

Pros and cons of the vertical and horizontal design studios in architects' education

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ABSTRACT: A design studio is a basic tool for educating architects at university. Design studios simulate real-life practice and creative problem-solving, with support from tutors. However, long-term discussions have been held on the form of the design studio between *horizontal* arrangements, where students of the same year of study and skills are grouped together, and *vertical*, combining students from several years of study. The authors have examined the pros and cons of both systems, based on experience in the Faculty of Architecture at Slovak University of Technology in Bratislava (FA-STU), Slovakia. In 2019, the Faculty transformed, experimentally, half of the design studios into a vertical system. The authors here review and evaluate this transformation. The findings were that the vertical system satisfied students and engendered discussion based on a plurality of opinions. However, the horizontal approach still has advantages for students in the beginning of their study, where the pedagogical focus is on embracing basic skills and the technical knowledge of architectural practice.

Keywords: Vertical design studio, teaching architecture

INTRODUCTION

The design studio has served for decades as a basic tool to educate architects and other creative professionals at university. The studio offers a place where students simulate real-life practice and solve design problems, with support and advice from professionals and tutors. However, there have been long-term discussions about the role and form of the studio, reflecting changes in current architectural praxis and new challenges faced by the profession. Authors from academia and professional organisations criticise studio rigour, unequal power relations and ambivalent culture. One of the solutions suggested would be a transformation from traditional *horizontal* arrangements, where students of the same year of study and skills are grouped together, to *vertical* or *integrative*, combining students from several years of study.

The aim is to develop a culture between students to support the transfer of know-how and knowledge. The work reported in this article is an attempt to contribute to this discussion by scrutinising experiences with the implementation of a vertical system within the horizontal study programme in the Faculty of Architecture at Slovak University of Technology in Bratislava (FA-STU), Slovakia.

DESIGN STUDIO AS A CORE OF ARCHITECTS' EDUCATION

From its formal beginning in the 18th Century to the 1980s, the basis of the education and preparation of future architects was achieved through the apprenticeship model. Architects-to-be learned necessary skills by observing a *master architect* in creative work, engaged in the tasks, many small, in an architectural office.

In the 1980s, the work of Schön supported the institutionalisation of this practice, in the form of the studio, including at a theoretical level. Schön, in his book, *The Reflective Practitioner*, highlights the argument that the studio simulates real professional life [1]. Following the work of other authors [2], Schön sees the framework as follows: pedagogical space (the architectural office transformed to the design studio); pedagogical tools (real-life architectural problems and challenges transformed to simulated design studio problems); pedagogical methods (design learned from the master architect transformed to design learned by the mentoring of teachers and university tutors).

Through the device of a story of architecture student Petra and her tutor Mr Quist, Schön highlights two essential elements of the studio system. First is the use of studio-based projects. These should be similar to real-life architectural

problems and challenges; studio design-based projects should simulate real-life projects in all their depth and complexity. Second is the practice of *reflection-in-action*; that is, practice leading to imitating or reflecting on the thinking and design approach of the tutor.

However, the established studio teaching system also has critics. As Webster points out, the focus on the design studio and its learning outcomes limits other sources of architectural learning: *...other cognitive, affective and corporeal dimensions to learning that take place both within the design studio and in other settings (the lecture theatre, the refectory, parties, etc)* [3].

Furthermore, as Webster elsewhere argued, many of the instructors/tutors taught students to believe they can only succeed by following their tutor's instructions [3][4]. She points to a study showing that poorly performing students used a formal, structured approach to learning. On the other hand, the best performing students embraced the learning of architecture as a more diverse activity, involving not only the formal, but many other extracurricular activities. Thus, the design studio in its standard form, even though awarded the highest credit allocation, does not play the only important role, in producing the best architects.

HORIZONTAL, VERTICAL AND MASTER'S APPRENTICESHIP APPROACHES TO DESIGN STUDIOS

More flexible and diverse forms of learning and teaching of architecture are strongly connected to the role of the design studio and its link to the complex curriculum of architect education. Then, there is the question of the *performance* of the studio: can a design studio transform to reflect contemporary architecture? Being limited, with various accreditation processes and approvals, one of the solutions to provide a more flexible education environment is to transform the system of teaching of a design studio.

The theme of the innovation and search for improved operational models, more interdisciplinary with improved social skills and an emphasis on value-driven design, have been the subject of various initiatives from academia. These include *Changing Architectural Education, towards a New Professionalism* by Nicol and Pilling [5] and *Design Studio Pedagogy: Horizons for the Future* by Salama and Wilkinson [6].

