UDC 37.02:69

DIDACTIC ASPECTS OF THE TRANSFORMATION OF CLIP THINKING IN THE CONTEXT OF TEACHING OF CONSTRUCTION MECHANICS

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DOI: 10.32347/2410-2547.2023.111.3-12

The article provides a generalization of the didactic aspects of solving the problem of transforming the clip thinking of students of higher education in the conditions of teaching construction mechanics, which ensures the formation and development of their professional competence. The characteristic properties of "clip" forms of thinking are defined and the advantages and disadvantages of this phenomenon are established on this basis. Turning to the competence approach and the student-centered educational paradigm proved the characteristic of the transformation of clip thinking of higher education students as a controlled process of ensuring the quality of their training determined by a logical method of mastering the content of the educational material thanks to modern means of digital technologies, taking into account "clip" perception.

Keywords: educational process, construction mechanics, professional competence, thinking, educational tools, digital technologies, transformation of clip thinking of students of higher education.

Information technologies in the educational process of higher education institutions, on the one hand, allow you to manage the educational and cognitive activities of applicants for higher education, but also require purposeful educational, methodological, information technology and organizational and managerial support. The growth in the content of educational information Forces research and teaching staff to change the style, methods of receiving, accumulating, processing and transmitting it. This determines the need to prevent overload of higher nervous activity. As a result, the perception of information becomes fragmentary or mosaic, «clip». For the first time, the term «clip» thinking (English clip – segment) was used by the English futurologist A. Toffler [24] as a characteristic of fragmentary information acquisition. It is precisely such features of the presentation of the material, in his opinion, that form fragmentary and superficial knowledge. In our opinion, the problem of clip perception is that applicants for higher education, in the process of obtaining information, operate with fixed «clips» (images), which do not fully allow logical thinking and build cause-and-effect relationships between phenomena, processes and events.

In the scientific works, there are papers by H. Korchova [12], Yu. Krasylnyk [13], M. Litvinova [14], which are devoted to the peculiarities of implementing technologies that are directly aimed at taking into account the «clipping» nature of perception of educational information by higher education students.

Problem statement. Regarding the theory and practice of training construction professionals, scientific developments are carried out mainly in the field of using creolized texts (the result of combining elements belonging to different semiotic systems - verbal and non-verbal (so-called iconic), which include illustrations (photos and drawings), various in nature - artistic, decorative,

cognitive, etc., as well as schemes, tables, diagrams, formulas, symbolic images, etc.) in the educational process as a means of adapting textual educational information to the specificity of the «clipping» thinking of modern youth. However, «clipping» thinking, as defined above, can also be a certain obstacle in the professional competence training of professionals.

Analysis of recent research and publications. The conceptual basis for the development of the stated problem is laid down and developed in the scientific research of many scientists. The problem of philosophical and cultural interpretation of the essence of clipping consciousness is devoted to the works of L. Rosen [21], L. Palladino [15], Ya. Chaplak, H. Chuyko [4], A. Toffler [24], and others. N. Carr [3] focuses on the analysis of the impact of modern telecommunications networks on mental processes. Ya. Chaplak and H. Chuyko [4] concentrate their attention on the phenomenon of clipping thinking and clipping fragmentation of the information flow in the Internet space as a precondition for social-psychological influence on personality and society. The most numerous studies concern the study of the manifestations of clipping perception, thinking, and behavior in the field of education (H. Bakhtina [2], H. Gich [6], T. Udovitska [25]). The comparison of the phenomenon of clip thinking with types of thinking such as NET-thinking, virtual-network thinking, as addressed by O. Panina [18], V. Pyrog [20], M. Smulson, Yu. Lototska, M. Nazar, P. Dityuk, I. Kovalenko-Kobylianska [8], and others.

