, general and research competences descriptors; questionnaire for integrating academics and practitioners' expertise; rate lists of students competences; top rate competences tables; professional, general and research students competences profiles; graphic presentations of zones of students competence development based on overlapping profiles; methodology of competence profiles transformation into curriculum. 3) Training trainers program including: descriptors of competences for multidisciplinary multicultural team profile, roles and functions of coordinators, methodologists, e-courses authors and trainers, evaluators and IT experts; questionnaire for identifying competences and training resources of HEI and organizations for sharing experience in multidisciplinary management; advanced training methodologies and e-training technologies for developing curriculum; project-oriented multidisciplinary teamwork and advanced evaluation; training programs for trainers and experts from HEIs and organizations in the mode of virtual lectures, webinars, master classes, role-plays and simulations, schools for sharing know-how and experience. 4) Pedagogical innovations that are focused on the learners with orientation to multidisciplinary STEAM set, eco-humanistic, metacognitive and entrepreneurship approaches to train students responding challenges in a holistic way across disciplines in cooperation with key stakeholders and leading experts. Training methodology that is aimed at developing competences for positive changes in professional and community environment. 5) Methodology that is based on 1) eco-human interaction reflected as existential circle of self-development; 2) synergetic cognitive-professional-social development within field of study; 3) multidisciplinary (metacognitive, professional, general and research) meta-competences; 4) developmental e-learning. 6) Flexibility of training strategies planning and training process that is based on real needs of labor market, professional and social community needs. Toolkit helps to identify student's individual zone of development; to choose training strategy in accordance with personal needs

and individual resources; to tailor individualized training course; to evaluate once own personality and cognitive development. 7) Innovative simulation technology that is based on step-by-step transformation of matrixes (problems - tasks - competences – team selection – project work) followed by activities aimed at developing communication and practical skills in multidisciplinary multinational project teamwork (problem solving, decision making, leadership, creativity, consultancy, conflict resolution, time management) within practice. 8) Multidisciplinary ASD e-curriculum that is co-designed by academics and industrial-business-community decision makers. Bologna-compliant flexible curriculum is based on balanced profile of university graduate' as a 'professionally-socially-emotionally competent, efficient-moral-harmonious, globally thinking and locally acting agent of sustainable development and a subject of self-development'. Curriculum can be flexibly tailored for concrete needs of MSc, PhD & LLL training; for professional needs (modules are interchangeable depending on field of study), for individual needs. Original technique allows identifying "zone of individual development" and curriculum relevance to professional world demands for developing in pace with dynamic time changes. Curriculum can be developed both from experts' top-down and students' bottom-up perspective. 9) Short e-learning courses leading to micro-credentials are integrated to professional curricula for all students across all levels and disciplines as well as for lifelong learning and employability in cooperation with socio-economic actors. 10) Training set that includes: a) methodology and toolkit; b) Bologna compliant flexible multidisciplinary curricula for MSc, PhD and LLL students and e-syllabus; c) 20 e-course units (CU) in English and UA languages with methodologically-founded structure; d) 20 introductory video lectures and PPT; e) e-control and self-evaluation package including 20 self-evaluation e-tests & 7 inventories for evaluation and self-evaluation for individual and training course profiles construction; f) self-developing knowledge base of training materials based on synchronized "curriculum – competence profiles – training materials"; g) 6 simulations based on 'Complex matrix of sustainability' for converting knowledge into practice by developing SD local map in the contexts of CU; i) 'Personal learning diary' for compiling individualized training course; h) prototype of ASD e-courses including: strategic orientation (to course and units), glossary, figures and tables, references, to recommended and used literature, problem solving units, questions and tasks for self-control, answer keys; unit authors' CVs. Deliverable are developed by team of authors, methodologists, IT experts and evaluators using best international experience in SD.

## CONCLUSIONS

E-learning aimed at complex development of students as agents of positive changes demands creating multidisciplinary e-curriculum providing students

development within university innovative ecosystem synergistically interacting with ecosystems relevant to regional sustainable development.

Key activities are aimed at development of:

- 1) ASD center as innovative ecosystem synergistically interacting with local industrial-business-community ecosystems relevant to sustainable development;
- 2) ASD role model on the bases of university infrastructure and space opened for community;
- 3) ASD e-curriculum co-designed by university-policymakers-entrepreneur-community actors;
- 4) ASD e-learning courses integrated to professional curricula across all levels for developing future-proof skills and competences of active citizen, entrepreneur, green and digital transition, personality efficiency;
- 5) ASD HR competent in pedagogical innovations based on holistic multidisciplinary, metacognitive, eco-humanistic, project work approach;
- 6) ASD database synergistically combining management, training, evaluation, dissemination and sustainability strategies, toolkits, training and events' packages;
- 7) ASD network and site.

Persons benefiting from the project are students (including lifelong learners and disadvantaged/ discriminated groups), graduates, academic administrative and technical staff; local policy makers, entrepreneurs, community; Ministries of Higher Education and Digitalization. Approximately 300 persons within the project and thousand within dissemination program.

Results of the project aimed at researching conditions for creating efficient e-learning are as follows: 1) ASD center; 2) ASD role model; 3) multidisciplinary ASD curriculum; 4) ASD e-learning courses; 5) ASD HR competent in pedagogical innovations; 6) ASD database, network & site.

Type and number of outputs are as follows: 1) strategy of university – authorities – entrepreneurs - community ecosystems synergetic interaction; 2) ASD profile; 3) ASD methodology; 4) ASD curriculum; 5) 7 ASD e-courses, 6) 5 packages of management, evaluation, dissemination, sustainability strategies & toolkits; 7) ASD database, network and site.

System approach to e-learning aimed at students' cognitive and personality development in synergy corresponds to regional, national and international priorities and has good perspective for multidisciplinary research based on international project model