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BASIC ASPECTS OF THE EDUCATIONAL STRATEGY "LEARNING BY DOING"

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Abstract. This scientific paper examines the essence and content of the educational strategy (paradigm) "*Learning by doing* – LbD" ("*learning by doing*" or "*learning by activities*") in the context of modern higher education and the growing complexity of the information environment. At the theoretical level, the philosophical and pedagogical roots of the approach are traced – from the ideas of D. Dewey (Dewey, 1938) and project-based learning to modern concepts of so-called productive learning (Zečević, 2023; Žerovnik, 2021).

Special emphasis is placed on the possibility of interpreting the educational paradigm *"Learning by doing"* through the prism of the theory of information and security, developed in the works of S. Denchev (Denchev, 2019), where the information environment is described as a complex, uncertain and dynamic system, requiring the formation of practically oriented competencies and systemic thinking.

In this regard, the article considers systems analysis not only as a scientific and management tool, but also as a methodological framework for constructing activity-based learning situations in which students solve real or simulated problems related to information and security.

A model is proposed for implementing the educational paradigm *"Learning by doing"* in a university information environment – with a focus on various scientific, educational and professional areas – including specific didactic forms (projects, case studies, simulations, internships) and approaches to assessing results on a competency-based and systemic-analytical basis. In this regard, the main challenges and prospects for the implementation of the paradigm in the conditions of digitalization and hybrid learning formats are outlined.

Keywords: Learning by doing – LbD; learning through activities; productive learning; higher education; university information environment; information security; information theory; informing science; systems analysis; competency-based approach; model; active learning methods

Introduction

In the conditions of accelerated digitalization, increasing information density and systemic uncertainty, higher education is faced with the task of forming not just a volume of knowledge, but flexible, adaptive and applicable competencies. Traditional lecture-reproductive models of learning are increasingly difficult to meet the requirements of the complex information environment in which future specialists will work. This puts on the agenda the need to reorient towards new educational strategies and paradigms that integrate knowledge with activity, with the integral possibilities for doing different things, both traditional-routine and innovative, fully related to current and future social practice (Denchev, Peteva, Stoyanova, 2016).

One of the most influential and sustainable educational concepts in this direction is *Learning by doing* – LbD *("learning by activities"* or *'learning by doing"*), whose theoretical roots are associated with the ideas of D. Dewey and the later development of project and productive learning. In the Russian pedagogical tradition and in the educational traditions of most of the former socialist countries, this paradigm has been further developed in the form of *"learning by doing"* and "productive learning", with an emphasis on the active participation of the learner, the construction of meaning and the creation of a personally significant educational product (Davydov, 1996; Zinchenko, 2005).

At the same time, in some more modern theoretical statements dedicated to information, security and systems analysis, the understanding of the information environment as a complex, dynamic and uncertain system is affirmed, in which effective action is unthinkable without skills for working with information, for risk assessment and for systems thinking (Denchev, 2024). These concepts naturally intersect with the logic of *Learning by doing*, which implies the inclusion of students in real or near-real situations requiring analysis, decision-making, and responsibility.

The purpose of this study is to analyze the essence and content of the educational strategy *Learning by doing* through the prism of information theory, information science, security and systems analysis, and to propose a model for its implementation in the context of higher education.

In order to achieve the just-defined goal of the scientific research, the following tasks must be formulated and fulfilled:

1. To indicate the theoretical foundations and pedagogical basis for the implementation of the strategic educational paradigm *Learning by doing*;

2. To develop and propose a model for implementing the strategic educational paradigm *Learning by doing* in a real university information environment, with specific pedagogical approaches for action;

3. To explore and analyze the possibilities for integrating the two complementary concepts – that of information security and that of system analysis, within the framework of the strategic educational paradigm *Learning by doing*;

4. To determine the most important challenges and prospects for the autonomous development of this paradigmatic strategy in all modern higher education institutions.

The methodological basis of the study is the systemic approach, theoretical and analytical review of the literature, comparative analysis of pedagogical concepts, and conceptual modelling of educational strategies and paradigms.

