

USING STRUCTURE GENERALIZATION SCHEMES  
IN THE TRAINING PROCESS AT HIGHER MEDICAL  
EDUCATIONAL INSTITUTIONSHalyna MOROKHOVETS, Yuliia LYSANETS, Tetiana PURDENKO,  
Liudmyla OSTROVSKA, Oleksandr PUSHKO,  
Ukrainian Medical Stomatological Academy  
Poltava (Ukraine), polstomumsa1@gmail.comМЕТОДИКА ВИКОРИСТАННЯ СТРУКТУРНО-  
УЗАГАЛЬНЮЮЧИХ СХЕМ У НАВЧАЛЬНОМУ  
ПРОЦЕСІ ВИЩОГО МЕДИЧНОГО НАВЧАЛЬНОГО ЗАКЛАДУГалина МОРОХОВЕЦЬ, Юлія ЛИСАНЕЦЬ, Тетяна ПУРДЕНКО,  
Людмила ОСТРОВСЬКА, Олександр ПУШКО,  
Українська медична стоматологічна академія,  
Полтава (Україна)  
ORCID ID: 0000-0002-6079-6878; ORCID ID: 0000-0003-0421-6362  
ORCID ID: 0000-0002-3561-4331; ORCID ID: 0000-0001-9523-7665  
ORCID ID: 0000-0001-7309-4798

**Галина Мороховец, Юлія Лисанец, Татьяна Пурденко, Людмила Островская, Александр Пушко. Методика использования структурно-обобщающих схем в учебном процессе высшего медицинского учебного заведения. Цель статьи** – исследовать методику использования структурно-обобщающих схем в учебном процессе высшего медицинского учебного заведения. **Методы исследования:** системный анализ, синтез и обобщение. **Научная новизна.** Впервые комплексно проанализированы вопросы применения структурно-обобщающих схем в учебном процессе медицинского вуза. **Выводы.** Структурно-обобщающие схемы являются одним из проявлений объяснительно-иллюстративного подхода, рекомендуемого многими отечественными и зарубежными учеными. Структурно-обобщающие схемы демонстрируют содержание темы при оптимальной смысловой и информационной нагрузке, наглядно упрощают восприятие сложных блоков информации. Учитывая информатизацию общества, современному человеку всё более присуще использование наглядно-образных данных. Они создают целостную картину материала, учитывая логику, иерархичность связей между его частями. Основными видами структурно-обобщающих схем являются логические цепи, логические цепи с обратной связью, циклические и радиальные схемы, кластеры, диаграммы Венна-Эйлера, диаграмма Исакавы, сложно-структурированные схемы. Для создания вышеуказанных схем целесообразно использовать возможности пакета Microsoft Office. Для создания простейших схем достаточно возможности текстового процессора – использование встроенных фигур. Сложно структурированные схемы, включающие элементы электронных таблиц, формул, баз данных, рисунков, используют редактор векторной графики MS Visio. Возможности редактора позволяют создавать, редактировать организационные диаграммы, планы, блок-схемы в динамической взаимосвязи с другими программами пакета Microsoft.

**Ключевые слова:** структурно-обобщающие схемы, наглядность, структурно-функциональные связи, медицинское учебное заведение.

**Problem statement.** In the 21st century, the dogmatic teaching has been replaced by the explanatory and illustrative one. The structure generalization scheme is one of manifestations of this approach. Creating a limited number of components that can be used to form a graphical representation via scheme and tables of virtually any type and complexity, allows us to unify structural material and summarize data within a practical class, laboratory work or lecture. This greatly simplifies the process of designing structure generalization tables, both in terms of systematization of educational material, and in the formation of relevant elements for the interface of electronic and educational publications.

