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Methods of strengthening the scientific component of the educational process in the training of architects at the Satbayev University

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Abstract. The article is devoted to the peculiarities of architectural education of the 21st century in Kazakhstan. A number of proposals are being made to reform the system of training architectural personnel in the higher school of the republic, including strengthening the scientific component of the educational process. The article highlights the experience of teaching undergraduate, graduate and doctoral students at Satbayev University by preparing their coursework for the disciplines «Principles of Sustainable Architecture», «Energy Efficiency in urban planning», «Urban Planning analysis», «Social Foundations of Architecture». The purpose of these works is to acquire practical research skills for students based on a comprehensive assessment of individual sections of the built environment of Almaty. The methodology of student research carried out under the guidance of the author of this paper is based on an expert assessment of the territory through its in-situ survey, analysis of design materials and statistical data, as well as on a social assessment of the territory based on the results of a sociological survey of residents of the site selected as the object of analysis. A comprehensive qualitative and quantitative assessment of the selected sites according to the criteria of the quality of the living environment of the population also allows us to formulate specific recommendations for designers who carry out a pre-project analysis of the city territory in the process of preparing draft master plans and detailed planning projects.

Keywords: *urban environment, comprehensive assessment of the territory, expert assessment, social assessment, questionnaire survey.*

1. Introduction

The challenges of the 21st century – the deterioration of the environmental situation at the global level, social explosions, the struggle of states for dominance in the political arena, the imbalance in the economic development of the countries of the so-called «North» and «South», along the rapid development of scientific and technological progress in all spheres of modern society, dictate increased requirements for the training of specialists in higher education.

Architectural education occupies a special place in this regard, since it is designed to train specialists who form the built environment in cities and rural settlements for the vast masses of the population, considering both functional and technical, environmental and aesthetic requirements. A modern architect, urban planner is obliged to consider a large number of factors affecting the quality and standard of living of the population when preparing projects for the planning of territories of various taxonomic levels, including schemes of regional settlement, master plans of urban agglomerations and cities, projects of detailed planning and development of residential, industrial and public complexes, recreational areas.

It is necessary to prepare students for the fact that for high-quality project development they will have to carry out a large amount of pre-project research, turning to modern methods of scientific analysis at the junction of related disciplines - ecology, economics, sociology, engineering, landscape studies, and a number of others, without replacing the competencies of specialists in different fields of knowledge, but being able to combine their efforts to solutions to various issues of spatial organization of social processes. It is quite obvious that for this it is necessary to learn how to speak with related specialists in their language, having basic knowledge and skills in the above disciplines.

It should be noted that such a strategy for training architects is not new, it began to form at the dawn of human civilization and was formulated by the Roman architect and scientist Mark Vitruvius Pollio in the I century BC – «Architecture is strength, benefit and beauty» [1]. In his work, he listed the qualification requirements for architects: «The science (my italics) of an architect is based on many branches of knowledge and on a variety of information with which you can judge everything done through other arts. This science is formed from practice and theory… He [the architect] must be a competent person, a skilled draughtsman, study geometry, know history comprehensively, listen attentively to philosophers, be familiar with music, have a concept of medicine, know the decisions of lawyers and have information in astronomy and celestial laws ... Therefore, if the architect's education is so extensive and so rich and abundant by many and with heterogeneous information, I do not think that anyone could suddenly declare himself an architect, except for someone who gradually ascended from one branch of education to another from a young age and, having absorbed the knowledge of many sciences and arts, reached the very heights of architecture» [2].

1.1. Modern problems of architectural education

It should be noted that the strategy of the versatility of architectural education and the ways to achieve it has not lost its relevance these days, moreover it also provides the key to reforming the theory and practice of training specialists in this field of modern society.

The author of this article has repeatedly spoken on this topic at conferences devoted to architectural education, published a number of articles in which, analyzing the advantages and disadvantages of the existing system of architectural education in the post-Soviet space and in Kazakhstan, among others. Author came to an unambiguous conclusion about the negative impact on it of the canons and templates of the Bologna Scheme [3, 4]. At the same time, as our analysis shows, it is not so much the system itself, which has been working more or less successfully in most countries of the world for a long time, but its institutional and organizational support in Kazakhstan (and in most CIS countries), which needs a deeper understanding, and not just in blind copying of the form of step-by-step training of specialists according to the bachelor's degree (3-4 years), master's degree (1-2 years), doctoral studies (3 years) scheme.