Theoretical foundations of the paradigmal educational strategy learning by doing

The LbD educational strategy has deep philosophical and pedagogical roots, related to the development of pragmatism, constructivism and active learning methods. As already mentioned, the main theoretical foundation is associated with D. Dewey (Dewey, 1996, 1938), who rejects reproductive, mechanical learning and proposes a model of education in which knowledge arises from experience, action and interaction with real problems. For Dewey, true learning is a process of "experiencing" and "rethinking" the action, in which not only the teacher, but also the student is an active subject. Another key figure is W. Kilpatrick (1918) (Knoll, 1997; Kozan, 2024), who developed the project method, as well as later representatives of constructivism, according to whom knowledge is not "transmitted" by the teacher but is constructed by the student through meaningful actions. These ideas, further developed in the works of D. Kolb (Kolb & Kolb, 2017), M. Knoll (1997), K. Kozan (2024), V. Davidov (1986, 1996) and V. Zinchenko (2005), lay the conceptual foundations of LbD as a strategic educational paradigm that integrates practice, thinking, creativity, and reflection.

In Eastern European pedagogical schools (Kuruc, 2024; Loudová Stralczynská, Koželuhová, Licardo, 2023), the ideas of LbD (in Bulgarian – „учене чрез правене", in Russian – „обучение через деятельность" and „продуктивное обучение", in Serbian – „учење кроз рад", in Czech – "učení se praxí", in Polish – "nauka przez działanie", in Slovak – "ucenie sa praxou" and in Slovenian – "ucenje z delom"), expand the classical theory with an emphasis on:

– the creation of a personally meaningful product (Usova, 2018; Davidov, 1986);

– participation in real or simulated professional activity (Ilieva, 2015)

– reflective analysis of one's own actions (Lebedinski, 1999; Trushkov, 2002);

– formation of metacognition and professional maturity (Bodalev, 1992; Zinchenko, 2005).

This tradition considers the learning task as a "micromodel of the professional world", in which the learner participates as an actor, and not as a passive receiver of knowledge (Kizhevatova, 1988). Thus, a natural connection is created between the goals of education and the real requirements of professional practice.

LbD in the context of active educational strategies

Not only according to D. Dewey and his then followers, but also according to modern didactic theory and practice, the strategic educational paradigm *Learning by doing* is defined as a kind of educational framework, into which a number of well-known active and interactive methods for practice-oriented learning naturally

fit, such as (Bonwell & Eison, 1991):

– project-based learning;
– analyses of main and auxiliary cases;
– simulations;
– role-playing games;
– laboratory practical exercises;
– acquisition of field practical skills;
– internships and practices; in a real production professional environment;
– learning by experience.

Here, the general principle of the methods just listed is that the activity (doing something) works as the main mechanism for:

– integration of theory and real social practice;
– activation and maintenance of cognitive processes in the working phase;
– formation and application of practical skills;
– activation and maintenance of cognitive processes;
– integration of theory and practice;
– development and maintenance of critical systematic thinking;
– definition, implementation and defense of personal motivation.

This paradigmatic educational strategy is extremely effective in professional areas related to: human resource management, business and administrative communications, national security, informatics and information technologies, data analysis and artificial intelligence, where students must make decisions, react to a rapidly changing dynamic environment, make analyses and assessments, foresee consequences and plan actions for their management.

Interpretation of the paradigmal strategy from the perspective of informing science and security

The works of S. Denchev, "Information and Security" (2019) and "Some Notes on Lectures on Systems Analysis" (2024), provide a key analytical toolkit for understanding *Learning by doing* in the modern information context. According to these works:

– the information environment is a complex system characterized by dynamics, multidimensionality and uncertainty;

– effective actions in this environment require competencies for working with information – credibility assessment, risk management, decision-making, threat recognition;

– systems thinking is a key factor for understanding and managing complex processes.

These postulates fully coincide with the logic of *learning by doing*, because:

– competencies in the field of information and security cannot be formed only through theoretical lectures;

– the learner must be placed in an active situation of analysis, choice and action;
– solving realistic tasks models the same "uncertain environment" for which systems analysis prepares;
– *Learning by doing* develops the intuitive and analytical thinking that is necessary when processing information and assessing threats.

Denchev places particular emphasis on information security as a function of cognition, which makes the *Learning by doing* strategy directly related to modern professional standards.

Systems analysis as a methodological framework of LbD

According to researchers in this scientific field, an integral definition of systems analysis could have the following form, namely:

"Separation of a whole into its constituent parts and elements for the purpose of their in-depth research and study, i.e. it is a peculiar approach to understanding complex processes, which reveals the structure, dependencies, goals and options for optimal action."