Professional organisations, such as the Royal Institute of British Architects (RIBA) and the American Institute of Architects (AIA) call for more value-based teaching. This is also reflected in the AIA students' call for improvements in studio culture [7]. However, none of these institutions gives a clear recommendation of how to organise and teach design studio. Rather, they support a diversity of approaches. There are two major teaching systems: horizontal and vertical. Traditional horizontal systems include students from the same year of study, with the same skills, knowledge and experiences. A vertical (or integrative) system is based on the grouping of mixed-level students, with diverse skills, knowledge and experience.

A move on to a vertical system for design studios has been made by many architectural education institutions, especially European. This trend was noted by Garbarczyk and Francis [8], and also by the authors' review of the teaching of design studio at the ten best architecture universities (according the 2019 QS World University Rankings); see Table 1. Still, the *horizontal* system prevails, with some of the exceptions combining the horizontal system in the beginning of study and the vertical system in later years.

Table 1: The comparison of design studios at the ten best architecture universities (2019 QS World University Rankings). Elaborated by authors based on data collected from the Web sites of the universities.

QS ranking 2019	University	Study programme	Vertical studio
1	UCL Bartlett Architecture	MArch	No
2	Massachusetts Institute of Technology (MIT)	MArch	No
3	Delft University of Technology	MSc Architecture	Yes
4	ETH Zurich	MArch	Mixed
5	Harvard University, Graduate School of Design	MArch	Mixed
6	University of California, Berkeley (UCB)	MArch	No
7	University of Cambridge	MPhil/A&Urban Design	No
8	National University of Singapore (NUS)	MArch	No
9	Tsinghua University, School of Architecture	MArch	No
10	Politecnico di Milano, School of Architecture	MArch	No

DESIGN STUDIO AT THE FA-STU

Since the beginning, in the 1940s, the design studios have taken up about 30% of the architecture curriculum in the Faculty of Architecture at Slovak University of Technology in Bratislava (FA-STU). At present, the design studio

accounts for 37.3% of the total hours of direct study and 44% of ECTS credits; in the Bachelor year it accounts for 30.6% of the credits and at the Master's level, 53%.

As Professor Julian Keppl describes, originally studios at the FA-STU focused on particular building typologies [9]. The only design studio not typology-based was for monument restoration, which was interdisciplinary and theory-based. This emphasis reflected the communist era when design work was guided by the state design institutes, working on the basis of typology building classification.

However, with changes in society and transition to a market-led economy more programmatic requirements were included in the education of architects at the FA-STU. These involved the energy efficiency of buildings; lowering the environmental impact of buildings; and the application of new technologies and construction materials. The number of typology-oriented design studios has decreased, while the emphasis was put on problem-oriented designs, such as experimentally and ecologically led designs or universal designs.

PILOT VERTICAL DESIGN STUDIO AT THE FA-STU

The call for transformation of the design studio teaching stems from academia, as well as the profession. The profession, on a global and local level, calls for more integrative and interdisciplinary learning. Concerns within the profession also relate to finance and the need for research excellence.

In June 2019, the Faculty experimentally transformed half of the design studio courses into a vertical system. Most important was to decide which *horizontal courses* to involve in the *vertical* system. As shown in Table 2, the decision was to include design studio courses from the final year of Bachelor's study and from the Master's study, which have similar learning objectives.

This division follows the didactic approach of the Faculty, where knowledge-based education focuses on the beginning of the study, and problem-based education on the final years. Twenty four new vertical studios were created involving students from the final Bachelor's year of study and two years of the Master's programme. Each studio involved a group of from eight to 16 students, led by between two and six tutors.

Table 2: Learning objectives of the vertical design studio course.

	Learning objectives: 4th year Bachelor's	Learning objectives: 1st year Master's	Learning objectives: 2nd year Master's
Winter term	Specialised studio design	Design studio 1: urban design	Design studio 3: pre-diploma design project
	Knowledge and skills in design of a particular type of building (housing, public buildings, etc), including real praxis and contemporary challenges.	Knowledge and skills in design and elaboration of urban plans of an urban neighborhood. Urban zone involving wider context: from landscape, settlement up to the neighbourhood. Complex and intradisciplinary approach.	Design a complex of buildings (series of buildings) on the basis of modern knowledge in the field of architecture, art and technical infrastructure. Emphasis on the leitmotif, creativity and feasibility.
Summer term	Bachelor's design thesis	Design studio 2: architecture	Diploma design project
	The ability to synthesise practical and theoretical knowledge of typology, art, technical infrastructure and project management. Result should be a project that could receive building permission.	Knowledge and skills leading to individual work, to design a building or a series of buildings and to co-ordinate project management.	Complex elaboration of architectural design, including exterior and interiors. Creative solutions from the level of urban design up to artistic and technical construction details.

