

EXPERIMENTAL METHODOLOGY FOR DEVELOPMENT OF COMPOSITIONAL THINKING IN SENIOR ARCHITECTURE STUDENTS¹**V.B. Grigorjeva,**

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Abstract. Analysis of a small part of methodological literature about development of compositional thinking in architecture students and its effect on development of flexible compositional activity skills in design work, acute need in development of a contemporary architect's personality able to adapt to new technologies and challenges of a job market determined the choice of the topic for the research "Experimental Methodology for Development of Compositional Thinking in Senior Architecture Students".

The article covers the object, subject, purpose, hypothesis and tasks of the research concerning development of compositional thinking based on the proposed system of composition exercises.

In the course of the research we have identified certain trends in development of compositional thinking in senior architecture students, such as: management of creative skills development was possible only on the basis of a set of various optimally compatible forms and methods, focused instruction and education on the basis of fairly wide general development of students in view of their personalities.

Research prospect, in our opinion, includes further study of possibilities for use of the system of exercises on general laws of composition in development of visual thinking in architecture students and improvement of their professional qualities in creative and design projects.

Keywords: institutions of higher education, architectural education, future architects, pedagogical conditions, the experimental methods, training, compositional thinking, general laws of composition, didactic model, heuristic teaching methods.

Problem statement. Current condition of the art education requires continuous improvement of methods for development of compositional thinking on a fundamentally new basis not only in the context of direct instruction but also remote learning.

Analysis of a small part of methodological literature about development of compositional thinking in architecture students and its effect on development of flexible compositional activity skills in design work, acute need in development of a contemporary architect's personality able to adapt to new technologies and challenges of a job market determined the choice of the topic for the research «Experimental Methodology for Development of Compositional Thinking in Senior Architecture Students».

Object of Research: Process of teaching composition to senior students.

Subject of Research: Development of compositional thinking in architecture students.

Purpose of Research. To develop and test methodology for development of compositional thinking on the basis of theoretical analysis and experimental research, which will facilitate activation of the learning process.

Hypothesis. Development of compositional thinking in senior students will be successful in case of arrangement of methodologically consistent compositional activity for learning general laws of the theory and practice of composition, use of heuristic and innovative teaching methods.

Tasks of Research: To identify teaching principles for development of compositional thinking and didactic principles for teaching senior architecture students seeking bachelor's degree; to identify levels of maturity of compositional thinking in the system of professional training of senior students; to develop and test a system of exercises and methodology for development of compositional thinking for learning general laws of composition; to develop a graphic set of visual aids for development of compositional thinking in accordance with the specified system of exercises.

Methodological principles of the research were statements of the cognitive theory regarding unity of the objective and subjective, rational and emotional, abstract and specific, content and form, transition of quantitative changes into qualitative ones in the creative activity.

Analysis of research sources and recent publications. Theoretical principles of the research were works by psychologists (L. Vygotsky, D. Elkonin, O. Leontiev) concerning peculiarities of artistic thinking and creative activity; works by researchers of art training for architects in institutions of higher education (I. Birillo [1], M. Habrel [4], O. Kaidanovska [11], I. Kinash [16], S. Karpova [12], I. Kubenko [15], A. Komarova [13], Z. Nagaeva [17], V. Tovbych [22] and others), works by educators (O. Bilhorodska [1], V. Grigorjeva [5-9], F. Kovaliov [10]) concerning development of professional knowledge, abilities and skills.

The research was conducted in 2016 - 2020 in three stages at the Sub-Department of Drawing, Painting and Architectural Graphics of the Institute of Architecture and Art at Odessa State Academy of Civil Engineering and Architecture.

At the first stage the object and subject of the research were identified and defined, research tasks and methods were specified, topic-related scientific and methodological literature was studied, academic and methodological documents, operating programmes of courses taught at the sub-department were analyzed, experimental methodology was developed (2016 - 2017).

The second stage was dedicated to summative and formative assessment. In the course of the summative assessment we identified levels of maturity of compositional thinking in architecture students before the start of the formative assessment. In the course of the formative assessment we tested the hypothesis, efficiency of experimental methodologies and created a didactic model for development of compositional thinking [1-6], summarized interim results, made necessary changes and corrections to exercises created for development of compositional thinking in senior students (2018 - 2019).