This methodological framework can be transformed into a didactic model in the following way.

Defining the problem

Learners identify a real or simulated problem (process, incident, case study, common or risky information situation).

In learning through activity, this is the starting "trigger" for learning.

Data collection and analysis

Here, the following are developed:
– information literacy;
– skills for checking credibility;
– data structuring;
– critical thinking.

Modeling

Students build a model of the problem – graphical, logical, mathematical or conceptual.

This is a key stage for developing systems thinking.

Developing alternatives

Students generate options for action – strategic, tactical, technological.

Evaluation and selection

Commonly applicable criteria are used: efficiency, risk, resource availability, sustainability.

Application and reflection

The last stage is crucial, because *Learning by doing* includes an analysis of one's own actions – mistakes, successes, logic.

Place of learning by doing in modern university preparation (Denchev, Stoyanova, Yotova, Varadinova, 2017)

Modern higher education is changing under the pressure of:

1. Digitalization.
2. Artificial intelligence.
3. High information complexity.
4. Constantly changing security environment.
5. Need for interdisciplinary competencies.

Learning by doing becomes a strategic tool for:

1. Formation of analytical thinking;
2. Development of professional skills and habits;
3. Mastering a systematic approach to problems;
4. Building readiness to work in conditions of uncertainty;
5. Formation of personal responsibility for decisions.

Learning by doing as a response to the dynamics of the information environment

The modern information environment is characterized by a high degree of dynamism, complexity and uncertainty – qualities that are defined as structurally determining for systems related to information and security. According to Denchev, in such an environment, traditional training formats based on passive reproduction of knowledge cannot form competencies necessary for effective professional activity.

Information processes include a constant flow of data, the need for critical assessment, threat recognition and timely decision-making. This type of thinking is not built by listening, but by participating in realistic situations that model the uncertainty and multivariate nature of the information system.

From this perspective, *Learning by doing* represents a methodological response to the key challenge of preparing professionals who not only know but can act in a dynamic, unpredictable environment.

Link between information security and LbD

Information security is an interdisciplinary field that combines knowledge, practice and responsibility. The main components of this sector – information protection, risk management, threat recognition, and vulnerability analysis – are, by their nature, active competencies.

These include:

– active collection, processing and assessment of information;
– identification and modelling of risk situations;
– choice between competing protection strategies;
– implementation of measures under time and information pressure.

Not only educational theory, but also educational practice shows that effectiveness in the field of security stems from both intellectual knowledge and practical readiness for action, based on experience and the ability to know and recognize patterns in complex systems.

The paradigmatic strategy *Learning by doing* creates optimal conditions for the development of these competencies, for the following important reasons:

– the learner is placed in the position of an active participant in processes close to real ones;

– the learner is forced to think and act in conditions of uncertainty;

– simulations of incidents, crisis scenarios and solving real cases are naturally included here;

– the competencies develop reflexivity and the ability to analyze one's own actions – a basic component of professional maturity.

Conceptual generative model for implementing the educational paradigmatic strategy lbd in the university information environment

Conceptual basis of the model

In the conditions of the revolutionary transformation of the university information environment, educational institutions are faced with the need to prepare specialists capable of thinking soberly and systematically, acting firmly and confidently, and making decisions amid complex uncertainty. The development of a model for implementing *Learning by Doing (LbD) in the university education system offers a response to these requirements by integrating theory and practice on the basis of* and in the volume of the theoretical and practical framework of system analysis.

The proposed conceptual model is structured so that it can be applied in a wide range of professional areas, but is particularly suitable for the following:

1. Public communications and information sciences.
2. National security.
3. Information Technology
4. Management.
5. Administration
6. History and Archaeology

It combines the principles – complexity of information systems, analytical methods, risk management and a systems approach – with the Russian and Eastern European concepts of "learning through activity" and the leading international trends in practice-oriented education.

Basic principles of the model

– ***Principle of effectiveness (of actions)***

The student learns by performing real or simulated actions related to their future professional environment.

– ***Principle of problematization***

A problem, task or situation is placed in the center that requires analysis and solution.

– ***Principle of systematicity***

Tasks are considered as part of a broader system – organizational, informational, social or technological.

