DESIGN STUDIOS AS ACADEMIC TESTLAB FOR TECHNICAL INNOVATION AND FIT-FOR-REALITY TRAINING

ULRICH PONT, MSc., Ph.D., Assistant Professor, Department of Building Physics and Building Ecology, TU Wien, Vienna, Austria

SIGRUN SWOBODA, MSc., Assistant Professor, Research Unit of Digital Architecture and Planning, TU Wien, Vienna, Austria

ANDREAS JONAS, MSc., Assistant Professor, Research Unit of Digital Architecture and Planning, TU Wien, Vienna, Austria

ARDESHIR MAHDAVI, Univ. Prof. Dr., Full Professor, Department of Building Physics and Building Ecology, TU Wien, Vienna, Austria

Abstract: Design studio courses constitute a predominant part in most curricula of architectural schools. Regularly the major intention is to offer students a sandbox training environment for development of new ideas and exploration of architectural morphologies. However, often these courses do suggest building designs which might be of high degree of creativity, but do not necessarily reach the level of detail that would be required for technical realization of the buildings or obtaining building permits. That can be considered as a severe educational shortcoming, given that these skills are regularly expected by alumni of architectural schools in their first jobs and starting years of practice. Moreover, if this is not properly trained in university courses, many practitioners see graduates of architectural schools more as apprentices than as employees or colleagues, which also is represented in the little willingness to pay respectable wages. Another aspect is that traditional design studios often focus on one task in one scale that has to be conducted by a single student. This does not represent reality anymore, where projects larger than single family homes in between only seldomly are worked upon by single persons. The more common principle of today’s building planning is teamwork in design groups, which often have a strong interdisciplinary character. This might have to do with the transition of building planning and delivery of recent years: Increasing time- and cost-pressure and tightening requirements require other forms of architecture design production. The wish to integrate so called “integrative” design studios can be observed internationally in academic context, however, only few successful integration examples are reported about. The present contribution illustrates efforts conducted at TU Wien, Vienna, Austria, to bridge the gap between pure designing and technical implementation aspects. Thereby the didactic concept and principal scheduling of specific design studios aiming to bridge this gap is highlighted, as well as the deployed interdisciplinary collaboration within these courses.

Key words: design studios, building science, collaborative efforts, building permits, technical implementation.

1. Introduction

This contribution describes teaching endeavours conducted at the TU Wien, Vienna, Austria, which have been established in the past semesters to satisfy the need for integrative approaches in the landscape of design studios offered at the TU Wien. The concepts for these efforts – as presented in this contribution – were majorly born due to the fact that the authors observed a divergence between the requirements of the A-E-C (Architecture, engineering, construction) market (namely, the employment possibilities in architectural studio offices) and the established practice in design and construction education. While strongly focussing on design, most of the academic efforts in teaching design end far away from structures that can be afforded by clients, built by engineers, or approved by building authorities. Aspects of reality are often labelled as “enemies of expressive design freedom” in courses, which might offer participating students the freedom of designing in a way they want (or their instructor wants). However, the price for this freedom is offer an educational lack in sense for reality, rendering graduates in a situation,
where they – cumbersome and error-prone – have to re-learn basics during latter practice. Needless to say, the denial of aspects of reality can leads to severe economic problems for graduates, as the willingness to pay for utopia might be sparse in today’s architectural reality.

Different studies focussed on the current trends in architectural education and the “image” of architects in today’s job markets. Schürer and Gollner [1] published a study that portrays the reality of (young) architects of today in the german-speaking countries. Thereby, the found that the classical run of young architects carriers is in decline. As classical run they define a rather long studying time of about 20 semesters (10 years), accompanied by working experiences a undergraduate collaborate in one or several architecture offices, after graduation employment in an office, taking on increasing amounts of responsibility up to “project architect” and sooner or later the taking of the so-called state-exam or Ziviltechnikerprüfung (a state-controlled qualification exam, which enables architects to be in charge of projects and to found their own office). Instead of this classical run, they found that students of architecture do not any longer have time to work extensively aside their studies and that getting an employment situation after graduation has become rather difficult (rather, architects set up project-based employment contracts). Moreover, due to the fact that a three year employment is required to be qualified for this state-exam, the numbers of university graduates eligible to become full-fledged architects is in decline. As a result, graduates are forced to exploit other possibilities of income, such as drafting or architectural model construction services, web-design, or even working in fields far away from their education. In a press article dealing with the scope of young architects [2], it was mentioned that the focus on design only is not a historically determined aspect, as architects from around 1900 – for instance Otto Wagner – did not work solely as designer, but also encompassed other activities in their scope (Wagner, by the way, was a real-estate-developer as well, as he bought sites, planned- and erected buildings, and sold the finished products to interested costumers). In the same article the role of the architect as leading coordinator of the building and planning process was put in doubt, rather the developer was seen as lead with the architect as one of many stakeholders in the overall delivery process. Moreover the article strongly emphasis the necessity of a parallelism in architectural education: While in-depth knowledge of classical fields such as building construction is still of immanent importance, skills for interdisciplinary work, such as command of the terminology of consultants, communication skills, and teamwork are important components of today’s worklife of architects. Forlati et al. [3] conducted a study about the compatibility between the architecture profession and having a family, and state that – while the general question of compatibility between job and family life is there in close to any branch of economy – the architecture profession provides rather difficult circumstances for being compatible with a “rest of life”. Thereby, the lack of preparation for the later professional life during the education is mentioned as possible further hampering point.