Regarding the term «transformation» in the context of educational science and psychological processes, we agree with the view of N. Pobirchenko [19] that it is a creative process of transferring essential features of innovative achievements of a particular education profile to another education profile in order to combine them. It is a managed process of improving the quality of the educational process in terms of students perception of the educational material content using modern visualization tools, taking into account clip thinking. According to O. Glushko [7], the concept of «transformation» includes a fundamental, structural, long-term, and qualitative transformation of the education system with the introduction of innovations. However, despite the deep analysis provided in scientific papers by researchers on the advantages and disadvantages of clip thinking, the problem of transforming «clip» thinking of future students of higher education using information technology remains insufficiently disclosed in the educational process of higher education institutions.

The purpose of the article is to identify the leading characteristics of «clip» thinking and approaches to transforming «clip» thinking of future students of higher education using information technology.

Presentation of the main research material. H. Korchova [12] reveals the main characteristics of clip thinking, identifies the main features of its carriers, proposes specific pedagogical technologies, methods, and teaching techniques aimed at overcoming the negative aspects of clip thinking and taking into account its determinants - the constant increase in information received, the growth of information speed, diversity and accessibility of information, and increased multitasking. The researcher draws a parallel between «clip» and visual thinking and considers these types of thinking to be similar. Therefore, the characteristic feature of «clip» thinking is its imagery; an increased emotional component in motivational and regulatory mechanisms that directly block the need for new knowledge; formal-dynamic individual characteristics (speed, energy, and variability) that greatly simplify the perception and processing of significant volumes of modern information flow.

T. Udovytstka [25], analyzing the phenomenon of clip thinking as a form of perception of the surrounding environment by modern youth in a diverse, mosaic, and fragmented form, argues that in the classical sense, a student's consciousness implies the presence of internal integrity and a certain intellectual structure - an intellectual scheme that corresponds to how information about the surrounding world and oneself is perceived, processed, and stored. According to the scientist, the destructive effect of the «clip» as a part of a whole lies in the fact that such a small fragmentary object, limited by frames, does not contribute to the formation of a holistic picture of the world for modern students. But at the same time, the author asserts that the presence of «clip thinking» in modern students cannot be denied, and therefore, the above-mentioned way

of mastering the surrounding reality and the «clip consciousness» formed on its basis are realities that characterize modern students.

Based on the analysis of psychological and scientific-methodical literature by Y. Solona [23], a whole spectrum of leading characteristics of «clippiness» of thinking is identified. Among them are: a decrease in the level of basic logical operations (analysis, synthesis, comparison, generalization, and classification); preference for visual (figurative) information; high speed of perception and superficial processing of information; deficit of attention and concentration; fragmentary and mosaic pictures of the world; loss of desire for knowledge; decreased need and ability for productive activity.

M. Litvinova [14] has proposed various methods, forms, and techniques for organizing productive activity of students during learning: visualization of educational information, project-game techniques using metaphorical-associative cards; frequent changes in types of activities and information sources; creation of a central image of a phenomenon or concept being studied; creation of an educational product new for those who are learning. O. Kornuta, T. Pryhorovska, N. Potiomkina [11] consider practical aspects of implementing the phenomenon of «clippiness» of thinking in teaching methodology using lecture classes as an example.

We agree that it is impossible to imagine a modern learning environment without a combination of classic classroom and virtual artificially created environments, just as one cannot imagine modern distance learning without Moodle, Teams, Zoom, Skype, Google Classroom, Google Meet, virtual tools (Google Glass, HoloLens, etc.). The result of such a combination is an educational environment characterized by the concept of a «synthetic learning environment» and has become a part of modern educational terminology.

Analyzing the trends in the construction and use of «synthetic learning environments» O. Burova, S. Litvinova, and O. Pinchuk [17] point to significant prospects for expanding the application of synthetic environments in education, particularly due to the development of educational tools based on IT technologies and experience in using multimedia tools and technologies. In the context of the student-centered educational paradigm, the idea of the scientists is that the transformation of the personality of the modern student as a bearer (acquirer) of knowledge into a synthesizing component of the educational process, when cognitive needs and abilities develop through the perception and processing of information from both external worlds (real physical and synthetic information), as well as the internal (biological) «world», can be harmonized by choosing an individual educational trajectory and necessary learning resources, taking into account the personality of the higher education acquirer.

