Master’s theses in architecture conducted at KSUAE: experience and prospects

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Abstract. Kazan State University of Architecture and Engineering (KSUAE) – one of leading institutions in Russia – prepares masters in architecture since 2014. Pedagogical reflection on experience of 12 professors and associate professors in supervision of master’s theses based on PhD approach, bachelor’s design-studio and participation in international competitions matched with the analysis of resulting student publications undertaken in this article allowed to illustrate and discuss by the example of KSUAE further paths of Russian architectural master’s study in general.

Keywords: architectural pedagogy, master’s study, student research, publications

1 Introduction

In 2020, Kazan State University of Architecture and Engineering (KSUAE) celebrates its 90th anniversary. Since more than 50 years it successfully educates architects employed on local, national and international job market. The PhD program in architecture is opened since at least 30 years and on average one person a year defends his PhD, while no more than 3 people a year enter the program. The first graduation of Masters in Architecture took place in 2014 and the total number of alumni from 2014 to 2019 is 47 graduates, the number of enrollees increased from 8 in 2012 to 24 in 2019. Along with the growing admission the study load on professors rises and thus the challenge to conveyor-belt approach to teaching appears. State of affairs is about the same in most other Russian architectural higher educational institutions (HEI) where the history of master’s program numbers no more than a decade, except singular of them were it appeared in late 1990-s.

Recognition of master’s study by students gives reason to treat master's study as a main research-based education for the most of its alumni and motivates professional discussions about universal pedagogical approach to master’s program. For instance first two issues in 2020, and several previous issues of one of the leading and oldest architectural magazines in the country – “Architecture and Construction of Russia” were fully dedicated to professional discussion of architectural education, including several publications about the master's pedagogy, that continued previous singular Russian articles upon the topic in other editions [1-3].

Concern of the State for the problem is reflected in Federal state learning standards that in the recent years are used to be updated annually towards giving more freedom of HEIs to choose specific pedagogic direction in attempting to accelerate the transition to the Bologna system. This requires additional considerable time for teachers to update documentation regularly, which is not always clear even for teachers [4] and is not always associated with the improvement of quality of educational process. Characteristically, the transition to the Bologna system does not affect by itself the training quality improvement not only in Russia [5,6], and the international mobility that was declared by the
Bologna system requires regular additional organizational measures even in the European universities themselves [7].

Most obvious way for the architectural master's program at KSUAE was to adapt time-tested PhD pedagogy, saving as more as possible of the qualities and demands to custom-made PhD dissertations to more numerous master’s theses. As far as Russian PhD in architecture may have 2 scientific directions – fundamental “Theory and history of architecture, restoration and reconstruction of historic-architectural heritage” or applied “Architecture of buildings and constructions. Creative concepts of architectural practice”, master’s theses may also be set up in two corresponding ways.

Scientific basis for master’s theses sustains the global trend of education through research, which requires the search for educative legal and methodological basis as well as effective strategies for research based design [8-13] or research process [14-19]. Scientific component in higher education is especially important for creative majors in Russian universities [20]. On the other hand scientific-based approach to master’s theses may give demanded applied output [21].

Alternative approach is speculative and futuristic exploration of new horizons of architecture, based mostly on creativity than on research, repeating for instance the experience of London Architectural Association experience [22, 23] or on the earlier master's program by Mies van der Rohe [24].

The goal of this paper is to analyze these approaches and to reveal common pedagogical experience in order to contribute to professional discussion about the future of architectural education in Russia.

2 Materials and methods
This research is empirical and qualitative case study based on textual analysis, open-ended interviewing and pedagogical reflection.

Main materials of this paper was a summarized personal educational experience of 12 professors and associate-professors of the Department of theory and practice of architecture at KSUAE (Galina Aidarova, Guzel Valeyeva-Suleimanova, Marina Zabruskova, Svetlana Korotkova, Inessa Fakhrutdinova, Ivan Krasnobaev, Elena Denisenko, Natalya Kinosyan, Stepan Novikov, Il'nar Akhtyamov, Rezeda Akhtyamova and Rinat Hafizov) concerning supervision of 24 dissertations defended with “excellent” evaluation at KSUAE in 2014-2019. Dissertations were illustrated by 21 russian-language articles written upon the results of these dissertations and published in peer-reviewed and open-access Russian-language journal listed in the Russian science citation index.