The main drawback of this scheme is in curricula developed according to state standards of higher education, in which the volume of special disciplines (for example, for an architectural specialty – architectural composition, architectural design, architectural structures and a number of others) has undergone significant reduction, moreover, a number of disciplines absolutely necessary for teaching an architectural specialty have been excluded from curricula altogether (history of art, history of architecture and urban planning, etc.). A large amount of a number of disciplines necessary for an architecture student has been transferred from the classroom load of teachers to the so-called IWS – «Independent Work of Students», which works extremely inefficiently, because it is simply ignored by students who do not have the skills to work with recommended literature, the culture of accessing library services, and relying only on resources the Internet. As a result, architects who graduate from the bachelor's degree, for the most part, are not ready to work in design firms as qualified specialists and often experience difficulties when applying for a job.

2. Materials and methods

Speaking about reforming the system of training specialists in the field of architectural and urban planning, it is necessary to return to teaching students within the framework of previous one-step system of training specialists with a duration of study from 5.5 to 6 years, along with the current three-stage system, as it was done in the Russian Federation and the Kyrgyz Republic. At the same time, it is quite obvious that both systems need significant adjustments in the conditions of modern realities of the market economy and the fourth industrial revolution.

Not being able to cover all aspects of work in this direction within the framework of the article, it is important to focus on the problems that need to be addressed as a matter of priority. First of all, «Architecture» should be removed from the category of technical specialties, which is now fixed by the Classifier of Higher Education Specialties approved by the Ministry of Science and Higher Education of the Republic of Kazakhstan. Firstly, this is essentially incorrect, since architecture has always belonged to art, along with painting, sculpture, music and other types of creativity. But in order to consider its engineering component (strength, benefit), it is necessary not to include architecture in the category of purely humanitarian specialties of art, but to give it an independent status of a special art, with the complex nature of the profession. This will solve many of the problems that higher school teachers face when training students at the undergraduate level, first of all by forming training programs adequate for the profession with the necessary set and scope of special disciplines. Secondly, this will allow us to return to the previously practiced ratio of the number of students per teacher in practical classes on architectural design, composition, drawing – no more than 8 people, necessary for students to acquire professional competencies in direct contact and dialogue with the teacher. And, finally, it will allow to exclude the practice of admission to master's and doctoral studies of applicants from other, mainly technically oriented professions, which creates unnecessary collisions associated with the inability of newly minted undergraduates and doctoral students to master the professional knowledge and skills necessary at their level in the fields of architecture and urban planning and, accordingly, significantly complicating their passage of courses of special disciplines as well as the preparation of qualifying dissertations.

An equally important aspect of the training of architects of the 21st century is the introduction of digital technologies into the educational process, without setting aside the formation of skills of manual architectural graphics, layout design, which are absolutely necessary for an architect in his work, just like a musician – skills of playing classical musical instruments, and a sculptor – skills of working with clay, granite and marble.

We also consider it necessary to emphasize the importance of increasing the scientific component of the education of architects and urban planners, which was already mentioned at the beginning of the article. The Department of Architecture at Satbayev University has quite a lot of groundwork in this direction. In particular, for more than 5 years, the author has been conducting practical classes for undergraduate, graduate and doctoral students in the disciplines «Principles of Sustainable Architecture», «Energy Efficiency in architecture and urban planning», «Social foundations of architecture» related to the preparation of term papers based on a comprehensive expert and social assessment of the territory of specific sites in Almaty, with a field survey the selected site, a questionnaire survey of its residents [5, 6].

A comprehensive assessment of the territory in urban planning has long been an integral part of pre-project analysis as a database for decision-making in the process of creating master plans of cities, projects of district planning of urban agglomerations and schemes of regional settlement. However, such an assessment is much less often carried out differentially for individual sections of the urban environment in order to obtain information about them according to the criteria of the quality of the living environment of the population living within the boundaries of these sections. At the same time, it is necessary for many reasons, for example, to establish the correctness or inaccuracy of the decisions laid down in the current general plans, or for the purposes of restoration and reconstruction of the housing stock, the system of cultural and consumer services, engineering networks, decision-making on the renewal and modernization of the

street and road network, and other purposes. In addition, the assessment of individual sections of the urban environment is necessary to monitor the implementation of sustainable urban development programs and compare the real situation with project forecasts. The completion of coursework by students in a number of disciplines included in the curricula of bachelors, undergraduates and doctoral students, and which are a response to current problems of sustainable development in the fields of architecture and urban planning, is not only a significant addition to the theoretical development of the material, but also a good motivation for introducing students to the methods of scientific analysis, developing skills to collect the necessary data on real objects of the urban environment.