While the mentioned studies pertain to the Austrian (or german-speaking) context, other international studies show similar issues: Farahat [4], for instance, argues that in the Middle East, several problems in undergraduate architectural education can be found, which he tries to categorize in four different groups: (i) Viewing architecture (solely) as art, (ii) The lack of knowledge and the failure to deal with the realities of professional practice, (iii) The lack of research on education and practice of architecture, (iv) the gaps between research (knowledge) and design and education in practice; For architecture education he suggests a set of goals and criteria that should be addressed by the education, which are illustrated in table 1, and are partly based on UNESCO recommendations.

Manav and Ertürk [5] claim that still a paradigm is used in curricular design for architects and interior designer, which they call academic Taylorism, and in their opinion is a cause for being far away from interdisciplinary and collaborative efforts in architecture education. In principle they criticise the split of curricular in many small units, where both teachers and students might focus on the maximum possibly outcome of the specific course, but might forget about the overall programs’ objectives.
Table 1

Education objects and criteria for architectural education, as suggested by Farahat [4]

<table>
<thead>
<tr>
<th>Education objectives</th>
<th>Criteria of architectural education</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. An ability to create architectural designs that satisfy both aesthetic and technical requirements.</td>
<td>1. Educational establishments are advised to create systems for self-evaluation and peer-review conducted at regular intervals, including in the review panel, teachers from other schools and practicing architects.</td>
</tr>
<tr>
<td>2. An adequate knowledge of the history and theories of architecture and the related arts, technologies and human science.</td>
<td>2. Each teaching institution must adjust the number of students according to its teaching capacity. Criteria for the selection of students shall be in relation to the aptitudes required for a successful training in architecture and will be applied by means of an appropriate selection process, organized by the schools at the point of entry in the program.</td>
</tr>
<tr>
<td>3. An adequate knowledge of the fine arts as an influence on the quality of architectural design.</td>
<td>3. Modern personalized computer technology and the development of specialized software make it imperative to teach the use of computers in all aspects of architectural education. Adequate laboratories, facilities for research, advanced studies information and data exchanges for new technologies should be provided at schools of architecture.</td>
</tr>
<tr>
<td>4. An understanding of the relationship between people and buildings, and between buildings and their environment and of the need to relate buildings and the spaces between them to human needs and scale.</td>
<td>4. The creation of a network, on a world-wide basis, for the exchange for information, teachers and senior students, is necessary in order to promote a common understanding and to raise the level of architectural education.</td>
</tr>
<tr>
<td>5. An understanding of the profession of architecture and the role of the architect in society, in particular in preparing briefs that take account of social factors.</td>
<td>5. Continuous interaction between practice and teaching of architecture must be encouraged and protected.</td>
</tr>
<tr>
<td>6. An understanding of the methods of investigation and preparation of the brief for a design project.</td>
<td>6. Research should be regarded as an inherent activity of architectural teachers. This architectural research must be founded on project work, construction methods, as well as academic disciplines Specific review panels are to be created to evaluate architectural research and architects must be included in the general evaluation research commissions.</td>
</tr>
<tr>
<td>7. An understanding of the structural design constructional and engineering problems associated with building design.</td>
<td>7. Individual project work with direct teacher student dialogue must form a substantial part of the learning period and must occupy half of the curriculum.</td>
</tr>
<tr>
<td>8. An adequate knowledge of physical problems and technologies and of the function of buildings so as to provide them with internal conditions of comfort and protection against the climate.</td>
<td>Andresson and Andresson [6] see a lack of interdisciplinary skill development in architecture and engineering programs, but proclaim that an integration of interdisciplinarity regularly could happen in existing curricular structure, given a certain willingness to follow these paradigms.</td>
</tr>
<tr>
<td>9. The necessary design skills to meet the buildings users' requirements within the constraints imposed by cost factors and building regulations.</td>
<td></td>
</tr>
<tr>
<td>10. An adequate knowledge of the industries, organizations, regulations and procedures involved in translating design concepts into buildings and integrating plans into overall planning.</td>
<td></td>
</tr>
</tbody>
</table>
Gregory et al. [7] quote Ove Arup who has written “Integration and collaboration have been preached ad nauseum” (which impressively illustrates that obviously the discussion is not a very new one) and state that in their opinion the time for integrative efforts in architectural curricula was never a better one due to the emerge of new technologies for collaboration such as BIM and the connected need to integrate these technologies also into educational programs. Ryńska [8] points out the necessity of interdisciplinary training with the education curricula for architects and engineers, and presents an example of such collaboration.