3 Results

3.1 Common issues of teaching masters in architecture at KSUAE
Enrollees to master’s program are totally different from yesterday’s schoolchildren entering to baccalaureate. Furthermore they are elder, most of future masters are ambitious, already have professional experience and good English, continue architectural practice during the study, pay tuition by themselves, appreciate their time and know what they want to get from the program.

The master’s program is supposed to be mainly an upgrade in theory and research for bachelors of architecture, but it is also opened for graduates from related majors - object or interior design, civil engineering etc. Main condition for their successful study is the correct choice of the topic, that connects their area of expertise with architectural perspectives.

The first criterion for admission is professional writing skills, that are verified by written research proposal of 500-1000 words a length, where the entrant through justifications of the topic should show ability to use terms and citations, logic in development and motivation of ideas, good outlook, resulting mainly from number of read books. During the study the main attention at the professional disciplines will be focused on the further development of these skills. Students will be supposed to read at least one professional, preferably foreign, book a week, through writing conference abstracts and scientific articles a final text of the dissertation will be compiled of 15 000-30 000 words on average. Both with writing a regular public speaking on the current results of the dissertation will be scheduled including group discussion with consultants, before a panel of professors of the department
once a semester and before an external reviewer before the defense. Peer reviewing, peer learning [14] and peer feedback [15] between students are welcome too. Communicative skills will be evaluated during the defense, where the report and answering questions is maybe the main assessment criterion - for good talk the bad graphics can be excused.

The second and less criterion for admission is hand graphic skills, ability of rapid drawn visualization of design and verbal ideas. Entrants are supposed to illustrate their research proposal by schemas, diagrams, sketches and drawings with necessary captions and comments composed on the A1 sheet of paper. This skill is familiar to architects, it is easy in visual evaluation and allows to rate entrants, but doesn’t give reasons for disqualification of non-architects. During the study students will accumulate and adapt appropriate examples of infographics to the needs of own research, design technical drawings and renderings by necessity to produce finally to public defense of the thesis 10-15 square meters of illustrations exquisitely composed on boards. This traditional to Russian architectural HEIs labor-intensive element finalizing the study program also allows in terms of the restricted time for defense (15 minutes for report and up to 45 minutes for questions and reviews) to conclude rapidly about the quality of research and level of received competences.

Final exposition is supposed to be done in any available graphic software. CAD and BIM technologies are not required and design ideas can be transferred with hand renderings, collages and abstract models. Variety and credibility of data systematization, richness of forms of its presentation, relationship of pre-design research with design concept, systematic and variable character of the proposals ensuring wide applicability of the solutions are more reviewed than graphic and compositional expressiveness or engineering literacy of technical drawings, that are subject for training during the baccalaureate and in master's thesis can be bypassed.

The only new software proficiency to develop during the master's study is making video. At the second year students are supposed to create and dub a short clip upon their thesis using self recordings, compilation of fragments from open video resources, multiplication and any other available forms of presentation. Experience of filmmaking helps future masters to promote their research, to contribute to the quality of final presentation and to enrich portfolio, that is the most demanded result of any architectural study.

Master in architecture is ready to manage his own studio, to produce competitive creative concepts [25], which is also confirmed by the employment of KSUAE graduates.

Common issues determine master’s pedagogy most of all at the beginning – during the entrance exams and at the final public defense. Individual character of the master’s thesis, specific process of its development depends mainly on its topic. That will be the subject for further study.

3.2 Review of theses concerning the direction “Theory and history of architecture, restoration and reconstruction of historic-architectural heritage”

The dissertation of Ksenia Olifir “Ornamental decor in modern architecture of Kazan: history and development” (supervised by Guzel Valeev-Suleimanova) was based on the concept of architectural regionalism of Saiyar Aidarov and doctoral thesis of the supervisor, concerning national decorative and applied arts of Tatars. In addition to theoretical survey, provocation schemes for the reconstruction of contemporary Kazan buildings using decorative elements were proposed (figure 1). This idea came at the end of the study during the collective discussion in order to animate the research, similar to PhD study.