The third stage of the research included theoretical generalization (2019-2020). At that stage we specified methodology for development of compositional thinking in architecture students, conducted comparative analysis of outcomes of summative and formative assessments, summarized statistical data, identified and provided theoretical rationale for outcomes of the assessment and the research in general.

Scientific novelty of the research: we created the first ever system of exercises for learning general laws of composition, created and provided scientific rationale for a didactic model and methodology for development of compositional thinking in architecture students based on a created system of exercises, identified levels of maturity of compositional thinking in senior architecture students.

Practical relevance of the research includes possibility to use outcomes in development and improvement of programmes and methodology for development of compositional thinking based on the system of exercises on general laws of composition during art training for architects, at creativity departments of art schools of higher education and colleges, in school teachers retraining system.

The base material and results of research. The most vital and controversial matter in theoretical literature on compositional thinking in art practices is the matter of laws of composition, based on which practical skills are developed. We believe this matter is logically considered in works by F. Kovaliov [10], who defines the essence of general laws of composition

using principles of form making (law of consistency, law of proportions, law of symmetry, law of rhythm, law of identifying essential in the whole).

Impact of the general laws of composition is obvious at all stages of creation of compositional form: linear, luminance and colour layout. The law of consistency determines unity of format perception, consisting of constructive parts, at the stage of linear layout of a sketch. At the stage of luminance and colour relations in action the law participates in creation of general luminance and colour harmony. The law of proportions manifests itself in correlation of format and dimensions of composition elements at the stage of linear layout. In the process of creation of luminance and colour composition the effect of the law continues in three-component structure and principle of proximity of luminance relations and affects development of colour harmonies. The laws of symmetry and rhythm in linear layout of composition participate in choosing the type of balance of the depicted plane, type of perspective formations, rhythmic segmentation and unification of image. In the process of creation of luminance and colour composition the effect of the law manifests itself in use of luminance and colour contrasts and nuances. The law of identifying essential in the whole at all stages of composition creation manifests itself in underlying compositional centre of the sketch with lines, luminance relations, colour dominant and colour emphases.

Creation of a system of special knowledge in theory of composition serves as a basis for creation and development of thinking in architecture students. Compositional thinking is a variety of artistic thinking. It manifests itself in such actions as comparison, generalization, classification, systematization, abstraction, specification. Compositional thinking is defined by three interconnected and interdependent factors: perception of life, structural organization of the concept and depiction tools of composition that is being created. Compositional thinking process may be described as movement of visual thinking towards creation of the artistic whole, where components of life and image are interconnected.

Theory of step-by-step development of compositional thinking enabled us to assume that a system of exercises for learning general laws of composition might serve as an efficient tool for learning creative thinking methodology by architecture students.

Summative assessment was conducted in three stages using diagnostic tasks in drawing classes for the 4th year architecture students of the Institute of Architecture and Art at Odessa State Academy of Civil Engineering and Architecture in the academic year 2016/2017 (total number of students: 210).

Purpose of the first stage was to identify level of knowledge of general laws of composition by architecture students in order to determine professional basis for the research topic.

For this purpose we developed 3 variants of questions about the essence of notions in composition terminology («composition», «structure», «principles of form making», «laws of composition», «stages of creation of a painting», etc.). Results showed that only 18% of architecture students studied basic notions of composition on a regular basis, where only 3% of the students had an interest in studies with an outlook for their future occupation; 15% were those who studied because they had to. As a result, theoretical competence was very low: 35.5% of the total number of students. Practical tasks were given in logical sequence of creation of composition and identified maturity of compositional thinking in the 4th year students.

