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THE IMPLEMENTATION OF DIDACTIC PRINCIPLE OF SYSTEMATIZATION AND CONTINUITY IN ELECTRONIC TEXTBOOKS

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Abstract*. The article deals with a relevant issue of studying the didactic potential of electronic textbooks, which has become particularly timely in the context of significant challenges to the education system caused by the pandemic. Contemporary scholars note that current educational practice is well ahead of the development of scientifically sound patterns and conditions for the formation and functioning of the components of the didactic system of e-learning. The purpose of the article is to analyze the positive and negative aspects of the implementation of the didactic principle of systematization and continuity in electronic textbooks. According to the research aim advantages and disadvantages of using electronic textbooks, in particular in of realization didactic principle of systematization and continuity are analyzed in the paper. It was found, that the expanded capacity of electronic textbooks will not only allow to implement that principle on the qualitatively new level but at the same time increase the didactic risks of their realization. The requirements for electronic textbooks, which will allow to minimize didactic risks and prevent potential negative impact on the educational process are formulated. While designing an e-textbook it is necessary to follow the sequence of presentation of educational material in a systematic and structured form and take into account the purpose, tasks, competencies to be formed and specific of a particular subject. Authors should take into account the retrospective and prospective relations of the educational material in order to ensure continuity in the acquisition of knowledge and skills. It is recommended to adhere to the general conceptual framework, use unified terminology, avoid duplication of educational material, methodically unsound hyperlinks, because the abuse both external and internal hyperlinks distracts from the main course of material presentation.*

Key words: *e-textbook, didactic principle, systematization, continuity, sequence, didactic risks*

Introduction. Today's challenges caused by the pandemic are forcing modern scientists to focus on the didactic potential of electronic educational resources. At the same time, most scholars note that currently educational practice is well ahead of the development of scientifically sound patterns and conditions for the formation and functioning of the components of the didactic system of e-learning. That is why more and more scientists are raising the issues of a new branch of pedagogy – e-didactics, which explores the laws, patterns, principles and e-learning tools.

Researchers have repeatedly paid attention to the fact that didactic principles have gained new momentum in electronic educational resources, are implemented at higher level due to the capabilities of information and communication technologies. However, the focus is mainly on the advantages of e-learning tools, and their shortcomings are positioned as single,

belonging to concrete e-textbooks, rather than this class of teaching aids in general.

Aspects of electronic didactics are covered in the works of N. Beketova, A. Gartsov, T. Kameneva, D. Kergel, E. Ospennikova, A. Pechnikov, I. Frolov. The didactic potential of e-textbooks was studied by M. Belyaev, V. Bykov, L. Bilousova, V. Volynsky, L. Gryzun, A. Gurzhiy, O. Krasovsky, M. Levshin, O. Mukoviz, E. Polat, and others.

The **purpose** of the article is to analyze the positive and negative aspects of the implementation of the didactic principle of systematization and continuity in electronic textbooks.

To achieve the research aim, such **methods** as an analysis of scientific sources, comparison and generalization have been applied.

Results and discussions. Electronic textbook – an electronic educational edition with a systematized presentation of educational material that is relevant to the educational program, contains digital objects of various formats and provides interactive interaction.

Leading methodologist of Ukraine pedagogical science S. Goncharenko believes that systematic learning involves the acquisition of knowledge, abilities and skills in a certain logical connection, when the essential features of the object of study are of paramount importance and when it, taken as a whole, is a holistic system. The concept of continuity and sequence in education indicates the need for that kind of teaching and learning, when the next is based on the previous and in turn logically determines the next step in cognitive work [4, p. 305].

Verlan & Tverezovska clarify that the principle of systematization and continuity is associated with both the organization of educational material and the system of student's actions of the in learning process and believe that in information technology specifically knowledge representation provides the didactic principle of systematization and continuity [3].

Kononets concretizes this thesis on electronic textbooks and argues that the principle of systematization and continuity, which consists in the systematicity achieved by consistent presentation of educational material in the electronic textbook, logical transition from learning previous to new material, is provided by hypertext organization. Adherence to the principle of hypertext in designing electronic textbooks provides a systematic acquisition of knowledge by students and therefore their systems thinking [6].

In our opinion, the hypertext organization does not have a didactic load or value. Both systematization and continuity are provided not by hypertext, but by the structuring learning material [8].

As Bilousova & Gryzun note, the hypertext structural base of a e-textbook is the hierarchical structuring of learning material, which logically involve its division into information units that have a conditional main and subordinate role and are combined into a unified semantic whole by hyperlinks. When working with hypertext, not only factual information is memorized, but also the structure of hyperlinks between them, which speeds up the process of reproduction of educational information and simplifies the further search for new knowledge. The implementation of the systematizing function depends on the quality of structuring and ranking of the material of the subject area. Thanks to structuring with consistent detail, the presence of deep relationships of information fragments at all levels, students have the opportunity to get a global view of the material and then clarify perceptions [2].

Another paradox is that the hypertext structure of electronic textbooks not only contributes to the implementation of the

principle of systematization and continuity at a new (compared to traditional teaching aids and learning tools) level but also significantly increases the didactic risks to implement it. Didactic risk is understood as a predictable characteristic of a potential learning situation that may arise while using new didactic tool and have a negative impact on the educational process; the probability of negative effects of innovative tools on the learning process (negative impact in this case is treated as an action that does not positive changes in the student's learning, personality development or intensification of the educational process) [1].