**Analysis of recent researches and publications.** The problem of using structure generalization schemes in the educational process was addressed by such scientists as V.F. Shatalov, I.A. Gerasimov, S.S. Zorin, O.M. Kolosov and others<sup>1</sup>. V.F. Shatalov used graphical coding in close connec-

tion with “anchor points”, which were widely introduced in pedagogical practice in the 1960s. Structural and logical schemes are recommended by a number of authors for the study of theoretical material in disciplines of different professional orientation. There are works containing the entire complexes of structural and logical tables in the educational material on pedagogical psychology, social innovation in management. Visualization of educational material is inextricably linked with its compaction and condensation<sup>2,3</sup>. In the works by I.A. Gerasimov and S.S. Zorin, it has been emphasized that due to graphic clarity of structural and logical tables, natural intellectual processes associated with the specific features of visual perception of graphic images are actively included.

In the writings of domestic and foreign scientists, the features of application of structure generalization schemes in the study of physical and mathematical disciplines in primary school have been described in detail. Further scientific research

<sup>1</sup> Shatalov V. F. Pedagogični personalí [Pedagogical personalities], *Portal suchasnikh pedagogichnikh resursiv* [Portal of modern pedagogical resources], 2010. URL: [http://intellect-invest.org.ua/pedagog\\_personalias\\_shatalov\\_vf/](http://intellect-invest.org.ua/pedagog_personalias_shatalov_vf/) [in Ukrainian].

<sup>2</sup> Arnkheim R. “Vizual'noye myshleniye” [Visual thinking], *Khrestomatiya po obshchey psikhologii* [Reading-book on general psychology], Ed. Gippenrayter Yu. B., Petukhova V. V., Moscow, 1981, P. 97 [in Russian].

<sup>3</sup> Ostapenko A. A., Kasatnikov A. A., Grushevskiy S. P. “Tekhnika graficheskogo uplotneniya uchebnoy informatsii” [The technique of graphic densification of the training information], *Shkolnye tekhnologii* [School technologies], 2004, №6, P. 90 [in Russian].

is needed to investigate the use of structure generalization schemes in the educational process of a higher medical education institution.

**The aim of the article** is to study the methods of using structure generalization schemes in the educational process of a higher education institution.

**Material and methods of the research.** In the course of research, we used bibliosemantic method for the analysis of scientific publications on using structure generalization schemes in the educational process of a higher education institution.

**Results.** New information is absorbed and remembered better when knowledge and skills are "blotted out" in the system of visual and spatial memory, and accordingly, the presentation of educational material in a structured form allows faster and better assimilation of new systems of concepts, methods of action<sup>4</sup>. Complex perception helps to create comfortable psychological and pedagogical conditions for realization of potential opportunities of future doctors, at the same time engaging the left hemisphere of the brain, which is responsible for the sequential and analytical assimilation of the material, and the right hemisphere, through which the holistic object occurs. It is known that the transition from verbal "left hemisphere" training to one that is designed for harmonious work of both hemispheres should lead to a much higher level of development.

Structural diagrams include key phrases, individual words, mathematical calculations, numbers to remember, pictures, graphs needed for presentation. The location of the material, the structure, the arrows, the colors are all carefully considered and are the basis for the answer, the algorithm of reasoning.

The semantic structure of the source material, taking into account the laws of logic, contributes to a better visual perception. In addition, structural and logical circuits create a holistic picture of the material through visual systematization of the material; provide concentration of attention due to the structure of semantic segments on which concepts, judgments, conclusions are based, demonstrate the content of the topic at the optimum semantic and information load: information is presented in a readable form, the logic of information presentation does not give ambiguous interpretation; it helps to restore the entire picture from semantic fragments; and takes into account the way of thinking of a modern man, who prefers non-textual, visual information<sup>5,6</sup>.

Creating structural and logical schemes, the teacher must comply with a number of requirements, in particular: the scheme should be concise, information should be placed in view of hierarchy, logic of presentation; the type of link between the schematic elements must match the scheme type; the scheme should be easy to perceive, and have informational, semantic, imaginative, emotional load.