For instance: as the *first* task students had to create a graphic composition with 4 geometric figures in A4 format in three relations (white, grey and black). Purpose of the exercise – to determine the level of seeing a format balance. Purpose of the *second* task was to determine rhythmic seeing of image plane: to create a rhythmic composition with hypothetical elements in A4 format. Tool – pencil. Purpose of the *fourth* task was to determine the level of seeing general luminance pattern of the image: to create a composition of a still-life painting from imagination in a full luminance range in A4 format using a pencil. In the *last* task architecture students had to

create a composition of a sea landscape from photos in A4 format using a pencil. Based on results of this task we determined maturity of compositional thinking in creation of an artistic image.

Results enabled us to make the following conclusions: most students (63%) had no compositional thinking skills, no knowledge of methodological consistency when working on a sketch, their initial concept remained unchanged; most architecture students (56%) did not know general laws of composition, depiction techniques and tools, and worked by the method of trial and error.

Based on analysis of practical tasks and student projects in the recent years, we have identified criteria of compositional thinking in art training for architects: perception and figurative image of life, structural organization of the concept, use of depiction tools in composition that is being created. 3 levels of maturity of compositional thinking in architecture students were identified and described based on the main criteria: high (9,6%), medium (66,1%) and low (24,3%).

Tasks of the second stage of the summative assessment were as follows: to specify teaching conditions for development of compositional thinking in senior architecture students when learning general laws of composition using conventional methodology with further completion of practical tasks recommended by the curriculum. Assessment of conventional teaching efficiency proved that level of maturity of compositional thinking in architecture students both in experimental groups (EG) and control groups (CG) based on three criteria was approximately the same.

Based on generalization of the data obtained we have identified causes of insufficiently developed compositional thinking. They include no composition course in art training for architects, focus of training on development of practical skills and lack of theoretical knowledge, use of conventional teaching methods only.

Based on results of experimental data analysis we have developed a system of exercises for learning general laws of composition for senior architecture students; teaching methodology using heuristic methods, visual teaching aids.

Study of general laws of composition determined the content of the system of exercises built on methodologically connected tasks with formal elements (line, spot, geometrical figures) from simple to more complex, from black-and-white to coloured, since analysis of outcomes of compositional thinking in senior students proved that development of compositional thinking was more rapid in the course of solving abstract tasks. The matter of content was not taken into consideration in experimental exercises on composition.

For the formative assessment we have developed a didactic model for development of compositional thinking using a system of exercises for learning general laws of composition (Fig. 1).

The suggested model provides for step-by-step development of compositional thinking in architecture students based on the major didactic principle – from simple to complex.

The suggested system consisted of introductory lectures and preparatory exercises, short-term training exercises and creatively active exercises, each of which had its own purpose and task. System of exercises for learning general laws of composition consisted of 4 interconnected stages: linear plane, luminance and colour schemes.

Disregarding the content, architecture students completed exercises focusing only on compositional techniques. Compositional patterns mastered by the students were solidified in methodologically consistent work over sketches of a still-life-painting, landscape and interior. At this stage heuristic teaching methods were applied (brainstorming, empathy, reflection, garland of associations, etc.)