In the dissertation of Nikolai Kharchenko “Environmental approach and adaptation of new projects to the architectural and historical environment (on the example of Kazan)” (supervised by Guzel Valeeva-Suleymanova) the theoretical works of foreign and Russian scientists devoted to the problems of forming the architectural environment of historical cities were analyzed, a critical analysis of the experience of building new projects in the historical center of Kazan was given. The principles and methods of contextualism, environmental adaptation methods of new projects to the architectural and historical environment of the developed space based on the style components of the architectural and historical heritage of Tatarstan (according to Saiyar Aidarov), aimed at reproducing local features were revealed [26].
Figure 1. Fragment of exposition of the master's thesis of Ksenia Olifir “Ornamental decor in modern architecture of Kazan: history and development”.
Similar tasks of architectural regionalism through the development of market buildings and mainly due to decoration were set in the dissertations of Tajik student Mehrubon Giyosov “Use of national elements in the modern architecture of Tajikistan” (supervised by Inessa Fakhrutdinova) and Kyrgyz student Hamid Abduganiev “Architecture of the Bishkek multifunctional shopping complex in the central-asian traditions” (supervised by Guzel Valeeva-Suleymanova). Adelina Zaynullina in her dissertation “The formation of traditional Tatar bazaar architecture in modern Kazan conditions” (supervised by Elena Denisenko), on the contrary, refused the decorative component of architecture and focused on the reconstruction and development on specific territory of the functional-spatial environment of traditional Tatar bazaar [27]. The rural issue, which is usually rarely chosen, even for bachelor's diplomas, was reflected in the dissertation by Irek Basyrov “The concept of rural settlement architecture modernization with the development of a trade and Fair center (on the example of Batyrevo village in the Chuvash Republic)” (supervised by Galina Aidarova). Batyrevo is a native village of Irek and he also took the market as an object of concentration of local traditions [28].

Oleg Volostnov turned to the tourist development of the soviet architectural heritage in the framework of routes and a specific museum building in his dissertation “Museum of soviet architecture in Kazan in the context of tourist destinations” [29]. Dissertation was supervised by Natalya Kinosyan, who defended her PhD on soviet architecture.

In Lilia Gizzyatova’s master's thesis “Strategy for the development of temporary public architecture in the urban space” (supervised by Ivan Krasnobaev) the researcher developed an approach to actualization of the historical environment through temporary architecture responsive to many social tasks [30]. During the study Lilia managed to design and realize several temporary buildings and after the study got into the governmental team of urban planners.

Temporary residential architecture can serve as a solution to the acute social problems of labor migrants and homeless, providing accommodation for tourists, volunteers and pilgrims, which is devoted to Margarita Ashirova's dissertation, “The architecture of quick response” (supervised by Galina Aidarova). It proposed a functional-constructive and compositional concept of the module, thought out options for its construction and blocking in the context of the urban environment with minimal damage to the surrounding architectural heritage [31].

Theses by Anna Aristova “Architectural adaptation industrial zones of industrial cities to modern conditions (on the example of Ulyanovsk)” (supervised by Ivan Krasnobaev) [32], Arthur Biktashev “Principles of modernization of the rail territories of large cities with the development of the model of the transport and logistics hub (Kazan-2)” (supervised by Ivan Krasnobaev) and Anastasia Kolomina “Principles of the formation of rail territories of large cities. The model of the greenhouse on the Kazan-2 railway section” [33] (supervised by Ivan Krasnobaev) demonstrate the adaptation of foreign concepts to the specific conditions of Russian cities searching for options to transform former industrial territories into public needs with varying degrees of presence of industrial functions.

3.3 Review of theses related to the direction “Architecture of buildings and constructions. Creative concepts of architectural practice”

The issues of conceptual modernization of well-known types of buildings, a combination of existing types and modeling of buildings and structures of a new purpose is the most understandable and close to bachelor's project form of a master's thesis. The first introductory stage for this type of theses is a chronological review of the selected typology, sometimes using data from related disciplines (for example, medicine for hospitals, sociology for housing or technology for industry). The main stage is a case study of modern design analogues, reveal of principles and techniques for solving design problems. The final stage is an indicative design project on a specific territory, mainly with a variety of solutions for the possibility of adaptation for other similar cases.

Thesis of Vyacheslav Savelyev “Health center in the structure of a multifunctional complex” (supervised by Rinat Hafizov), starts from the problem of unattractiveness and obsolescence of medical buildings. The researcher suggests combining outpatient functions with commercial buildings or including public functions in hospitals, preserving and including them in city structure [34].
Victoria Brundukova in her dissertation “General education center in the urban space structure” (supervised by Elena Denisenko), proposed to increase accessibility and motivation for education by introducing the infrastructure of educational modules in the city, united around a single inter-age educational center [35].