The main types of structural diagrams are logic circuits, feedback logic circuits, cyclic and radial circuits, clusters, Venn-Euler diagrams, Ishikawa diagrams (fish bone), complex structured circuits<sup>7</sup>.

The simplest block diagram is a logical circuit. Such schemes are used by us in the educational process in the study of the content module "Methodology of Scientific and Patent Search" at the third educational and scientific level.

Creation of complex structured schemes should be based on a number of principles:

- consolidation of information units;
- concentrating nodal issues by eliminating the minor ones;
- combining and generalizing individual sections into a single whole;
- the use of structural generalization tables facilitates the acquisition of a large amount of theoretical knowledge;
- overview with a single glance of the set of individual blocks of new information, establishing links between them, their comparison - logical processing of the material and its translation into the long-term memory;
- implementation of the principle of large-scale introduction of theoretical knowledge in teaching.

Structural diagrams can reflect the structure of a coherent unit of training material and some parts of training material.

Knowledge sharing should be carried out taking into account the importance of mastering a particular material. Importance is determined by the number of connections one needs to make while studying the subject, between concepts and phenomena, between concepts and laws. That is, it is about structural and functional relationships, content-logical, logical-genetic, cause-and-effect relations. Accordingly, the concepts are classified into concept-categories, main, basic and reference<sup>8</sup>.

To depict the classifications of concepts in block diagrams, capital letters of different colors are used. Different types of arrows are used to represent relationships in structural tables, namely: logical-genetic relationships, structural-functional relationships, cause-and-effect relationships.

MS Office features are used to create schematic diagrams. Simple structural diagrams are implemented with the help of MS Word text editor, using the ability to insert figures (lines, arrows, flowcharts, footnotes) of the main menu of the program. Creating schematic diagrams in MS Word text-based environment does not require special skills and abilities, and over time does not require the use of special components of the Microsoft suite. In our opinion, it is advisable to use the Windows Chart Editor and Visio Vector Graphics Editor, available in standard and professional versions of Microsoft Office, to create professional schematic diagrams. MS Visio has a typical intuitive office interface which allows us to create a number of objects: organizational charts, plans, technical projects, etc., using a set of figures and templates. The main viewer in Visio is the vector figures that build the diagram or plan. For convenience, the figures are grouped into thematic categories, each of which can see similar in appearance or theme elements. Shapes are the primary, but not the only, tool for Visio representation. One can also use text and numeric data, graphics and color formatting<sup>9,10</sup>. Visio Robot has the ability to select and open a

<sup>4</sup> Bleyk S., Peyp S., Choshanov M. "Ispol'zovaniye dostizheniy neyropsikhologii v pedagogike SSHA" [The use of neuropsychology findings in the U.S. pedagogics], *Pedagogika* [Pedagogics], 2004, N 5, P. 89 [in Russian].

<sup>5</sup> Strukturno-logichni skhemi. Tablitsi. Oporní konspekti. Navchal'ni prezentatsii: rekomendatsii do skladannya: metod. posib. dlya stud. [Structural and logical schemes. Tables. Basic lecture notes. Training presentations: recommendations for development: methodical guidelines for students], Ed.: L. L. Butenko, O. G. Ignatovich, V. M. Shvirka, Starobil's'k, 2015, 112 p. [in Ukrainian].

<sup>6</sup> Alekseev O. M. "Zasvoennya navichok i umin' studentiv tekhnichnikh vuziv" [Mastering of skills and abilities by students of technical universities], *Visnik Zhytomir's'kogo derzhavnogo universitetu* [Herald of Zhytomyr State University], 2010, N 57, P. 1-6 [in Ukrainian].

<sup>7</sup> Kenyayev Ye. D. "O primenenii povtoritel'no-obobshchayushchikh blok-skhem" [On application of repetitive and generalizing block-schemes], *Fizika v shkole* [Physics at school], 1993, N 6, P. 45-48 [in Russian].