Usually, the logical line of substantiation of the principle of systematization is built through the systematization of knowledge, which is recognized as a natural result of systematicity and consistency in learning, in which new knowledge is based on previously acquired and in turn becomes the foundation for subsequent knowledge. Systematic learning means the reflection of structural connections, adequate to the connections in scientific theory, through a system of methodological knowledge, which includes: general scientific terms, knowledge about the structure of knowledge and methods of scientific knowledge.

Scholars emphasize that the requirement of systematic and consistent learning in the use of electronic textbooks means ensuring the consistent acquisition of a certain system of knowledge in the research subject area by students. However, the logical structure of science is not mechanically transferred to the logical structure of academic discipline: the logic of the subject reveals the essence of science, but the specific way of learning is determined by the logic of the educational process, which convey the sequence of educational steps, which provides optimally effective results for both learning and cognitive development of students [5].

The desire to expand as much as possible the range of didactic capacity of the electronic textbook leads to a violation of the integrity of teaching and learning process, an inconsistency. The increase in the amount of information due to direct hyperlinks to the other resources, portals, encyclopedias, etc. complicates the perception of educational material by students. In addition, these sources often belong to different authors, represent different scientific schools, use different terminological systems.

Abuse of external and internal hyperlinks distracts from the main course of the material, disrupts the logical sequence of learning. It should be noted that the highlighted and underlined text in the traditional textbook is marked as a fragment to which special attention should be paid, so active hyperlinks are perceived by students as direct instructions to act, which are not conditional but categorical. Due to the overloading of the text with hyperlinks (which often abound in the pages of electronic textbooks), acquaintance with the material turns into tracking additional information, which further diverts from the main line, destroying the logic of unfolding the content of subject.

We should agree with researchers, which emphasize that "it is necessary that knowledge, skills and abilities are formed according to a certain pedagogical system, in a certain logical sequence and find practical application. This involves creating the preconditions for the formation of the student's personal model of knowledge, which should be internally consistent system, meet the objectives of learning, be the most adequate pedagogical model of knowledge, which is defined in accordance with learning objectives subset of scientific knowledge in the field" [7]. Researchers

believe that in the content of this principle it is advisable to identify a new component – the way of implementing educational activities, during which knowledge is acquired.

Conclusion. Thus, in order to prevent didactic risks when designing electronic textbooks, it is necessary to follow the sequence of presentation of the subject and take into account its purpose, tasks and competencies to be formed. Authors should take into account the retrospective and long-term connections of the educational material in order to ensure continuity in the acquisition of knowledge and skills. It is desirable to adhere to the general conceptual idea in the representation of educational material, because inconsistency of information complicates the understanding of the material for students who do not yet have scientific thinking skills. The resources connected by hyperlinks should contain the general conceptual framework and the unified terminology; the duplication of educational material is unacceptable.

Particular attention should be paid to the logical sequence in the presentation of educational material, its presentation in a systematic and structured form, optimization of information presentation methods, effective distribution of information load between different structural components of the textbook, ensuring the system integrity of subject content, educational and professional skills, prevention of fragmentation of knowledge.

Thus, expanded capacity of electronic textbooks will not only allow to implement the didactic principle systematization and continuity on the qualitative new level, but at the same time increase the didactic risks of their realization. Taking into account such risks at the stage of designing an electronic textbook allows you to minimize them and prevent potentially negative effects on the educational process. None of the most modern resources is universal and cannot carry out all educational tasks, so we should not neglect a balanced method of combined use of training tools that have different purposes and functions.

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РЕАЛІЗАЦІЯ ДИДАКТИЧНОГО ПРИНЦИПУ СИСТЕМАТИЗАЦІЇ ТА ПОСЛІДОВНОСТІ В ЕЛЕКТРОННИХ ПІДРУЧНИКАХ

Балалаєва О. Ю.

***Анотація**. Статтю присвячено актуальній проблемі вивчення дидактичного потенціалу електронних підручників, яка є на часі в контексті значних викликів системі освіти, спричинених пандемією. Сучасні вчені зазначають, що сьогодні освітня практика значно випереджає розроблення науково обґрунтованих засад, закономірностей та умов формування і функціонування компонентів дидактичної системи електронного навчання. Метою статті є проаналізувати позитивні і негативні аспекти реалізації дидактичного принципу систематизації та послідовності в електронних підручниках. Відповідно до мети дослідження проаналізовано переваги та недоліки використання електронних підручників щодо реалізації цього дидактичного принципу порівняно з традиційними.*

Виявлено, що розширений потенціал електронних підручників не тільки дозволяє реалізувати цей принцип на якісно новому рівні, а й водночас збільшує дидактичні ризики його реалізації. Сформульовано вимоги до електронних підручників, які дозволить мінімізувати дидактичні ризики та запобігти потенційному негативному впливу на навчальний процес. Під час проєктування електронного підручника необхідно дотримуватися послідовності подання навчального матеріалу в систематизованій і структурованій формі, враховувати мету, завдання, специфіку конкретного предмета та компетенції, які мають бути сформовані під час його вивчення. Автори повинні враховувати ретроспективні та перспективні зв'язки навчального матеріалу, щоб забезпечити безперервність набуття знань та вмінь. Рекомендовано дотримуватися єдиної концепції, використовувати уніфіковану термінологію, уникати дублювання навчального матеріалу, методично не виправданих гіперпосилань, адже зловживання не лише зовнішніми, а й внутрішніми гіперлінками відволікає від основного русла подання матеріалу, порушує послідовність його викладання, руйнує логіку розгортання змісту навчальної дисципліни.

***Ключові слова**: електронний підручник, дидактичний принцип, систематизація, наступність, послідовність, дидактичні ризики*