In Alsu Khusnutdinova’s dissertation, “Principles of developing roadside service infrastructure (on the example of Tatarstan Republic)” (supervised by Marina Zabruskova), it is proposed to streamline the functional planning organization and thereby improve the extremely unattractive appearance of gas station complexes, cafes, motels and other roadside facilities depending on the location, road status, and other parameters [36]. In Karina Khazeeva’s dissertation “Strategy for the development of infrastructure of public sanitary facilities in large cities (city of Kazan as an example)” (supervised by Marina Zabruskova), an equally important and socially significant topic of urban public toilets is dealt upon, a typology of their functional and compositional solutions is proposed with considering urban environment [37].

Elina Yusupova, in her dissertation “A multifunctional residential complex as a model of adapted housing for people with special needs” (supervised by Svetlana Korotkova), addresses the elderly citizens and people with disabilities her development of a rental residential building combined with medical care, the possibility of a personal front garden and other specialized options [38]. By the same analogy, Tatyana Moskalenko in the dissertation “Correction and developmental rehabilitation complex for children with limited health (that have mental underdevelopment)” (supervised by Svetlana Korotkova) developed and applied special architectural techniques in the project that take into account special needs of children with intellectual disabilities [39].

A fascinating and at the same time practice-oriented topic of circumpolar settlements architecture became the basis for Roman Romantsov’s dissertation “The concept of architectural and planning residential complexes organization for polar regions conditions” (supervised by Galina Aidarova and Ivan Krasnobaev), who developed a modular system of industrial and residential blocks for Antarctica [40] and for Ksenia Seletskaya’s research “Architectural and urban typology of scientific research projects in the Arctic” (supervised by Stepan Novikov) who proposed a comparable solution for the coast of north Arctic Ocean [41].

3.4 Review of theses related to forecasts and concepts of future architecture

Futuristic concepts of architecture, intuitive, compositional, heuristic approach from hypothesis to theory constitute the basis for the most creativity-intensive master theses and give most chances for winning in international architectural competitions, including the “Archiprix”. The risk of not gaining sufficient certainty for the master's thesis in analysis and proposal is compensated by the opportunity to create expressive architectural forms that require minimal substantiation.

The master theses of Elvira Sabirova “2116 city: the concept of a multifunctional cluster based on nanobiotechnologies” [42] and Anastasia Zhendarova “Principles and prospects for the bioarchitecture development” [43] (both supervised by Elena Denisenko) represent, as far as possible, practical and theoretical forecast models, developing PhD research of their supervisor. Louisa Karimova in the dissertation “Principles of formation of architectural space upon a water framework. The concept of a habitable bridge in the water area of Kazan city” (supervised by Elena Denisenko) thought out options for combining water resources with communicational and public-residential functions to create in future new development resources of a brand new quality in Kazan [44].

In Yanis Al-Nabulsi’s dissertation “Features of building materials progress in architecture” (supervised by Ivan Krasnobaev) the historical excursus of the relationship between architecture and building materials goes through the latest foreign studies to a fairly well-substantiated speculative concept of future building from liquid metal and other futuristic materials and located at the territory of new ambitious satellite city near Kazan – Innopolis (figure 2).

In the dissertation of Ilsiyar Gabdrakhmanova, based on several international competitions entries “The concept of adaptive architecture. Fundamental models and implementation schemes” (supervised by Ilnar Akhtyamov and Rezeda Akhtyamova) is shown that temporary architecture allows the
obsolete typology of buildings to adapt to the new needs of society, increasing social activity in degrading areas, preserving spatial resources and deal with urban sprawl [45].

Figure 2. Fragment of exposition of the master's thesis of Yanis Al-Nabulsi “Features of building materials progress in architecture”.
4 Discussion

Methodology of the master’s study is a challenge for Russian architectural education. Contradiction of the individual character of any research and necessity to formalize the process to translate common mandatory competences and receive comparable output for all alumni demands building a system as it was done for lower level of study - bachelor's program, that replaced and inherited methodology of so called specialist's program. Or as it exists in the US, where “master degrees in architecture have become a backbone not only for research and pedagogy but for design field as well” [46].