In particular, K. Oldrich [1] believes that pedagogy is one of the six «critical criteria» that require attention if we want to improve the quality of the synthetic environment. According to the scholar, the main pedagogical elements in a synthetic learning environment should include: providing sufficient reference information/resources embedded in the simulation; preparation of learning settings; diagnostic interactions; cooperation; dynamic and context-sensitive assistance; embedded reflective strategies; work experience; and student-controlled experience.

Teachers' awareness of socio-state requirements for the quality of professional training of future students of higher education enables the development and effective implementation of modern educational technologies, best management practices, and research findings to form and develop self-sufficient individuals capable of creative professional activity. Thus, Y. Krasylnykom [13] substantiates the psycho-pedagogical principles and technologies for developing visualization skills of educational information among future vocational education teachers in higher education institutions. He establishes the concept of visualizing educational information as a specific way of achieving didactic goals that determines the nature of the visual model of objects and processes under study, means of visualization, methodological and technological constructs of their application, and the specificity of didactic activity of the teacher in accordance with the individual psychological characteristics of the higher education student and the need to activate their educational and cognitive activity for the perception, understanding of educational information and formation of certain competencies based on it. The researcher characterizes the ability of

future vocational education teachers to visualize educational information, which embodies their psychological, technical, technological qualities, and didactic competencies, namely: the ability to present educational information, its transformation and technologization of educational activities. The author has established that information and communication technologies enable the activation of the educational and cognitive activities of higher education learners by enhancing the visual representation of instructional information and combining logical and pictorial ways of learning. The technology for developing the visualization skills of future vocational education teachers, developed by Y. Krasylnyk, consists of several components: a conceptual foundation (methodological and theoretical-methodological principles of visualization; goals, objectives, scientific approaches, and principles that determine the technological aspects of visualizing instructional information), educational process participants (methodology of selecting productive forms, methods, and tools that are adequate to the conditions of subjectivization of the visualization process; organization of educational interaction in the system "teachers-higher education learners-developers of educational information resources-methodological service workers-higher education institution managers"), and the technological process of visualizing instructional information (selection of productive forms, methods, and means of teaching, as well as the corresponding forms, methods, means, and techniques of visualizing instructional information; designing models of visual instructional information in various types of educational activities that are implemented in the conditions of information technology and supplemented by the students' work according to individual educational trajectories and interactive teaching methods).

H. Korchova [12] identifies teaching methods and techniques that have proven themselves in teaching practice: project-based learning; «flipped classroom»; discussions; brainstorming; debates; forums; round tables; seminar-discussions (group discussion); case method (situational analysis); mind maps, mental cards (mindmapping); idea basket; visualization schemes; synqueines; «Fishbone» or «Fish skeleton» technique; working with historical sources with an emphasis on visual sources (drawings, posters, photographs, maps, film documents). She also draws attention to educational technologies that are most successful for learners with clip thinking. In particular, web quests as a problem task with elements of role-playing, when using information resources of the Internet; sketching technology – creating small drawings that make the lecture or presentation more understandable, while all the lecture material is placed on one sheet (colored markers, markers or pencils are needed, and for video scribing – a computer (gadget), camera and video editing programs); infographics, the essence of which is to visualize data or ideas in order to convey complex information to the audience quickly; the best way to create infographics is to break the audience into microgroups, each of which has time to study the information; gamification as a technology closely related to the use of gaming forms and teaching methods.