In the following sections we present recent teaching efforts, which in our opinion, illustrate the great potential of knowledge-based, interdisciplinary, and technically-focused design studios, for an improved education of architects (and to a certain extent also engineers).

2. Conception of interdisciplinary and knowledge-focused design studio outlines

This section describes two concepts of design studios that strongly focus on interdisciplinary collaboration, multicriterial development of designs and aspects of practicability / realisability of the designs. Both of the concepts bear some common aspects; however, the focus of the two concepts is different. Both concepts have led to a continuous offer of design studios, one concept was envisioned for the summer term, the other one for the winter term. In the following elaboration the major aspects of both concepts are illustrated:

2.1. Concept A – offered in Summerterm

Since Summerterm 2014 we offer a design studio, which is organized by an interdisciplinary team of instructors (design architects, CAD/BIM/digital architects, structural engineering experts, and building physics experts). Thereby, students work in teams of two (or three in case of large projects), and are asked to fulfil a specific, building planning task, such as rooftop extension, extension and retrofit of an existing house, or planning a new multi-storey building under conservation of an historic façade. The topic is changing each year, and the design studio is named after the major planning task and the district of the city of Vienna the site is situated in (The design studios had names and topics as follows: rising*8 – rooftop extension in summerterm 2014, remodelling*13 – retrofit and extension of a house from the 1930ies in summerterm 2015, re-filling*7 – Building on a site of a demolished house in summerterm 2016, raising*14 – rooftop extension of a house from 1900 in summerterm 2017, restoring*8 – multistory building with existing façade conservation in summerterm 2018, and – ongoing – regaining*5 – filling of a gap site in a Gründerzeit building row in Vienna with residential usage for temporary residence). The goal of Concept A design studios is to arrive at a translation of a proposed design into a fully-planned building, which can be realized and which can be approved by the building magistrate officials as complying with actual laws and standards. Thereby, students visit the magistrate officials twice or three times per semester to perform a consultancy talk with a magistrate official, such as it would happen in real project development. Posters that advertised these design studios are illustrated in Figure 1.

The workflow of these design studios is as follows:

Phase 1 – Teambuilding, research, and client wish definition: In this phase the teams of 2 respectively 3 persons are formed, and each student is assigned a specific research topic of a case-relevant issue. These topics can span a wide range of topics relevant for the specific site, such as analysis of the existing building or the surroundings, noise pollution around the site, building regulations pertaining to the specific site, specific construction principles, or innovative design concepts, such as integration of building greenery. Students are asked to investigate in their topic and to generate and deliver an easy-to-understand summary of their major findings, so that fellow students can benefit from these findings, without having to go through the same time-consuming investigation process. A further process in this Phase 1 is that each team has to set up a requirement list of “client wishes”, which than is used as task description for another group. This means that each group receives a very specific requirement document that illustrates the de-
sires of virtual clients and thus emulates the reality. Regularly, the Phase 1 does last for one or maximum two weeks at the beginning of the semester.

**Phase 2 – Concept phase:** In the concept phase, students have to develop basic concepts of how their design will look like, how they integrate their clients’ wishes. Moreover, principle decisions such as the main construction method should be decided over. Students thereby can use the different instructor as consultants. The concept is presented to the instructors after some weeks, right before students are asked to visit the magistrate officials to check in compliance with building codes.