<sup>8</sup> Shatalov V. D., Sheyman V. M., Khait A. M. Opornyie konspekty po kinematike i dinamike: Kn. dlya uchitelya: Iz opyta raboti [The basic lecture notes on kinematics and dynamics: A book for teachers], Moscow, 1989, 143 p. [in Russian].

<sup>9</sup> Visio: posibnyk pochativtstva [Visio: The beginner's manual]. URL: <https://support.office.com/uk-ua/article/visio-%D0%BF%D0%BE%D1%>

pattern, drag and drop shapes, and add text to shapes. Collections of Visio stencils contain collections of figures. Shapes in each stencil collection have common features. These can be collections of figures to create a scheme of a certain type or several different types of one figure. The basic stencil for circuits of any complexity is a collection of figures of a simple flowchart containing the common figures of flowcharts. Visio is equipped with a set of figures of different directions (from general to technical), combined into stencils.

In most cases, MS Visio is a utility that is best used with the full capabilities of Microsoft Office (Excel, Access). Visualization of data in MS Visio is made possible with the use of tables of diagrams of the processor, data of system of management of databases, the editor of formulas, etc., and the process of using these resources becomes dynamic - when one changes an Excel file or other source, the data in the Visio chart also change.

**Conclusions.** Structural and generalization schemes are one of the manifestations of explanatory and illustrative teaching, which is recommended by many domestic and foreign scholars. Structural and generic schemes demonstrate the content of the topic at the optimum semantic and information load, refine and simplify the perception of complex blocks of information. In view of the informatization of society, the use of visual information is more and more inherent to the modern man. They create a complete picture of the material, taking into account the logic, hierarchy of connections between its parts. The main types of generic circuits are logic circuits, logic circuits with feedback, cyclic and radial circuits, clusters, Venn-Euler diagrams, Ishikawa diagrams, complex structured circuits. It is advisable to use the features of Microsoft Office to create the above schemes. To create the simplest schemes, the capabilities of a word processor - the use of built-in figures are sufficient. Complexly structured diagrams that include elements of spreadsheets, formulas, databases, drawings, use the MS Visio vector graphics editor. Editor features allow us to create, edit organizational charts, plans, flowcharts dynamically in conjunction with other Microsoft programs.

**Мороховець Галина, Лисанець Юлія, Пурденко Тетяна, Островська Людмила, Пушко Олександр. Методика використання структурно-узагальнюючих схем у навчальному процесі вищого медичного навчального закладу. Мета статті** – дослідити методику використання структурно-узагальнюючих схем у навчальному процесі вищого медичного навчального закладу. **Методи дослідження:** системний аналіз, синтез та узагальнення. **Наукова новизна.** Вперше комплексно проаналізоване питання застосування структурно-узагальнюючих схем у навчальному процесі медичного вищого навчального закладу. **Висновки.** Структурно-узагальнюючі схеми є одним із проявів пояснювально-ілюстративного навчання, що рекомендуються багатьма вітчизняними та зарубіжними вченими. Структурно-узагальнюючі схеми демонструють зміст теми при оптимальному смислово-інформаційному навантаженні, унаочнюють та спрощують для сприйняття складних блоків інформації. З огляду на інформатизацію суспільства, використання наочно-образної інформації все більш притаманне сучасній людині. Вони створюють цілісну картину матеріалу, враховуючи логіку, ієрархічність зв'язків між його частинами. Основними видами структурно-узагальнюючих схем є логічні ланцюги, логічні ланцюги зі зворотним зв'язком, циклічні та радіальні схеми, кластери, діаграми Венна-Ейлера, діаграма Ісікави, складно-структуровані схеми. Для створення вищевказаних схем доцільно використовувати можливості пакета Microsoft Office. Для створення найпростіших схем достатніми є можливості текстового процесора – використання вбудованих фігур. Складно структуровані схеми,

що включають елементи електронних таблиць, формул, баз даних, рисунків, використовують редактор векторної графіки MS Visio. Можливості редактора дозволяють створювати, редагувати організаційні діаграми, плани, блок схеми у динамічному взаємозв'язку з іншими програмами пакета Microsoft.