In our opinion, a positive trend is the focus of scientists on analyzing the problem of insufficient humanization in the education of higher education seekers in technical specialties. In particular, O. Kornilov [10] considers the process of teaching the discipline «Strength of Materials» from the perspective of its humanization potential. The researcher believes that in the process of mastering the content of this discipline, it is not enough to rely solely on sensory perception of external objects, i.e. simple, direct perceptions of the external world. Rather, students require a fairly high level of apperception. An effective means of enhancing apperception can be the teacher's use of images from literature and the introduction of a figurative (image-based) component of thinking. We agree with this statement because the processes of word and image perception and their processing by both hemispheres of the brain occur differently. «Left-brain» thinking is analytical and discrete, while «right-brain» thinking is spatial, synthetic, and capable of instantly grasping numerous object properties. Depending on the conditions of a person's psychological-intellectual development, there may be a relative dominance of left or right-brain thinking, which largely determines the characteristics of the subject's psychological cognitive processes in learning. The use of figurative and aesthetic components to increase the productivity of learning material acquisition is justified during

various types of educational activities. For example, the emotional and aesthetic coloring of the lecture content will contribute to its retention in the student's long-term memory. As an illustration, conducting a laboratory practical on determining the magnitude of normal stresses during off-center tension (compression) is an important element of the process for technical and construction specialties. At the State Biotechnology University (Kharkiv), during a laboratory experiment [22], students are offered to experimentally determine the magnitude of normal stresses in the transverse section of a bar (Fig. 1).

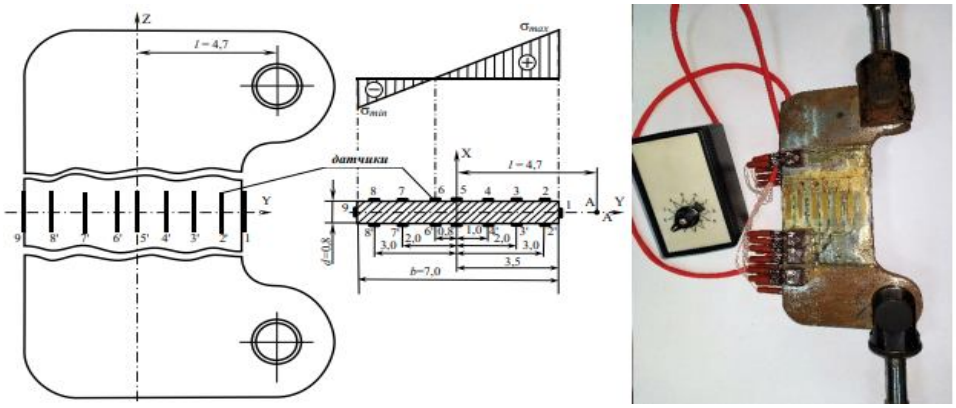

Fig. 1. Sample of a rod used in the laboratory work "Off-center tension (compression)": sketch of the rod (a), cross section and normal stress diagram (b), external view of the sample with the sensor switch (c)

In the conditions of remote learning, the use of modern finite element analysis systems, particularly ANSYS, has proven to be effective in completing this laboratory work. The computer modeling of the bar in ANSYS WORKBENCH is shown in Fig. 2.

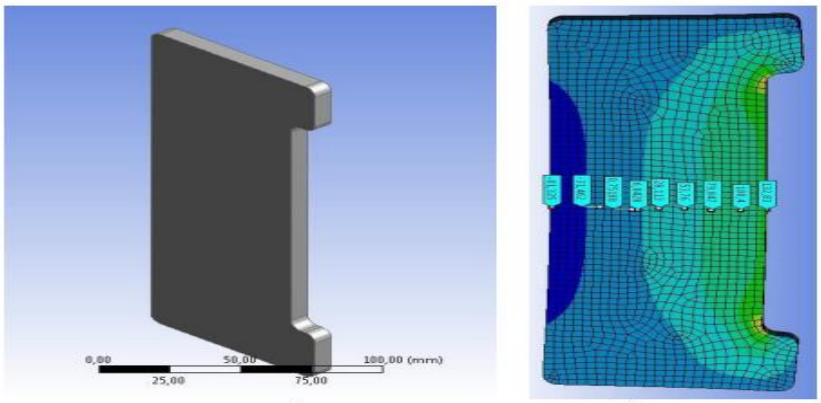

Fig. 2. A model of the rod for performing the laboratory work «Off-center tension (compression)» in ANSYS WORKBENCH: general view (a), normal stresses in a cross section (b)