**Phase 3 – Design phase:** Subsequently, the building design is furtherly developed. Thereby, the overall design should be elaborated, all design decisions and basic detailing is developed. In a parallel and iterative ping-pong process the requirements regarding structural engineering and building physics performance are worked upon. The design phase concludes with a presentation and a check-up meeting with the magistrate officials to approve the code compliance.

**Phase 4 – Finalization phase:** In this phase, the student teams furtherly finish their design, by following a specific list of requirements. These requirements include a set of building physics- and structural engineering related proofs, as well as a full set of building plans in scale 1:100. Moreover, students need to develop the major construction joint details in scales 1:20 to 1:5. The design studio concludes with a final presentation.
In parallel to the four phases, students are asked to fill in a time-and-effort documentation. This was used in past to learn about the time- and effort distribution in typical tasks of the architectural domain (and in design studios). We already published an in-depth analysis about these effort and effectiveness considerations [9]. Moreover, depending on the specific topic, excursions to companies which provide useful information on specific construction aspects have been offered in past Concept A design studios. These encompassed, amongst others, a company that produces gypsum board systems and a company that is specialized on prefabricated concrete elements.

To fulfil tasks of the design studios, the participating students are equipped with licences for software instruments for basic building physics assessment [10] and structural engineering evaluation [11,12].

Figure 2 illustrates the principal workflow of a concept A design studio.

### 2.2. Concept B – offered in Winterterm

The concept B design studio addresses technology innovation during developing a design. This type of design is a collaborative effort between the master programme Building Science and Technology (focusing on architectural engineering) and the master programme Architecture (focusing on design). Thereby, two graduate students of architecture collaborate with one graduate student of Building Science and Technology. Although the focus points of each team member is pre-defined by the educational background (architecture students: architectural design, plans, detailing, visualizations; building science students: building performance evaluation, compliance checking, technical realization and aspects), students are expected to work as one design team, not a number of individuals on the same project. The Master of Building Science students come from 3rd Semester of the corresponding Master Programme and thus are equipped with background knowledge and tool command in the domains numeric building simulation, normative procedures for building performance evaluation, and important aspects of thermos-dynamics, mechanics, acoustics, and lighting.

This type of design studio was offered for the first time in Winterterm 2017/2018 and was continued in the Winterterm 2018/2019. In Winterterm 2017/2018, the comprehensive retrofit and façade improvement of a rationalist building from the 1950ies, which is situated in a very prominent location in the middle of Vienna, was set as design studio objective. Some aspects about this design studio have been published in two recent contribution [13, 14] The Winterterm 2018/2019 focussed on the building update and façade renovations of inter-war-period buildings.

---

**Fig. 2. Principal time table of a summerterm design studio following concept A**

<table>
<thead>
<tr>
<th>March</th>
<th>April</th>
<th>May</th>
<th>June</th>
<th>July</th>
</tr>
</thead>
<tbody>
<tr>
<td>Teambuilding, research, and client definition</td>
<td>Research Delivery</td>
<td>Concept phase</td>
<td>Concept presentation</td>
<td>Visit of Magistrate</td>
</tr>
</tbody>
</table>

Summertime (March – June)
Along a heavy traffic road in Vienna. The outcomes of this design studio will be published in a upcoming book of abstracts [15] Figure 3 highlights the announcement poster for Winterterm 2018/2019.

Generally speaking, this type of design studio is – as well – splitted in phases: In principle the students have one semester (4 months plus two weeks to one month finalization time) time period for developing solutions for the specific design task. The four phases in this type of course are Intro-Phase, Draft/Design Phase, Evaluation/Execution Phase, and Realization phase. The Intro-Phase includes Teambuilding, establishment of a Knowledge-base, a set of Impulse lectures, and the generation of first conceptual drafts. In the Draft/Design-Phase these concepts are furtherly elaborated to architectural design studies. Aspects that have to be considered in this phase are the architectural design and its aesthetics, as well as aspects of building physics, material, durability, and maintenance. This phase ends with an intermediate review of the architectural design in form of a presentation-and-poster session. Subsequently the Evaluation/Execution Phase starts. In here, the previously developed architectural design shall be elaborated on to the level of construction detail level. Moreover, it includes the in-depth analysis of the building’s performance after the retrofit with state of the art tools such as building performance simulations tools in the domains thermal behavior of the overall building, thermal bridge evaluation, acoustics simulation, artificial and day-light evaluations, and structural evaluation. Furthermore, principal aspects of the building delivery process have to be considered and elaborate. The last phase of the overall course is the Realization phase, which on the one hand encompasses the finalization detailed construction timeframe plans and step-by-step description of the overall building delivery process. Moreover, the student teams should generate a real or virtual mock-up of their design to illustrate the overall functionality of their design. During the Realization phase also the final review session takes place. Students had then overtime (2 weeks to up to one month) to conclude all working steps of their specific project. The final deliverable consists regularly of a comprehensive documentation of the project itself and its design genesis. In addition to architectural plans (floor plans, sections, views), the most important details have to be documented in scales from 1:1 to 1:20, dependent on the project. Moreover, a construction phase plan, a comprehensive building performance assessment (considering energy, thermal, acoustical, visual, and environmental aspects), and a BIM-based representation of the design are required.