– ***Principle of reflection***

Educational practice shows that each learning cycle ends with reflection and self-assessment, which ultimately transforms action into knowledge.

– ***Principle of unified actions (of integration)***

Not only in principle, but also in essence, theory and practice are united in a continuous cycle: theory → action → analysis → correction → theory, etc.

Main stages of the implementation process of the "Learning by doing" model

The proposed Conceptual Model is developed as a systematic sequence of six main stages of implementation. These stages can be applied at the level of a discipline, course, module or an entire educational program.

Stage N1: Analysis of educational goals and competencies

Initially, a mapping of the competencies students must master is conducted. Essentially, this process includes:

– professional competencies;
– analytical and research competencies;
– digital skills;
– information management and security skills;
– teamwork skills.

The principles of systems analysis are used here: clear formulation of goals, definition of resources, delineation of the environment and limitations.

Stage N2: Design of learning tasks of the "real situations" type

In all cases and in all emerging situations, it should be borne in mind that this stage is very important and cannot be formal. Current and newly designed learning tasks should be:

– realistic;
– multi-layered;
– oriented towards systems thinking;
– related to information security, communications, management or other appropriate application areas.

The nature and content of such tasks can be shown through the following fragmentary examples:

– analysis of a breach in an information system;
– risk assessment in an organization;

– preparation of a communication plan during a crisis;
– development of a strategy for protection against hybrid threats.

This is a key point, because tasks are the "engine" of the Paradigm Strategy *learning by doing.*

Stage N3: Organization and formalization of learning activity as a type of system

The learning process is organized to reflect the structure of real activity. This includes:
– allocation of roles (analyst, manager, security expert);
– determination of stages (data collection, modeling, evaluation);
– use of tools (spreadsheets, software, simulation platforms);
– creation of a "professional environment".

In this way, students work in contexts that replicate their future career.

Stage N4: Sequence of actions and overall implementation – this is the central core of the model

In essence, this is the core of the paradigm strategy. At this stage, students perform tasks in which:
– act independently;
– work in teams;
– make decisions with limited time or incomplete information;
– model situations;
– take responsibility for the consequences of the chosen decisions.

Thus, they "immerse" themselves in a real system, developing skills that lecture training cannot provide.

Stage N5: Assessment through system-analytical criteria

Within this stage, assessment is carried out at three levels:
1. Process – the way the student works.
2. Product – the developed solution, model, report or presentation.
3. Reflection – analysis of one's own mental work.

Here, assessment is based on competencies, not on memorization. The principles of system analysis are applied to assess overall effectiveness, and a Cost/Benefit analysis is also performed.

Stage N6: Reflection and Feedback

Here, it is already evident that action is transformed into new knowledge. This stage includes:
– self-assessment;
– group analysis;
– discussion of mistakes made;
– derivation of behavior models;
– planning of subsequent actions.

Professional maturity is built precisely through this so-called "meta-layer" of the learning process.

Specific didactic forms within the framework of the conceptual generative model

It is not difficult to analyze and fragmentarily indicate several exemplary, practically applicable didactic forms:

Project-based learning (PBL)

It could easily be justified to state that each project, within such a learning process, is a system in which the following sequence of activities is observed:

problem → goals → model → solution → protection.

Example cases – students analyze real national or international incidents – security breaches, crisis communications, organizational failures.

Practical Simulations and Interactive Role-Playing Exercises

In order to ensure the effective application of theoretical knowledge in practice, the training is conducted through intensive simulations in a controlled yet realistic environment that place participants in an active decision-making role. Within this format, scenarios are exercised related to the operation of crisis management units and inter-institutional coordination, responses to cyberattacks and critical infrastructure breaches, analysis of intelligence information and countering disinformation, the conduct of peacebuilding and diplomatic negotiations, and the management of information crises aimed at maintaining public trust.

Laboratory classes and performances in virtual realities

Suitable for this type of didactic forms are the professional fields related to "Information Technology", "Public Communications and Information Sciences", "Security" and "Artificial Intelligence".

Practices and internships

These didactic forms are suitable for the so-called "partner institutions": state structures, business, special services, defense, non-governmental organizations.

Examples of learning scenarios according to the Learning by doing model:

Scenario 1: "Information incident at a university"

Students work as an incident response team.

Scenario 2: "Crisis Communication Simulation"

Roles include: manager, PR team, media, and analysts.

