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DIGITAL ECOSYSTEMS AS A RESOURCE FOR THE FORMATION AND DEVELOPMENT OF AN EDUCATIONAL COMMUNITY

Abstract: *this article analyses the transformation of the educational environment under the influence of digitalisation of economic and social processes. It substantiates that the digital ecosystem acts not merely as a technological add-on, but as a system-forming resource for the formation and development of an educational community. The structural elements of the new educational ecosystem, its advantages and challenges are examined. Special attention is paid to the synthesis of technological equipment and the creative potential of participants in the educational process as a necessary condition for training personnel for the digital economy. The authors conclude that the effective functioning of a digital ecosystem is possible only with coordinated changes in teacher training approaches, assessment practices and educational policy.*

Keywords: *digital ecosystem, educational community, digital competencies, creativity in education, network interaction, TPACK, personalised learning.*

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ЦИФРОВЫЕ ЭКОСИСТЕМЫ КАК РЕСУРС ФОРМИРОВАНИЯ И РАЗВИТИЯ ОБРАЗОВАТЕЛЬНОГО СООБЩЕСТВА

***Аннотация:** в статье анализируется трансформация образовательной среды под влиянием цифровизации экономических и социальных процессов. Обосновывается, что цифровая экосистема выступает не просто технологической надстройкой, а системообразующим ресурсом для формирования и развития образовательного сообщества. Рассматриваются структурные элементы новой образовательной экосистемы, её преимущества и вызовы. Особое внимание уделяется синтезу технологической оснащённости и творческого потенциала участников образовательного процесса как необходимому условию подготовки кадров для цифровой экономики. Авторы приходят к выводу, что эффективное функционирование цифровой экосистемы возможно только при согласованном изменении подходов к подготовке педагогов, оценочных практик и образовательной политики.*

***Ключевые слова:** цифровая экосистема, образовательное сообщество, цифровые компетенции, творчество в образовании, сетевое взаимодействие, ТРАСК, персонализация обучения.*

1. Introduction.

The transition of economic and social relations to a digital format, as recorded in the strategic documents of the Russian Federation, has predetermined the need for a deep modernisation of the professional education system. The digital society, often characterised by the concept of «Industry 4.0», requires not just technical re-equipment of educational institutions, but a change in the very paradigm of professional training. Under these conditions, the digital educational ecosystem ceases to be an auxiliary element and turns into a key resource that ensures the continuous development of the educational community – a set of teachers, students, experts and digital platforms united by common goals and values [1].

The relevance of the study is due to an existing contradiction: on the one hand, there is a growing need to expand educational ecosystems and introduce end-to-end digital technologies; on the other hand, an analysis of practice shows that the use of information systems in the educational process is often limited to primitive functions – demonstrating materials or simple testing [3]. Overcoming this gap lies not in simply increasing technical means, but in a systemic restructuring of interaction between participants in the educational process.

2. Theoretical foundations of the digital ecosystem.

A digital ecosystem in education is understood as a multidimensional space covering a wide range of a person's educational needs throughout life [4]. Unlike the industrial model, where rigid curricula and uniformity dominated, the ecosystem approach assumes the coexistence of many formats: from traditional classroom lessons to massive open online courses, mobile applications, augmented reality elements and network communities of practice [1].

An important characteristic of the current stage is that the digital ecosystem does not completely abolish existing institutions – schools, colleges, universities. On the contrary, they receive new roles and «ecological niches», turning into educational hubs. Such hubs have specialised spaces for individual and collective work, serve as a meeting place for various communities and are recognised as a safe environment for educational experiments [4]. Thus, the formation of a digital ecosystem proceeds not through

the destruction of the old, but through its evolutionary transformation and endowment with new functions.

3. The educational community as the centre of the ecosystem.

The key resource that the digital ecosystem produces and develops is the educational community [5]. Three interconnected spheres can be distinguished in its structure.

The first sphere is global educational platforms, which become the main suppliers of content and knowledge. They provide access to up-to-date information regardless of the user's location.

The second sphere is local urban formats that take into account the requests of specific students and offer individualised lifelong learning services. They connect global knowledge with local issues.

The third, most significant for the formation of a community, is practice-oriented communities built around groups of masters and mentors. Here live human interaction, co-creation, transfer of tacit knowledge and technological experience take place [6]. These communities become the basis for the development of collective intelligence and professional identity.

It should be emphasised that in the digital ecosystem the roles between the elements described in the systemic model of creativity (individual – field – domain) are redistributed [7]. If earlier the field (expert community) acted as the main «gatekeeper» evaluating innovations, modern network technologies allow the learner to directly address a wide audience, bypassing traditional institutional experts. This shifts the balance of power towards distributed network assessment and requires a revision of conventional ideas about the teacher's exclusive right to judge results [3].