PILOT VERTICAL DESIGN STUDIO IMPLEMENTATION

One of the objectives of the vertical design studios was to provide design studios with diverse focus, from individual development or master's apprenticeships up to design studios focused on specialised theories or programming. Half of the 24 newly created design studios had a universal focus with a traditional *master's apprenticeship* approach, led by successful Slovak architects. Three of the design studios focus on monument restoration, reflecting the deep tradition of the Faculty. Two of the design studios focus on interior design, reflecting contemporary trends and the marketplace.

There were six design studios with a particular focus on theoretical knowledge and contemporary trends in design for the diversity of focus of the vertical design studios (see Figure 1a).

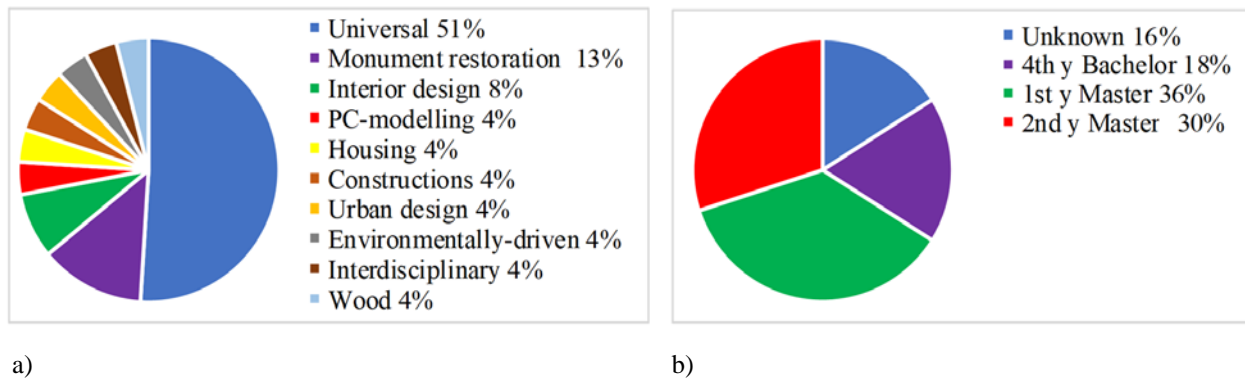


Figure 1: a) the diversity of focus of vertical design studios implemented at the FA-STU in the academic year 2019/20; and b) the composition of responses in the evaluation form distributed among students at the FA-STU.

CASE STUDY: THE VITKOVÁ AND ŠPAČEK VERTICAL DESIGN STUDIO

Space/location, tools and methods are the crucial elements of teaching in the design studio. Webster argues also for the importance of other informal and extracurricular activities [3]. The design studio Vitková and Špaček developed a curriculum reflecting Webster's views and is the subject of this scrutiny. Enrolled at the studio were 14 students: two from 4th year Bachelor's; ten from 1st year Master's; and two from 2nd year Master's, under the tutorship of six teachers.

The theme for the whole academic year was *Bratislava in 2050 - lowering the carbon footprint of the capital city of Slovakia*. The brief was elaborated in co-operation with the City Office of Bratislava and Chief Architect of the City of Bratislava. The theme reflected the robust climate changes the city is facing, and a search for solutions that would, of necessity, trigger shifts in residents' lifestyle.

As part of the emphasis on informal activities, students were to join in, almost every week, at least one extra-curricular activity: excursion, lecture or workshop, outside of the University. Student participation in these activities turned out to be 100%. Their informal character and changing context engendered emotive and experiential learning, and proved very popular with the students.

The *theme* of the design studio was broad and students could choose assignments according to their interests, skills and knowledge. This freedom led to diverse outcomes at the end of the semester, from proposals dealing with food security, i.e. urban agriculture, to typologies for new public amenities and designs of autonomous urban transport systems.