However, in our opinion, the optimal approach for laboratory work is to combine real and digital objects, which allows students to better understand the content. Therefore, an improved learning environment should include updated educational material, new methods of self-assessment, and video clips with detailed instructions for each practical session, which significantly improves learning outcomes [5]. By scientists of the Kyiv National University of Construction and Architecture [26], to indicate the importance of the problem of modernization

of the operational and activity component of educational activity, further scientific development of theoretical and technological components of technical educational disciplines in the institution of higher education of the construction profile, determinists, which define peculiarities of their teaching methods, clarified approaches on the formation of the content of education, oriented on the priority of personaloriented learning and competence-based approach. Recommendations for improvement of the basic types of training in lecture, practical, and laboratory classes have been developed. The content of the stages of implementation of the technique of teaching technical disciplines in the institution of higher education of the construction profile is determined.

An analysis of the psychological and pedagogical literature on innovative approaches in the training of construction professionals and innovative educational practices has allowed us to identify a range of information technology tools in the context of taking into account and transforming the «clip-thinking» of students. The Department of Vocational Education at the Kyiv National University of Construction and Architecture actively uses a wide range of electronic systems to create an interactive educational environment during teaching sessions. The most popular of these is the Moodle e-learning platform [16]. Moodle (Modular Object-Oriented Dynamic Learning Environment) is a free learning management system distributed under the GNU General Public License. The platform is popular because it has undergone multiple modifications and has been supplemented with new solutions and tools. The Moodle system meets the main criteria for e-learning systems. In the system, it is possible to create and store electronic educational materials and set the sequence for their study. Thanks to the fact that access to Moodle is via the Internet or other networks, higher education students are not tied to a specific location and time and can choose their own pace for learning the material. Considering this, it should be noted that the Moodle system can be used not only for organizing distance learning, but also for supporting traditional classroom learning.

Organizing the educational process in a qualitative and effective manner can also be achieved by creating a virtual classroom in Classroom [9], uploading and storing documents on the virtual Disk (text, table, presentation, forms, tests), posting prepared materials in a private file repository with integrated editing tools. In addition to the ability to receive and exchange information, these resources allow for working and learning online. Another advantage of this resource is the ability to edit files simultaneously by multiple participants in real-time, conduct webinars, meetings, consultations, and create distance courses, provide educational consultations, and post materials for self-education.

At the Kyiv National University of Construction and Architecture, the most popular platform in Office 365 is Microsoft Teams, a hub for teamwork that integrates users, content, and tools necessary for more efficient work. The application brings everything together in a shared workspace that includes chat for meetings, file sharing, and corporate programs. The application is useful for higher education students as it allows them to work on Android, iOS, Windows, and Phone platforms.

One of the tools that is most adapted for learning and convenient to use is the Zoom program. This program has gained widespread use since the beginning of the COVID-19 pandemic caused by the SARS-CoV-2019 coronavirus and the war in Ukraine. Zoom allows for the quick planning and organization of online classes and webinars. Additionally, the program allows for demonstrations of materials on the PC desktop; recording of classes with student participation and personal inquiries; and the organization of public and private chats for messaging and exchanging materials. Therefore, the latest IT technologies increase students' interest in learning, activate cognitive activity, develop creative potential, and allow for the effective organization of personalized, collective, and group activities during classes, independent work, and the improvement of practical skills. Computers, the Internet, and modern audio-visual teaching tools make the learning process creative and exploratory, enabling the use of multimedia presentations, animated videos, and interactive equipment (SMART Board interactive whiteboards, Sympodium interactive displays), and more.