Students are offered a choice to explore urban neighborhoods of Almaty mainly by place of residence and evaluate them according to the criteria of the quality of the living environment of the population. The complexity of the assessment is laid down not only by the introduction of several, the most important criteria, such as the quality of housing, landscaping and landscaping of the territory, the effectiveness of the system of cultural and consumer services, transport infrastructure, aesthetics of buildings, and others, but also by conducting a social assessment of the territory. The social assessment is based on a questionnaire survey of residents of the site selected for analysis. At the same time, students master the technique of sociological research, going through all the necessary stages of organizing a survey of the population – from compiling a questionnaire, to distributing it and processing the results, which serve as the basis for a social assessment of the territory, that is, its assessment by the residents themselves.

3. Results and discussion

One of the objects of student research were, for example, the Ainabulak 3, 4 micro districts in Almaty, built up with typical panel houses in the early 90s of the last centuries. Their location on the periphery in the northern tip of the city, along with other factors of an objective and subjective nature, led to the gradual degradation of elements of residential development, landscaping and infrastructure facilities. And although the nomenclature of cultural and consumer services facilities has been significantly expanded in recent market conditions, in general, the site requires reconstructive measures based on scientifically sound recommendations. Therefore, the work carried out is relevant and has practical significance (Figure 1).

Necessary element of the analysis was the justification of the evaluation criteria on a 5-point evaluation scale, which made it possible to structure and objectify the results of the expert and social assessment of the site by individual sectors and by the site as a whole. Thus, an expert assessment of the cultural and consumer services system (CCS) within the boundaries of the site showed the relative provision of micro districts with everyday service facilities, mainly grocery stores, catering enterprises, beauty salons and pharmacies, and was evaluated by the student with 5 points (Figure 2).

At the same time, a full-scale survey of the site according to the level of landscaping, the condition of the appearance of buildings (both residential and public), the provision of parking lots for individual transport, places for collecting and disposing of household garbage, showed that these neighborhoods suffer from the same disadvantages characteristic of the old neighborhoods of Almaty, and require adoption constructive solutions to eliminate them on the part of management structures at the city level. The expert assessment of the site in the course work had a significant addition to the social assessment of the analyzed territory, that is, by the residents themselves during the questionnaire survey.

Figure 1. Placement of Ainabulak 3,4 micro districts in the structure of Almaty

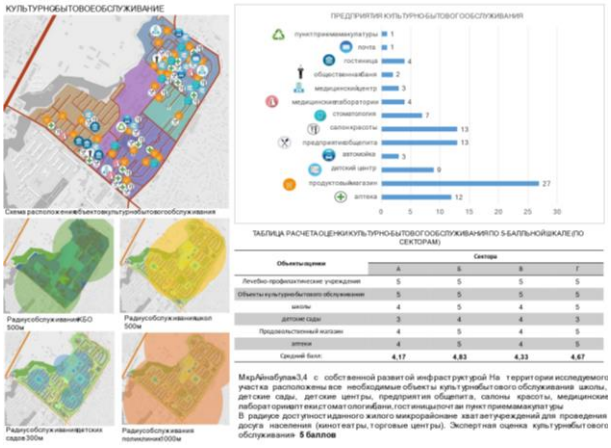

Figure 2. Expert assessment of the site according to the criteria of the development of the CCS system

The analysis showed that the questionnaire survey of the population as a whole correlates with the expert assessment. Thus, according to the results of the assessment of the landscaping, residents of all four sectors allocated on the site are not satisfied with the availability of parking spaces for personal vehicles. The minimum satisfaction rate was 7.7% for

residents living in Sector B. Residents are also not satisfied with the arrangement of footpaths, although in various sectors of the site, satisfaction with this indicator ranges from 14.3% of the total number of surveyed residents in sector D to 61.5% in sector B. More than 95% of the surveyed residents of the site are satisfied with the arrangement of playgrounds and sports grounds. More than 60% of respondents in all sectors are satisfied with landscaping, the presence of garbage cans, and night street lighting (Figure 3).