The mandatory mid-term controls and *final jury* were supplemented by smaller and more frequent reviews enriched by the tutors from other disciplines, such as smart mobility or environmental sustainability. These provided an unbiased perspective on the design problem and its reframing into the wider societal context. Providing inspirational experience for the students placed a higher demand on the tutors, their co-operation and co-ordination. However, these management issues expose the students to another dimension of real-world praxis: *in situ* collaboration and dealing with *ad hoc* problems. Scenes from the studio are depicted in Figure 2.



Figure 2: The work in a vertical design studio, its physical environment and diverse programme; from *jury critics* to extra-curricular lectures.

EVALUATION BY THE STUDENTS

A questionnaire was distributed to students at the beginning of February 2020, after the completion of design studio courses in the winter term of the academic year 2019/20. The questionnaire had 129 responses, of which 83 were relevant to this research on vertical design studios. Of these 83 responses, 12% were from 4th year Bachelor's students, 54% were Master's (27% each for 1st and 2nd year) and the rest an unknown year of study.

This sample was 14% of students from the 4th year Bachelor's degree (10 out of 73 students); 27% of students from 1st year Master's degree (22 out of 82 students); and 23% from the 2nd year Master's degree (22 out of 97 students). Presented in Table 3 are the findings from evaluation of the teaching of the vertical design studio.

Table 3: Evaluation of the teaching of vertical design studio at the FA-STU.

		Response rate (%)	Positive response medium - high score (%)	Negative response unsatisfactory score (%)
1	Assignment of studio/project brief	94	99	1
2	Connection to the praxis	92	97	3
3	Collaboration in the design studio	99	88	12
4	Competitiveness of a design studio	99	99	1
5	Approach of the tutors	100	89	11
6	Final defence	80	86	14
7	Quality of the discussion during final defence	99	91	9
8	Space provided (physical environment)	96	63	37
9	Satisfaction with the final results and grading	95	89	11

Conclusions from the questionnaire can be summarised following Webster's interpretation of Schön's model in the areas of pedagogical space (learning environment), pedagogical tools (brief assignment) and pedagogical methods (learning and final defence).

The low quality of the physical environment was a major finding of this evaluation. This included the lack of space (rooms inappropriate to the number of students), lack of Wi-Fi Internet connection, and the absence of other technical equipment. Since one of the fundamental premises of the implementation of vertical systems is to support the students in the school, the failure to provide a good quality environment is important. As for pedagogical methods: students largely were satisfied with the assignment. There was particular satisfaction with the project brief, its details and its relation to praxis.

Learning experiences can be summed up generally as sufficient, but some important problems with the work in the design studio stood out. Often mentioned was the lack of collaboration between students across different years of study. There was a long-term problem with the ambivalent approach of some of the tutors that had not been resolved in this more competitive environment.

Last, but not least, are the issues connected to the final project defence. The final defence seemed to have less importance for students in the evaluation. The data suggest the need for improvement in the communication between the jury and a student to ensure better understanding of the jury comments, including that of a project's strengths and weaknesses.

One of the highest ratings in all categories was given to the Vitková and Špaček design studio. The students' comments were that the highest benefit for them were the extra-curricular activities and interdisciplinary approach that resulted also in fruitful discussions during mid-term reviews and final defence.

CHALLENGES TO BE ADDRESSED

The outcomes from evaluation have pinpointed two major challenges to be addressed in the implementation of vertical design studios: learning environment and experience. Even though it might seem that the learning environment in the digital era is not important, especially for the youngest generation, the opposite seems to be true. The vertical studio provided students with their *own space* where, for example, they could store personal belongings. Despite expectations that their *own space* would improve the quality of the learning experience, students were critical of the learning environment.

By contrast, the *Portsmouth model* sees the environment of the design studio as a resource base better aligned to the expectations of the students [10]. The *Portsmouth model* is built on a *core space*, for debating, with moral support

and good equipment on offer (PC and other technical equipment). Such a setting provides potential for the students to improve their collaboration skills and for the school to keep its status as a knowledge and innovation base, rather than as a student's *service* organisation.

The second major issue is the learning experience. This includes work in the studio: collaboration with the other students, collaboration with the professionals from the practice, as well as the relationship between students and tutors. The expectation of the vertical system is to spontaneously support the interdisciplinarity and collaboration between the students. The evaluation shows that the spontaneous nature of these processes has its limitations and more intense co-ordination of the tutors is required to support knowledge transfer between students from various years and improve the preparation of the tutors.