4. Integration of creativity and technology as a condition for community development.

An analysis of advanced approaches shows that technological saturation in itself does not guarantee the development of the creative potential of the community [2]. For effective integration of creativity and technology, simultaneous influence on three levels is necessary: teacher education, assessment practices and educational policy.

At the level of teacher education, it becomes key to develop in teachers not only technological, pedagogical and content competence (known as TPACK), but also an attitude towards intellectual risk and openness to new things [8]. Future teachers must themselves participate in creative activities using digital tools in order to then pass on this experience to students. Without such an attitude, even the most perfect classroom equipment remains dead weight.

In the field of assessment, the central dilemma is the contradiction between standardised measures and the nature of creativity, which is always contextual [2]. A productive approach seems to be one that assesses the creative result according to three parameters: novelty, effectiveness and wholeness [2]. At the same time, wholeness captures the aesthetic and contextual dimension – the internal completeness and harmony of the product relative to the norms of the subject area in which it was created. The digital environment provides unique opportunities for such multidimensional assessment through data triangulation, the use of portfolios and mutual peer review within the community.

Educational policy at all levels – from national to school – must recognise creativity not as an elite quality for the gifted, but as an everyday «habit of mind» subject to purposeful development [2]. This means embedding tasks for creative thinking and work with digital tools in absolutely all academic disciplines, rather than moving them into separate electives.

5. Advantages and challenges of the digital ecosystem.

A developed digital educational ecosystem gives the community a number of competitive advantages. First, it provides the possibility of continuous distance learning, which is critical for rural areas and small towns. Second, through the use of individual educational trajectories, it allows each participant to build a career path in accordance with the requirements of the digital economy. Third, network interaction opens channels for the exchange of experience and knowledge between equal participants, breaking down hierarchical barriers.

At the same time, there are also challenges. The main one is the shortage of qualified personnel capable not only of using digital devices, but also of redesigning the

educational process in the new ecosystem [3]. Without overcoming this personnel gap, all technological investments will be ineffective. The second challenge is the need to develop digital hygiene and critical thinking among all members of the community in conditions of information overproduction.

6. Practical cases and recommendations for implementing digital ecosystems.

Concrete examples illustrate how digital ecosystems function in practice. The concept of a «personal learning environment» (PLE) lets students aggregate tools and content according to their individual needs [4]. Open infrastructure, where learners connect external applications (knowledge maps, portfolios, communication channels), turns the ecosystem into a genuine community resource.

In teacher professional development, following the TPACK model [8], successful initiatives integrate creativity workshops into technology training through project-based modules (designing podcasts, infographics, AR markers) tested in peer-reviewed micro-teaching sessions.

Three recommendations emerge:

- start with community needs, not technology. Survey students and teachers to identify real collaborative or creative tasks;
- create «digital mentors» among peers. Train enthusiastic teachers to support colleagues – aligning with the community-of-practice model [5];
- allow gradual adoption. Let participants choose elements that fit their work, expanding the ecosystem organically.

These recommendations mitigate risks (teacher burnout, digital inequality, replacing live communication with interfaces) [3] and strengthen creative potential through autonomy and ownership [2].

7. Conclusions.

The digital ecosystem in education is not just a set of technologies, but a new environment where connections between participants are restructured and ways of acquiring knowledge change [1]. Unlike the traditional model with a rigid hierarchy, the ecosystem is built on horizontal, network interaction. Its main resource is the educational community that arises around common goals and values [5].

For the ecosystem to work effectively, a balance of three principles is necessary: global content (world platforms), local demands (school and city projects) and live communities of practice (mentoring, co-creation) [5]. Without the last link, technologies remain formal tools.

The transition to such an ecosystem is impossible without coordinated changes in three areas:

- teacher education – from simple ICT literacy to pedagogical design and readiness for experimentation;
- assessment – from standard tests to portfolios, mutual peer review and tracking dynamics;
- educational policy – from declarations to embedding creativity and digital skills in all disciplines.

In the digital ecosystem, creativity ceases to be the lot of the gifted and becomes an everyday «habit of mind» – the ability to solve non-standard problems. Technologies act not as an end, but as a means of expanding opportunities. The key risks are digital inequality, teacher burnout and the replacement of live communication with interfaces [3].

Only the joint efforts of researchers, practitioners, developers and policy makers can turn the digital ecosystem into a genuine resource for forming a cohesive, creative and responsible educational community ready for the challenges of the 21st century.

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