Fig. 3. Announcement poster of the concept B design studio, offered in Winterterm 2018/2019
Figure 4 illustrates the principle run of the semester of a Concept B design studio bases on the studio of Winterterm 2017/2018.

2.3. Common aspects and differences of both Design studio types

Table 2 illustrates some summarizing properties, common aspects and differences between the two design studio types.

<table>
<thead>
<tr>
<th>Properties of both design studio types</th>
<th>Concept A Design Studio</th>
<th>Concept B Design Studio</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Semester</strong></td>
<td>Summerterm</td>
<td>Winterterm</td>
</tr>
<tr>
<td><strong>Participants</strong></td>
<td>Graduate students of Architecture</td>
<td>Graduate students of Architecture and graduate students of Building Science</td>
</tr>
<tr>
<td><strong>Groups size</strong></td>
<td>2 persons (in specific cases 3 persons)</td>
<td>3 persons (2 architects, 1 building science student)</td>
</tr>
<tr>
<td><strong>Instructors / teaching teams</strong></td>
<td>1 architect, 1 BIM/CAD/Digital Design domain specialist, 1 building physicist, 1 structural engineer, 3 Magistrate officials of the City of Vienna, 1 expert in timber construction (since 2019)</td>
<td>1 architect, 1 BIM/CAD/Digital Design domain specialist, 1 building physicist, 1 expert in timber construction (since 2019), 2 domain specialists in building delivery and project management</td>
</tr>
<tr>
<td><strong>Focus point</strong></td>
<td>Building planning, Detailing, and construction planning of a building to a level of obtainable building permit (and realizationality)</td>
<td>Technology development and integration in (existing) buildings pertaining to building envelope technology, building planning, Detailing, and construction planning/building delivery process</td>
</tr>
<tr>
<td><strong>Ects-Points</strong></td>
<td>10.0 (thus 20/30 per team)</td>
<td>10.0 (thus 30 per team)</td>
</tr>
<tr>
<td><strong>Typically used tools / instruments</strong></td>
<td>- CAD/BIM environments&lt;br&gt;- Normative building physics evaluation (thermos-hygrics, acoustics)&lt;br&gt;- Basic structural engineering tools&lt;br&gt;- Physical models / technical model / presentation models</td>
<td>- CAD/BIM environments → BIM model of the final design&lt;br&gt;- Normative building physics evaluation (thermos-hygrics, acoustics)&lt;br&gt;- Basic structural engineering tools&lt;br&gt;- Physical models / technical model&lt;br&gt;- Numeric simulation (domains: thermos-hygrics, visual performance, acoustical performance, structural engineering)&lt;br&gt;- Building planning net plans</td>
</tr>
</tbody>
</table>
3. Results of the design studios
The results of the design studios of both concepts can be considered to be of rather high quality, although students are grateful for the extra time granted at the end of each semester, which can be used to improve the state of the project between final presentation and final delivery deadline. Figure 5 illustrates some of the results of the past design studios. Regarding the grading, it can be said that around 50 to 60 percent of the projects are graded with excellent, and some 20 to 30 percent regularly are graded with good. The grading process is conducted two fold: During the final presentation all students have to vote and provide points to the presented projects. In a grading session, the instructors discuss and suggest also point scales onto each project. These evaluations are compared and in case modified. It can be stated that students possess after one semester of working effort a good feeling for their own performance, and regularly are satisfied with their grade (even if it is not an excellent).