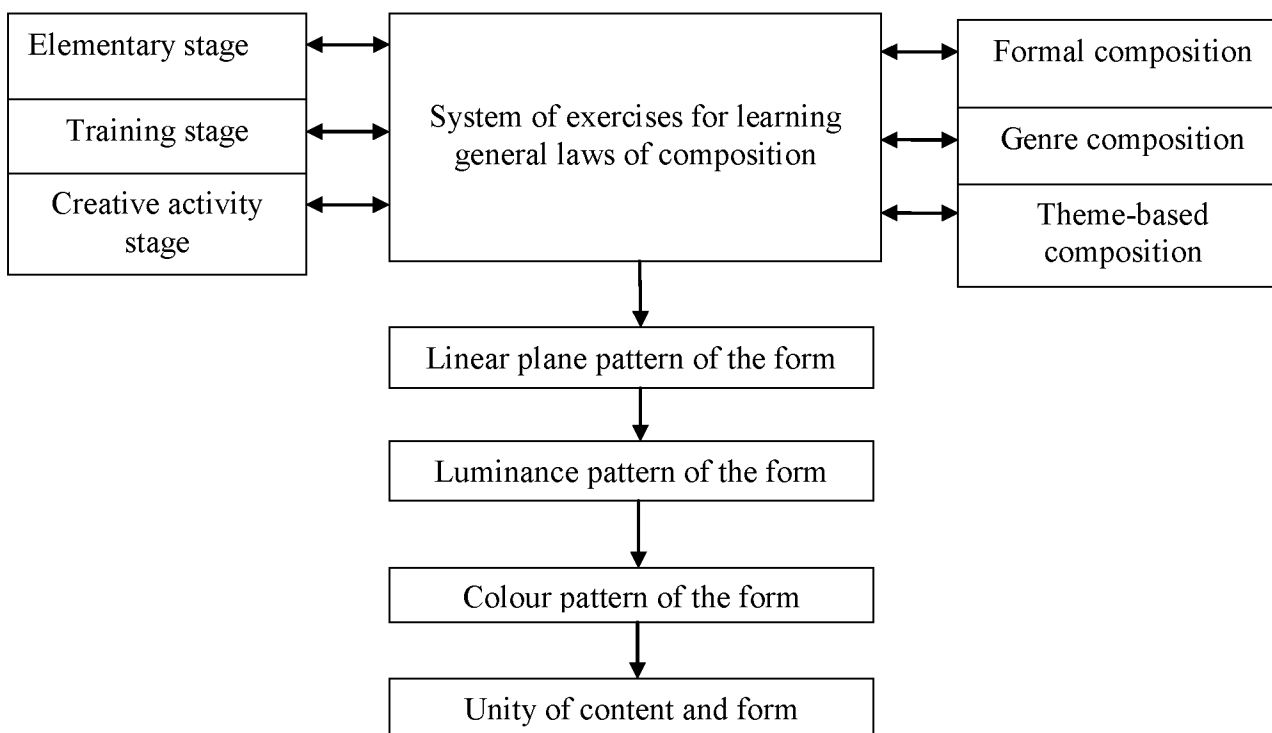


Fig. 1 Didactic Model for Development of Compositional Thinking in Senior Architecture Students

At the stage of elementary training the students were given theoretical knowledge about general laws of composition and were offered a series of preparatory exercises for creation of a formal composition on curriculum-based topics. Practical part of the stage was aimed at determining a structure of linear plane, luminance and colour form. Disregarding the content, the students completed exercises focusing only on visual aspects.

The second (training) stage was the main one, since it included not only study of various compositional techniques, but also strengthening of such knowledge in genre compositions. Short-term training exercises were designed to draw attention to certain patterns and to develop abilities and plastic skills.

At the third stage (creative activity) compositional activity skills were perfected in unassisted creative composition by applying the principle of unity of content and form of composition. From that time compositional activities of architecture students were aimed at determining *visual characteristic of a musical or literature selection, transformation of compositional techniques of famous painters and architects in a student's sketch, visual analysis of randomly placed colour spots for the purpose of creation of composition, which were «suggested» by fantasy*. The above exercises were final in the process of development of compositional thinking in senior architecture students.

Teaching conditions for development of compositional thinking as a result of completion of the above exercises were as follows: conscious attitude of architecture students to completion of clearly identified didactic tasks required by each series of exercises; adequate choice of theoretical material and its methodological form; degree of variety of exercises based on types, content, forms and techniques of reference to previous material.

At the final stage of the experiment we have performed control assessment for the purpose of identifying efficiency of the developed methodology. In order to identify efficiency of exercises a control survey was performed, aimed at determining the level of understanding the essence of compositional notions. Survey results showed that knowledge of theoretical principles in experimental groups was higher than in control groups by 29%. Analysis of final projects of

unassisted creative composition prepared by architecture students on the topics *Odessa Landscape*, *My Home*, *Architectural Fantasy* enabled us to determine the following patterns: after training compositional thinking criteria in experimental groups grew by 49% - perception and figurative image of life (high level changed from 9% to 30%; medium – from 73% to 59%, low level decreased from 38% to 7%); by 30% - structural organization of the concept (high level grew from 5,3% to 21,6%, medium - from 61% to 64%, low level decreased from 42% to 10%). In control groups criteria changed by 24,4%, 11% and 8% respectively.