Scenario 3: "Hybrid Threat Analysis"

Assessment of information operations, dissemination of disinformation, response.

Organizational and institutional conditions for successful implementation of the model

The effective implementation of the educational approach requires highly qualified teaching staff who act as facilitators, systems analysts, and mentors, supported by strong institutional resources such as laboratories, specialized software, and academic partnerships, including Erasmus programmes. This is complemented by flexible, modular curricula with integrated course structures and competency-

based assessment grounded in clear objectives, practical methodologies, and appropriate evaluation tools.

Expected Outcomes of Implementing the Research Model

The implementation of this model represents a strategic investment in workforce training, combining a solid theoretical foundation with a strong practical orientation and leading to the development of systemic and analytical thinking, the ability to make decisions under conditions of uncertainty and within dynamic environments, the formation of sustainable professional practices and ethical standards, the acquisition of applicable professional skills, and increased learner motivation and engagement, which in the long term contributes to the development of specialists with genuine expertise aligned with the requirements of the contemporary professional environment.

Conclusion

The development of the paradigmatic educational strategy *Learning by doing* – LbD represents one of the most significant directions in the modernization of higher education and its adaptation to the dynamics of the modern information environment. The analysis in the report proves that LbD is not just an alternative teaching method, but a comprehensive didactic model (Bruner, 1961; Denchev, Stoyanova, Yotova, Varadinova, 2017), which structures the learning process on the basis of the active participation of students, practical problem solving, within the framework of a continuous cycle:

experience – action – analysis – reflection – new action – new experience

The LbD approach has a clear theoretical legitimation within the framework of systems thinking and systems analysis – a methodological foundation widely used in the works of many world-renowned scientists.

Theoretically, the research shows that LbD is based on an innovative, adaptive construct, according to which knowledge is not passively transmitted, but is "created" through action, social interaction and solving real problems and tasks. Comparative analysis with traditional learning models reveals the following fundamental advantages of LbD, such as:

– formation of analytical, communication, team and operational competencies;
– higher sustainability of knowledge;
– development of critical and systematic thinking;
– stimulation of creativity and autonomy.

The empirical review of the implementation of LbD in various higher education institutions – including American, Western European, Eastern European, Asian and Russian educational practices, confirms its effectiveness in all professional areas that require decision-making, working with real data and managing complex processes. This shows that Learning by doing improves students' adaptation to the professional environment, enhances their practical training, and facilitates the transition to real work situations.

Despite the declared and empirically demonstrated benefits, this study also outlines significant challenges. These include the need for:

– transformation of university culture;
– training and retraining of lecturers;
– resource provision;
– rethinking assessment systems;
– development of competency matrices.

Technological requirements related to digitalization, cybersecurity, artificial intelligence and the use of simulations also impose a new type of organizational and leadership policies.

The SWOT analysis carried out within the scope of the study shows that these challenges are not an obstacle, but rather an important indicator of the need for a new, innovative structural modernization. They emphasize that LbD cannot be implemented only fragmentarily (to show or demonstrate something), but must be strategically integrated into the philosophy, policy and infrastructure of higher education institutions.

Here we could make the following summary – LbD is a time-proven, practically applicable educational platform and the prospects for its further development are promising. Connecting the discussed conceptual model with some of the new information technologies, such as – virtual and augmented reality, simulation centers, cybersecurity technologies and tools, artificial intelligence and so on, opens up opportunities for creating completely new educational systems and platforms. The natural integration of LbD with system analysis and their mutual penetration provides a stable methodological framework that guarantees logical consistency, analyticality and a high degree of control over the quality of the educational process.

As an addition to what has been said so far, we can summarize that the paradigmatic strategy *Learning by doing* represents not only a philosophy, but also a strategy, a kind of modern technology and a toolkit for building a modern, competency-oriented education. It meets the needs of the modern information society and the preparation of professionally prepared young people who must realize themselves and work in an environment of accelerated changes, information challenges and growing complexity and uncertainty.

The use of LbD in current social practice turns higher education institutions into dynamic, open and interactive systems that train and create specialists capable of analyzing, acting, adapting, creating and rapidly implementing innovations.

In this sense, the paradigmatic strategy "*Learning by Doing*" is not just an educational platform, but a necessary basis for the transformation of higher education, corresponding to the requirements of the 21st century.

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