4. Student Feedback
After each semester, students are asked for their feedback. Most statements give the course an excellent feedback in aspects such as “knowledge gaining”, “learning curve”, “inter-disciplinarity”. This is emphasized by the fact that many students who did the course either in the summer term or in the winter term tried to get a place in the vice-versa course of the following semester, despite the rather large offer of design studios at the TU Wien. Additional anonymous feedback suggested in the past improvements, such as additional workshops for software tools. As far as possible regarding ressources and time allotment, these suggestions were integrated into the semester planning of the design studio courses of the next semester. However, some students commented about the quire steep learning curve connected with the courses, and possible issues in group works. The former might be in part caused by a curricular speciality at TU Wien, which in part allows students to avoid heavy learning load courses by taking courses either abroad or at different teacher’s institutions. Moreover, it could be observed during past years that student’s ability to not just take construction knowledge from books but to utilize the basic knowledge to form a deep understanding for building construction technology is in a constant decline. Regarding the latter, it has to be stated that group works always bear the danger for all group members that one invests more time and effort than the other(s). In the forming of groups we thus recommend to really establish a working culture during the semester. In some cases, the feedback after the semester contained that students made large progress in these “soft skills” as well.

5. Future Development
The described courses enjoy a big popularity amongst students, and also the instructors seem to enjoy the courses so far. Nonetheless, further development is envisioned. Regarding the organisational framework, two to three consultancies per week – the current dose – seems to be the peek in time allotment of both instructors and participating students (it can be called intensive). However, additional workshops for tools and for special topics shall be included in future design studios of both Concept A and B. Regarding the content, it is planned to integrate the topics of building greenery and environmental footpring in a stronger form. Currently, a design studio course that additionally brings in student of environmental engineering with the focus point of circular economy in the AEC-domain is planned.

On the long run, the establishment of a master program focussing on architectural engineering might offer fruitful options for both students and instructors to clearly choose the subject of desire, might it be sole design, technical fundamentals and realization, or application and utilization of state-of-the-art simulation tools.
6. Acknowledgement

In addition to the authors, the following persons contributed to the past design studios described in this contribution: Peter Schober (Holzforschung Austria), Kamyar Tavoussi (Research Unit of Structural Design, TU Wien), Heinz Priebernig and Florian Waldmayer (Institute of Architecture and Design, TU Wien), Balázs Somogyvary (A-Null Bauphysik GmbH). Moreover, the authors would like to thank all participating students (in numbers close to 150 people) for their inspiring motivation.
References
10. Archiphysik. URL: http://www.archiphysik.at.
11. RuckZuck. URL: http://www.ruckzuck.co.at.
АННОТАЦИЯ: Курсы дизайн-студии составляют преобладающую часть в большинстве учебных программ архитектурных школ. Основная регулярная цель — предложить студентам среду обучения, «песочницу», для разработки новых идей и изучения архитектурных морфологий. Однако часто на этих курсах разрабатываются проекты зданий, которые могут обладать высокой степенью креативности, но не обязательно достигают уровня детализации, необходимого для технической реализации зданий или получения разрешений на строительство. Это можно рассматривать как серьезный образовательный недостаток, учитывая, что эти навыки регулярно ожидаются у выпускников архитектурных школ на их первых рабочих местах и в первые годы практики. Более того, если этому не обучают должным образом на университетских курсах, многие практики видят выпускников архитектурных школ скорее учениками, чем сотрудниками или коллегами, что также выражается в малой готовности платить приличную зарплату. Другим аспектом является то, что традиционные дизайнерские студии часто фокусируются на одной задаче в одном масштабе, которую должен выполнять один студент. Это больше не отражает реальность, где проекты, большие, чем дома на одну семью, редко выполняются отдельными людьми. Более распространенным принципом современного строительного планирования является командная работа в проектных группах, которые часто имеют сильный междисциплинарный характер. Это может быть связано с преобразованием строительного планирования в последние годы: увеличение времени и затрат, а также ужесточение требований требуют других форм производства архитектурных проектов. Желание интегрировать так называемые «интегративные» дизайн-студии можно наблюдать на международном уровне в академическом контексте, однако, сообщается лишь о нескольких успешных примерах интеграции. Настоящий документ иллюстрирует усилия, предпринятые в Венском техническом университете, Вена, Австрия, для преодоления разрыва между чисто проектными и техническими аспектами реализации. Тем самым подчеркивается дидактическая концепция и основные планы конкретных дизайн-студий, нацеленных на преодоление этого разрыва, а также развернутое междисциплинарное сотрудничество в рамках этих курсов.

Ключевые слова: дизайн-студии, строительная наука, совместные усилия, разрешения на строительство, техническая реализация.