Analysis of experimental data enabled us to conclude that criteria of perception and figurative image of life in the experimental group were the highest. We believe this is due to the fact that variety of teaching methods greatly improved cognitive activity, promoted development of fantasy, emotional responsiveness and compositional thinking in architecture students in general. The smallest changes were in the criteria of use of visual aids in the composition that was being created, since the range of aids used by the students was within the limits of realistic art only.

Comparative analysis of levels of maturity of compositional thinking in senior architecture students before and after the experiment: high level – 9,6% (EG), 3,2% (CG) / 30,2% (EG), 3,2% (CG); medium level – 66,1% (EG), 78,0% (CG) / 61,0% (EG), 78,8% (CG); low level – 24,3% (EG), 18,8% (CG) / 8,8% (EC), 18,0% (CG).

Results of the experiment show that there have been positive changes in levels of maturity of compositional thinking in architecture students in experimental groups: 30,2% of students in experimental groups achieved high level of maturity of compositional thinking (before the experiment such level was 9,6%); medium level decreased slightly from 66,1% to 61,0%, and low level was only 8,8%. There were no significant changes in control groups.

Conclusions. Study of curriculum-based and methodological materials for institutions of higher architectural education, questionnaire survey and completion of special exercises in general laws of composition by architecture students revealed a gap between theoretical knowledge and practical compositional activity, in the process of which no attention was paid to acquisition of a consistent system of scientific knowledge and to development of flexible professional skills and abilities in students.

In the course of the experiment we have identified dependence between systemic development of the students' mental actions and the overall process of development of compositional activity. Development of mental actions of various kinds determines nature and level of compositional thinking, which in its turn provides for professional training of architecture students and is characterized by independence, originality, associativity, visualization and imagination.

Based on results of the summative assessment we have identified source levels of maturity of compositional thinking in senior architecture students. High level was characterized by artistic perception and figurative vision of life, constant apperception, emotional responsiveness, in-depth knowledge of theoretical patterns and adequate use of depiction tools (9,6%). Medium level of maturity of compositional thinking manifested itself in low emotional responsiveness, uncertainty when selecting compositional techniques and tools (66,1%). Low level was characterized by passive thinking, pattern-based use of visual tools, use of templates (24%).

The core of the experimental methodology was a didactic model for development of compositional thinking using the system of exercises for learning general laws of composition, which consisted of three stages: elementary, training and creative activity. Elementary stage was dedicated to division of a set of compositional problems into certain types of learning activity and respective sections of the theoretical course. Disregarding the content, theoretical knowledge was strengthened in the process of realizing formal composition.

Based on the research results we have identified efficient conditions for development of compositional thinking: using a system of special exercises for learning general laws of composition, using theoretical knowledge based on practical experience, application of heuristic methods of compositional thinking in the teaching process.

In the course of the research we have identified certain trends in development of compositional thinking in senior architecture students, such as: management of creative skills development was possible only on the basis of a set of various optimally compatible forms and methods, focused instruction and education on the basis of fairly wide general development of students in view of their personalities.

Research prospect, in our opinion, includes further study of possibilities for use of the system of exercises on general laws of composition in development of visual thinking in architecture students and improvement of their professional qualities in creative and design projects.

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ЕКСПЕРИМЕНТАЛЬНА МЕТОДИКА ФОРМУВАННЯ КОМПОЗИЦІЙНОГО МИСЛЕННЯ СТУДЕНТІВ ВИПУСКНОГО КУРСУ АРХІТЕКТУРНОЇ СПЕЦІАЛЬНОСТІ

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Анотація: В статті розкрита проблема формування композиційного мислення у студентів архітектурної спеціальності при вивченні дисципліни «Рисунок», яка пов'язана з гуманізацією змісту сучасної освіти, зміною стилю професійного архітектурного мислення та новітніх тенденцій підготовки майбутніх архітекторів у вищій школі.

Узагальнюючи новітні розробки теоретичних та методичних основ формування професійних знань, умінь та навичок майбутніх архітекторів у вищих навчальних закладах, було виявлено вплив сформованості композиційного мислення студентів на їх композиційну діяльність та професійно зорієнтовану образотворчу підготовку.