Conclusions. Thus, there is a tendency towards the dominance of «clip thinking» among students, characterized by certain properties, the main ones being visualization (imagery) of information; high speed of perception and superficial processing of information; deficit of attention and concentration; fragmentariness and mosaic nature of worldviews; loss of desire for knowledge; reduced need and ability for productive activity. These properties can be transformed through the appropriate construction of educational organization, including through the use of information technology, towards logical presentation of educational material; alignment of education with practical goals; implementation of education technologies aimed at educational interaction (use of electronic discussions (forums), email, conferences, etc.); ensuring an individual approach to organizing the educational and cognitive activity of students taking into account their motivations, needs and abilities; variability in the selection of IT learning technologies and their combination. Among the ways of organizing this process, one can highlight the activation of the learning process by involving problem-search, research approaches in teaching; scientific content of teaching; providing the opportunity to build all types of activity on scientifically substantiated principles.

The results of the research can be used for the creation and improvement of didactic technologies and methods, as well as optimization of the content of educational disciplines using information technology in the training of construction professionals in a higher education institution in the field of construction.

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Стаття надійшла 19.10.2023

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ДИДАКТИЧНІ АСПЕКТИ ТРАНСФОРМАЦІЇ КЛІПОВОГО МИСЛЕННЯ В КОНТЕКСТІ ВИКЛАДАННЯ БУДІВЕЛЬНОЇ МЕХАНІКИ

Актуальність проблеми трансформації кліпового мислення здобувачів вищої освіти в умовах викладання будівельної механіки та її вирішення з урахуванням дидактичних можливостей освітніх та цифрових технологій є беззаперечною з огляду на динаміку зростання обсягу навчальної інформації, що вимагає від суб'єктів освітнього процесу гнучкого адаптування наукових підходів, технологій викладання, способів мислення до сучасних освітніх потреб. Визначено, що кліпове мислення, яке характеризується швидкістю та поверхневим обмірковуванням інформації, дефіцитом уваги та її концентрації, фрагментарністю та мозаїчністю картини світу, втратою бажання до пізнання, зниженою потребою та здатністю до продуктивної діяльності, може бути як перевагою, так і недоліком в умовах цифрової епохи, сучасних системних вимог щодо підготовки професіоналів із сформованою системою ціннісних орієнтацій, інноваційного мислення, культурою пізнавальної діяльності. Встановлено, що сутність трансформації кліпового мислення здобувачів вищої освіти в контексті викладання будівельної механіки полягає в інтегруванні освітніх інновацій з метою підвищення якості навчання та викладання, розвитку критичного мислення студентів, змін у способах сприймання та обробки інформації. З'ясовано, що дидактичні механізми трансформації кліпового мислення – ефективне використання аналітики даних, інтерактивні навчальні платформи, візуалізація даних, спільні платформи та обмін думками, автоматизація процесів для збору та обробки даних, стимулювання критичного мислення – сприяють збалансованому використанню освітніх засобів для покращення сприйняття інформації, розвитку когнітивної компетентності та сприяють створенню навчального середовища, яке відповідає потребам сучасності. Зроблено висновок, що властивості «кліпового мислення» можна трансформувати за умови відповідної побудови організації вивчення будівельної механіки в напрямі логічності подання навчального матеріалу; відповідності навчання практичним цілям; впровадження технологій навчання спрямованих на освітню взаємодію; забезпечення індивідуального підходу до організації навчально-пізнавальної діяльності студентів.

Ключові слова: освітній процес, будівельна механіка, професійна компетентність, мислення, освітні засоби, цифрові технологій, трансформація кліпового мислення здобувачів вищої освіти.