CONCLUSIONS

The aim of the work reported in this article was as a contribution to the discussion of innovation in the teaching of the design studio as the core course of the education of architects. A pilot implementation of a vertical system at the FA-STU, the pros and cons and the main challenges, were outlined. Combining the standard horizontal system with the vertical proved to be successful. The pilot involved final year students of the Bachelor's year and both of the Master's years of study. The main didactic approach of the Faculty was followed, i.e. knowledge-based education at the beginning of the study, with more problem-based education in the final years. This didactic approach proved feasible and successful.

The vertical system satisfied students and supported interdisciplinarity among the individual departments of the Faculty and discussions based on a plurality of opinions. However, the classic, horizontal approach, still brings advantages for students in the beginnings of their study, where pedagogical focus is on embracing the basic skills and technical knowledge of architectural practice.

REFERENCES

1. Schon, D.A., *Educating the Reflective Practitioner: Toward a New Design for Teaching and Learning in the Professions*. San Francisco: Jossey Bass Publishers (1987).
2. Brockbank, A. and McGill, I., *Facilitating Reflective Learning in Higher Education*. Berkshire: SHRE and Open University Press (2008).
3. Webster, H., Architectural education after Schön: cracks, blurs, boundaries and beyond. *J. for Educ. in the Built Environ.*, 3, 2, 63-74 (2008).
4. Webster, H., The architectural review: a study of ritual, acculturation and reproduction in architectural education. *Arts and Humanities in Higher Educ.*, 4, 3, 265-282 (2005).
5. Nicol, D. and Pilling, S. (Eds), *Changing Architectural Education, towards a New Professionalism*. London and Ney York: E&FN Spon, Taylor & Francis Group, 208-216 (2000)
6. Salama, A.M.A. and Wilkinson, N., *Design Studio Pedagogy: Horizons for the Future*. Gateshead: ARTI-ARCH, Urban International Press (2007).
7. American Institute of Architecture Students, Studio Culture Task Force, Koch A. The Redesign of Studio Culture: The Redesign of Studio Culture, a Report of the AIAS Studio Culture Task Force (2002), 11 May 2020, http://www.aias.org/wp-content/uploads/2016/09/The_Redesign_of_Studio_Culture_2002.pdf
8. Garbarczyk, M. and Francis, K., Setting up an upsetter: a vertical studio for architecture. In: Rajagopalan, M. (Ed), *Engaging Architectural Science: Meeting the Challenges of Higher Density: 52nd Inter. Conf. of the Architectural Science Assoc. 2018*. The Architectural Science Association and RMIT University, Australia, 477-484 (2018).
9. Kepl, J., *Tvorba 01*. In: Špaček, R. and Šíp, L. (Eds), *Vzdelávanie Architekta na FA STU v Bratislave*. Spektrum STU (2016) (in Slovak).
10. Potts, W., *The Design Studio as a Vehicle for Change: the Portsmouth Model*. In: Nicol, D. and Pilling, S. (Eds), *Changing Architectural Education, towards a New Professionalism*. London and Ney York: E&FN Spon, Taylor & Francis Group, 208-216 (2000).

BIOGRAPHIES



Pavel Gregor is the author and co-author of more than 70 realised architectural works, many of them with the highest awards, as well as numerous research publications. His pedagogical and professional activities are focused on the issue of protection and restoration of architectural heritage, including new architectural creations in the historical environment. He has developed a concept for specialised teaching of the restoration of architectural heritage, and more recently, a transformation of the design studio teaching in the Faculty of Architecture at Slovak University of Technology in Bratislava (STU), Bratislava, Slovakia.



Katarina Smatanová works in the Institute of Urban Design and Planning at the Faculty of Architecture at Slovak University of Technology in Bratislava (STU), Bratislava, Slovakia. Apart from teaching theoretical courses, she is involved in the teaching of design studio integrating environmental and urban issues. Currently, her research is focused on social sustainability in urban planning. She also serves as a government expert in the field of regional development.



Andrea Šeligová is currently undertaking her PhD studies in the Institute of Urban Design and Planning at the Faculty of Architecture at Slovak University of Technology in Bratislava (STU), Bratislava, Slovakia. Her work deals with the intensification and recycling of inner city areas and methods of urban regulation, with a particular use of GIS methods. She is also involved in the teaching of design studio integrating environmental and urban issues.