Since 6 years as master's program in architecture at KSUAЕ is ongoing some pedagogical principles were worked out. Common demands to entrance and graduation, combining PhD with design studies were described above. Review of theses allowed to reveal the following patterns and strategies, concerning the study process, that are advisory and voluntary in nature but give benchmarks to supervision.

Student new to Kazan are recommended to choose topics, related to architecture of their native city or village. In most cases this gives novelty in primary research materials (site analysis, interviewing with authorities and local inhabitants) and design ideas, that in small settlements can directly contribute to regional spatial development, following the practice of professor Vyacheslav Glazychev [47]. Students from regions with rich cultural history, in our experience most of them were Asians - may develop projects concerning regional stylistic identity, based on theoretic heritage of professor Saiyar Aidarov. All this also opens opportunity to good employment at homeland. Those who wish to relate their research with Kazan, that is quiet investigated in all aspects, are to be aware in details of local political and economic trends, recently related with increased attention to the quality of urban environment and public spaces. They should exit to city's authorities with questions and persistent proposals concerning the chosen topic. Otherwise master's thesis will stay only a study work and probably will not give substantial career promotion. Those who choose global architectural topics have more chances to international employment and thus may draw motivation for their dissertations from preambles of international competitions. Reconciliation of global ideas with local proposals gives double benefit.

During the study the title, goal, subject and object of research that determine its topic are the most variable (first in direction, then in wording) elements until the very end of the study. To withstand this uncertainty future masters are expected to have or to gain a high level of self-organization and professional reflection, so each one is required to keep a research diary. Topics are initially self-chosen by students but later are usually modified for many external and internal reasons, for example newly received unique information or vice-versa inaccessibility of expected research materials. Master’s thesis may continue the topic of bachelor's diploma project if the student is able to deepen or broaden the topic and mainly is not fatigue from it. Promising perspective may be preparatory course to master's study for graduate students in architecture, when they try themselves in writing an article upon their diploma projects.

Student may choose the supervisor simultaneously or even before the choice of the topic and follow the approach proposed by him. The best case is when the master's research continues the PhD or other research project of the supervisor. It rises scientific quality of the master's thesis, allows to expect to be published in editions of international level and to continue studies on PhD level. Another effective strategy is when the master's thesis becomes a theoretical, pre-design part of a complicated design project – commission of the supervisor - practicing architect. Participation of masters in collective research projects opens even more serious perspectives [21].

As far as the topic is determined study process is continued by the collecting of research materials - first of all Russian and foreign bibliography with full-texts of the publications. Another big part of research materials - database of architectural projects, mainly foreign, related to the field of the study. For some cases also on-site analysis may be required - photographs, measurements, interviews etc. Collecting materials often continues parallel to their processing and may take up to 3 from 4 semesters of study. Processing materials means alternating producing texts and illustrations, that will constitute the thesis itself, its synopsis, figures in the text and final exposition necessary for final defense. Analysis of bibliography in most cases form the first part of thesis - theoretical and historical
background. Analysis and classification of contemporary practical experience usually composes the second part of the thesis. The third and normally the last part of thesis is synthetic and consists of the description of the design proposal or alternative outputs - abstract or speculative models, design principles, forecasts etc. Contents of the thesis in some cases may be combined in 2 parts - theoretical and applied. Producing texts and graphics is recommended to carry out in several stages sprawled during the whole time of study, moving from draft to versions that are more and more close to fair copy. Work over the thesis is proposed to alternate with professional tasks not related with the thesis - participation in architectural competitions, visiting expos, critical reading or simply walking the city [13] to avoid the extremes of pragmatic narrow specialization [8].

5 Conclusions
This paper was a first attempt of reflection on pedagogy of master's theses in architecture at KSUAE. Other Russian schools, as shown in the recent publications stay at the same level of summary. Analysis of dissertations and experience of their supervision allowed to reveal established methodological principles of the master's program. Combination of PhD pedagogy with design studio and competitive conceptual design formed 3 corresponding approaches, that have much in common and may be combined to produce a wide range of topics with various ratios of theoretical and design issues, fundamental and applied output, depending on the personal interests, ambitions and opportunities of the student and the supervisor, the availability of research materials, the relevance and novelty of the topic. In the conditions of relative methodological freedom, multiplicity and adaptability of approaches each student can get a personalized educational experience and career promotion. On the other hand master's theses contribute to architectural practice and academic science and under certain conditions may even more improve their quality via collaborative projects and international publications.

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