В процесі теоретичного аналізу методичної літератури була розроблена система вправ щодо вивчення загальних законів композиції як ефективного способу оволодіння знаннями, вміннями та навичками композиційної діяльності. У теоретичній та методичній літературі найбільш важливим та суперечним є питання щодо законів композиції, їх сутності та місці в художній та архітектурній освіті. Нам вважається логічним розгляд цього питання в працях видатного педагога-вченого Ф.В. Ковальова, який визначав сутність загальних законів композиції принципами формоутворення (закон цілісності, закон пропорцій, закон симетрії, закон ритму, закон виділення головного в цілому).

Вперше в методиці навчання композиції науково обґрунтовано домінуюче вивчення композиційних категорій незалежно від жанру, теми і стилістичного напрямку. Обґрунтовано і розроблено дидактичну модель і методику формування композиційного мислення у студентів випускного курсу архітектурної спеціальності.

В статті проаналізовані результати констатуючого та формуючого експериментів на прикладі вивчення студентами-архітекторами загальних законів композиції. За результатами констатуючого експерименту визначено критерії та рівні сформованості композиційного мислення у студентів випускного курсу архітектурної спеціальності. На основі формуючого експерименту були розроблені педагогічні умови і методика засвоєння теоретичних та практичних основ композиції з використанням евристичних методів навчання.

Ключові слова: вищі навчальні заклади, архітектурна освіта, майбутні архітектори, педагогічні умови, експериментальна методика, підготовка, композиційне мислення, загальні закони композиції, дидактична модель, евристичні методи навчання.

ЭКСПЕРИМЕНТАЛЬНАЯ МЕТОДИКА ФОРМИРОВАНИЯ КОМПОЗИЦИОННОГО МЫШЛЕНИЯ СТУДЕНТОВ ВЫПУСКНОГО КУРСА АРХИТЕКТУРНОЙ СПЕЦИАЛЬНОСТИ

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Аннотация: В статье раскрыта проблема формирования композиционного мышления у студентов архитектурной специальности при изучении дисциплины «Рисунок», которая связана с гуманизацией современного образования, сменой стиля профессионального архитектурного мышления и новейших тенденций подготовки будущих архитекторов в высшей школе.

Обобщая новейшие разработки теоретических и методических основ формирования профессиональных знаний, умений и навыков будущих архитекторов в высших учебных заведениях, было выявлено влияние сформированности композиционного мышления студентов на их композиционную деятельность и профессионально ориентированную изобразительную подготовку.

В процессе теоретического анализа методической литературы была разработана система упражнений по изучению общих законов композиции как эффективного способа овладения знаниями, умениями и навыками композиционной деятельности. В

теоретической и методической литературе наиболее важным и спорным есть вопрос о законах композиции, их сущности и месте в художественном и архитектурном образовании. Мы считаем логичным рассмотрение этого вопроса в трудах выдающегося педагога-ученого Ф.В. Ковалева, который определил сущность общих законов композиции принципами формообразования (закон целостности, закон пропорций, закон симметрии, закон ритма, закон выделения главного в целом).

Впервые в методике обучения композиции научно обосновано доминирующее изучение сугубо композиционных категорий независимо от жанра, темы и стилистического направления. Разработаны дидактическая модель и методика формирования композиционного мышления у студентов выпускного курса архитектурной специальности.

В статье проанализированы результаты констатирующего и формирующего экспериментов на примере изучения студентами-архитекторами общих законов композиции. По результатам констатирующего эксперимента определены критерии и уровни сформированности композиционного мышления у студентов выпускного курса архитектурной специальности. На основе формирующего эксперимента были разработаны педагогические условия и методика усвоения теоретических и практических основ композиции с использованием эвристических методов обучения.

Ключевые слова: высшие учебные заведения, архитектурное образование, будущие архитекторы, педагогические условия, экспериментальная методика, подготовка, композиционное мышление, общие законы композиции, дидактическая модель, эвристические методы обучения.