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DIDACTIC ASPECTS OF THE TRANSFORMATION OF CLIP THINKING IN THE CONTEXT OF TEACHING OF CONSTRUCTION MECHANICS

The relevance of the problem of transforming the clip-based thinking of higher education students in the conditions of teaching construction mechanics and its solution taking into account the didactic capabilities of educational and digital technologies is undeniable in view of the dynamics of the growth of the volume of educational information, which requires the subjects of the educational process to flexibly adapt scientific approaches, teaching technologies , ways of thinking to modern educational needs. It was determined that clip thinking, which is characterized by speed and superficial consideration of information, lack of attention and its concentration, fragmentation and mosaicism of the world picture, loss of desire for knowledge, reduced need and ability for productive activity, can be both an advantage and a disadvantage in the conditions of digital era, modern system requirements for the training of professionals with a formed system of value orientations, innovative thinking, a culture of cognitive activity. It was established that the essence of the transformation of clip thinking of higher education students in the context of teaching construction mechanics is the integration of educational innovations with the aim of improving the quality of learning and teaching, developing students' critical thinking, and changes in the ways of perceiving and processing information. It was found that didactic mechanisms for the transformation of clip thinking - effective use of data analytics, interactive educational platforms, data visualization, joint platforms and exchange of opinions, automation of processes for data collection and processing, stimulation of critical thinking - contribute to the balanced use of educational tools to improve the perception of information , the development of cognitive competence and contribute to the creation of an educational environment that meets the needs of today. It was concluded that the properties of "clip thinking" can be transformed under the condition of the appropriate construction of the organization of the study of construction mechanics in the direction of the logical presentation of educational material; compliance of training with practical goals; implementation of learning technologies aimed at educational interaction; ensuring an individual approach to the organization of students' educational and cognitive activities.

Keywords: educational process, construction mechanics, professional competence, thinking, educational tools, digital technologies, transformation of clip thinking of students of higher education.

УДК 37.02:69
Чернишев Д.О., Почка К.І., Корчова Г.Л., Красильник Ю.С., Руденко М.В. **Дидактичні аспекти трансформації кліпового мислення в контексті викладання будівельної механіки** // Опір матеріалів і теорія споруд: наук.-тех. збірн. – Київ: КНУБА, 2023. – Вип. 111. – С. 3-12.
У статті наведено узагальнення дидактичних аспектів вирішення проблеми трансформації кліпового мислення здобувачів вищої освіти в умовах викладання будівельної механіки, що забезпечує формування і розвиток їх професійної компетентності. Визначено характерні властивості «кліпових» форм мислення та встановлено на цій основі переваги та недоліки даного феномену. Звернення до компетентнісного підходу та студентоцентрованої освітньої парадигми засвідчило характеристику трансформації кліпового мислення здобувачів вищої освіти як керованого процесу забезпечення якості їхньої підготовки детермінованого логічним способом засвоєння змісту навчального матеріалу завдяки сучасним засобам цифрових технологій із врахуванням «кліпового» сприйняття.
Іл. 2. Бібліогр. 26 назв.

UDC 37.02:69
Chernyshev D.O., Pochka K.I., Korchova H.L., Krasylnyk Yu.S., Rudenko M.V. **Didactic aspects of the transformation of clip thinking in the context of teaching of construction mechanics** // Strength of Materials and Theory of Structures: Scientific-and-technical collected articles. – Kyiv: KNUBA, 2023. – Issue 111. – P. 3-12.
The article provides a generalization of the didactic aspects of solving the problem of transforming the clip thinking of students of higher education in the conditions of teaching construction mechanics, which ensures the formation and development of their professional competence. The characteristic properties of "clip" forms of thinking are defined and the advantages and disadvantages of this phenomenon are established on this basis. Turning to the competence approach and the student-centered educational paradigm proved the characteristic of the transformation of clip thinking of higher education students as a controlled process of ensuring the quality of their training determined by a logical method of mastering the content of the educational material thanks to modern means of digital technologies, taking into account "clip" perception.
Fig. 2. Ref. 26.

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