**Ключові слова:** структурно-узагальнюючі схеми, наочність, структурно-функціональні зв'язки, медичний навчальний заклад.

**Галина Мороховець** – кандидат педагогічних наук, завідувач аспірантурою наукового відділу, Українська медична стоматологічна академія. Коло наукових інтересів: формування інформаційно-комунікаційних компетенцій у майбутніх лікарів.

**Halyna Morokhovets** – Candidate of Pedagogical Sciences, Head of the Postgraduate Program of the Research Department, Ukrainian Medical Stomatological Academy. Research interests: developing the information and communication competencies in future doctors.

**Лисанець Юлія** – кандидат філологічних наук, доцент, доцент кафедри іноземних мов з латинською мовою та медичною термінологією, Українська медична стоматологічна академія. Коло наукових інтересів: світова література, медичний дискурс, наратологія.

**Yuliia Lysanets** – Candidate of Philological Sciences, Associate Professor, Associate Professor of the Department of Foreign Languages with Latin and Medical Terminology of Ukrainian Medical Stomatological Academy. Focus of research interest: world literature, medical discourse, narratology.

**Тетяна Пурденко** – кандидат медичних наук, доцент, доцент кафедри нервових хвороб з нейрохірургією та медичною генетикою, Українська медична стоматологічна академія. Коло наукових інтересів: впровадження сучасних технологій навчання у процесі викладання дисциплін “Неврологія”, “Нейрохірургія”, “Медична генетика” та “Дитяча неврологія”.

**Tetiana Purdenko** – Candidate of Medical Sciences, Associate Professor, Associate Professor of the Department of Nervous Diseases with Neurosurgery and Medical Genetics, Ukrainian Medical Stomatological Academy. Research interests: introduction of modern teaching technologies in delivering the subjects “Neurology”, “Neurosurgery”, “Medical Genetics” and “Pediatric Neurology”.

**Людмила Островська** – кандидат медичних наук, доцент, доцент кафедри терапевтичної стоматології, Українська медична стоматологічна академія. Коло наукових інтересів: діагностика та патогенетичні підходи до профілактики та лікування змін тканин пародонта.

**Ludmyla Ostrovska** – Candidate of Medical Sciences, Associate Professor, Associate Professor of the Department of Therapeutic Dentistry, Ukrainian Medical Stomatological Academy. Research interests: diagnosis and pathogenetic approaches to the prevention and treatment of periodontal tissue changes.

**Олександр Пушко** – аспірант кафедри нервових хвороб з нейрохірургією та медичною генетикою, Українська медична стоматологічна академія. Коло наукових інтересів: дослідження впливу комплексної фізичної реабілітації на моторні та когнітивні функції пацієнтів у відновному періоді мозкового ішемічного інсульту.

**Oleksandr Pushko** – postgraduate student of the Department of Nervous Diseases with Neurosurgery and Medical Genetics, Ukrainian Medical Stomatological Academy, Research interests: study of the impact of comprehensive physical rehabilitation on motor and cognitive functions of patients in the recovery period of ischemic stroke.

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<sup>9</sup> 81%D1%96%D0%B1%D0%BD%D0%B8%D0%BA-%D0%BF%D0%BE%D1%87%D0%B0%D1%82%D0%BA%D1%96%D0%B2%D1%86%D1%8F-bc1605de-d9f3-4c3a-970c-19876386047c [in Ukrainian].

<sup>10</sup> Sayenko M. S., Morokhovets' H. Yu. Vykorystannya informatsiyno-komunikatsiynykh tekhnolohiy u maybutniy profesyniy diyal'nosti v protsesi vyvchennya medychnoyi informatyky [The use of information and communication technologies for the future career in the process of studying medical informatics], *Imidzh suchasnoho pedahoha* [The image of a modern teacher], 2018, N 3 (180), P. 18–21 [in Ukrainian].