Figure 3. Social assessment of the Ainabulak 3, 4 micro districts according to the criteria of the effectiveness of the CCS system and landscaping

Course work in the same discipline is naturally subject to increased requirements for doctoral students, which they cope with quite successfully, especially if they have previously been trained in the framework of the master's degree of our educational institution. For example, this applies to the justification of the criteria for the expert assessment of the site (in this case, the doctoral student himself acts as an expert), which requires familiarization with regulatory documents with mandatory reference to them.

4. Conclusions

Thus, it is obvious that architectural education in Kazakhstan requires significant reform, including in terms of increasing the scientific component of the educational process. One of the effective ways to do this is to introduce tasks related to elements of scientific pre-project analysis in real areas of the urban environment into the curricula. Course projects on real urban planning topics significantly increase the motivation of learning, introduce students to research methods and give them the practical skills necessary to work in production. The author hopes that the results of his educational experiment will also find a response among professional architects working in the field of urban planning, who can use the methodology of integrated urban planning analysis based on expert and social assessment of the territory when creating projects for detailed planning and development of individual districts and sections of a large city.

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Сәтбаев университетінде сәулетшілерді даярлау кезінде білім беру процесінің ғылыми құрамдас бөлігін күшейту әдістері

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Аңдатпа. Мақала 21 ғасырдағы Қазақстандағы сәулет білімінің ерекшеліктеріне арналған. Республиканың жоғары мектебінде сәулет кадрларын даярлау жүйесін реформалау, оның ішінде - білім беру процесінің ғылыми құрамдас бөлігін күшейту жөнінде бірқатар ұсыныстар енгізілуде. Satbayev University-де бакалавриат, магистратура және докторантура студенттерін «тұрақты сәулет қағидаттары», «қала құрылысындағы энергия тиімділігі», «қала құрылысын талдау», «сәулет өнерінің әлеуметтік негіздері» пәндері бойынша курстық жұмыстарды орындау процесінде даярлау тәжірибесі жарияланады. Бұл жұмыстардың мақсаты - студенттердің әрі қарай кәсіби қызметінде қажетті Алматы қалалық ортасының жекелеген учаскелерін кешенді бағалау негізінде зерттеу жұмысының практикалық дағдыларын игеру. Осы жарияланым авторының басшылығымен орындалатын студенттік зерттеулердің әдістемесі аумақты заттай зерттеу, жобалау материалдары мен статистикалық деректерді талдау жолымен сараптамалық бағалауға, сондай-ақ талдау объектісі ретінде таңдалған учаске тұрғындарының әлеуметтік сауалнамасының нәтижелері бойынша аумақты әлеуметтік бағалауға негізделеді. Халықтың тіршілік ету ортасының сапа критерийлері бойынша таңдалған учаскелерді кешенді сапалық және сандық бағалау сонымен қатар бас жоспарлар мен егжей-тегжейлі жоспарлау жобаларын дайындау процесінде қала аумағын жобалау алдындағы талдауды жүзеге асыратын жобалаушылар үшін нақты ұсыныстарды тұжырымдауға мүмкіндік береді.

Негізгі сөздер: *қалалық орта, аумақты кешенді бағалау, сараптамалық бағалау, әлеуметтік бағалау, сауалнама.*

Методы усиления научной составляющей образовательного процесса при подготовке архитекторов в Satbayev University

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Аннотация. Статья посвящена особенностям архитектурного образования 21 века в Казахстане. Выдвигается ряд предложений по реформированию системы подготовки архитектурных кадров в высшей школе республики, в том числе по усилению научной составляющей образовательного процесса. В статье освещается опыт обучения студентов бакалавриата, магистратуры и докторантуры в Satbayev University путем подготовки ими курсовых работ по дисциплинам «Принципы устойчивой архитектуры», «Энергоэффективность в градостроительстве», «Градостроительный анализ», «Социальные основы архитектуры». Целью этих работ является приобретение студентами практических исследовательских навыков на основе комплексной оценки отдельных участков городской среды Алматы. Методология студенческих исследований, проведенных под руководством автора данной статьи, основана на экспертной оценке территории путем ее натурного обследования, анализе проектных материалов и статистических данных, а также на социальной оценке территории, основанной на результатах социологического опроса жителей участка, выбранного в качестве объекта анализа. Комплексная качественная и количественная оценка выбранных объектов по критериям качества среды обитания населения также позволяет сформулировать конкретные рекомендации для проектировщиков, которые проводят предпроектный анализ территории города в процессе подготовки проектов генеральных планов и проектов детальной планировки.

Ключевые слова: *городская среда, комплексная оценка территории, экспертная оценка, социальная оценка, анкетный опрос*.

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