LEGAL TOPICS IN BUILDING-RELATED EDUCATION

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Higher education in the field of civil engineering and architecture is demanding and time-consuming. Besides subject related topics, most modern study programs also contain courses in other disciplines such as languages, ethics or law. Nevertheless, while elaborating a curriculum sometimes it is discussed controversially if the valuable study time should be spent with teaching law contents rather than use it for subject specific courses. The question is whether legal knowledge is required for civil engineers and architects to work professionally. The authors analyzed the professional competences and skills civil engineers and architects should have. They examined existing alumni reviews and carried out new surveys among participants of two conferences. The objective was to obtain more information about the worth of teaching law topics in civil engineering and architecture education as well as the need of legal knowledge in the professional life. The authors concluded that teaching legal topics is necessary and helpful for civil engineering and architecture graduates to work professionally. Most of the asked professionals agreed with that statement and desired additional law education in their professional life. However, the paper also shows differences between the two professional groups. Thus, more architects than civil engineers recommended teaching legal topics and were interested in continuing legal education.

\textit{Keywords}: Study program contents, Civil engineering, Architecture, Construction law, Professional competences, Further education.

1 INTRODUCTION

Worldwide, construction projects need to comply with various rules and regulations, such as public and private construction law, environmental and emission control law, civil law, neighbor law or criminal law. If architects or civil engineers breach law, it may result in serious consequences, for example in a corresponding penalty or in a lawsuit (Quapp and Holschemacher 2019). Therefore, graduates should be familiar with legal terminology, relevant regulations, standards and codes. This will enable them to avoid claims for damages and penalties as well as to save money in their own interest and the interest of the building industry (Quapp and Holschemacher 2014).

Breadth, depth and complexity of legal knowledge and competencies architects and civil engineers need to work professionally, has been discussed controversially. Beside the academic discussion about legal skills and knowledge, it seemed to be more reasonable to the authors to ask professionals currently working in building industry, design offices, construction companies and
building administration. Thus, the authors analyzed the Second Saxon Alumni Study and conducted surveys among participants of two conferences to learn about the required legal education. Additionally, for this research project, they examined current architecture and civil engineering curricula of various universities.

2 METHODOLOGY

This paper is part of a research study that explores inclusion of legal topics in building-related engineering education. The objective was to obtain more information about the value of teaching law topics in civil engineering and architecture education as well as the need of legal knowledge in the professional life. Identifying the necessity of improving legal education for architects and engineers, the authors used desk research to identify legal requirements for practicing as civil/structural engineer or architect in Germany. Furthermore, they compared legal teaching contents of various German universities with these requirements and examined alumni reviews. Additionally, surveys were conducted among professionals at two conferences to analyze required professional competences and skills of civil engineers and architects.

3 LEGAL COMPETENCES AND SKILLS FOR CIVIL ENGINEERS AND ARCHITECTS

German Federal States’ engineers’ and architects’ acts contain an obligation for continuous professional development that includes legal training. If architects and engineers apply for building-related higher-grade civil service, a further education in law and administration is mandatory. Furthermore, professional associations of architects and civil engineers as well as the building industry in Germany require at least graduates’ basic knowledge in civil and public law as well as in public construction law on the bachelor’s level. Graduates should be able to name the relevant acts and regulations and to understand the relationship between law and civil engineering (AS Bau 2018).

4 EDUCATIONAL CONTENTS IN CIVIL ENGINEERING AND ARCHITECTURE PROGRAMS

In Europe, additionally to the implementation of bachelor’s and master’s programs, the Bologna Process required the inclusion of interdisciplinary courses and general subjects in engineering and architecture programs. Today, universities offer courses like professional orientation, scientific methods, multidisciplinary modules, foreign languages and extracurricular studies such as Studium Generale, in addition to scientific basics as well as classical civil engineering subjects, which reduces education time for engineering and architectural courses (Quapp and Holschemacher 2015). Thus, it has to be discussed if interdisciplinary courses contribute to the employability of civil engineering and architectural graduates.

4.1 Interdisciplinary Contents in General

Today, interdisciplinary contents are included in nearly all civil engineering and architecture curricula all over the world. Analyzing the civil engineering bachelor’s program at HTWK Leipzig, students can obtain 22 credit points, (so called ECTS points; see European Commission 2015) of in total 180 credit points in interdisciplinary contents (HTWK Leipzig 2020a) and in the master’s program in civil engineering up to 17 credit points of in total 120 credit points (depending on the chosen specialization) (HTWK Leipzig 2020b). See Table 1 and 2 for details.
Table 1. Interdisciplinary contents in civil engineering bachelor’s program at HTWK Leipzig.

<table>
<thead>
<tr>
<th>Option</th>
<th>Course</th>
<th>Credit Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>Compulsory</td>
<td>Foreign Languages I</td>
<td>4</td>
</tr>
<tr>
<td>Compulsory</td>
<td>Scientific Methods</td>
<td>3</td>
</tr>
<tr>
<td>Compulsory</td>
<td>Extracurricular Studies</td>
<td>1</td>
</tr>
<tr>
<td>Compulsory</td>
<td>Interdisciplinary Course I</td>
<td>1</td>
</tr>
<tr>
<td>Compulsory</td>
<td>Procurement und Contracts</td>
<td>5</td>
</tr>
<tr>
<td>Compulsory optional</td>
<td>Foreign Languages II</td>
<td>4</td>
</tr>
<tr>
<td>Compulsory optional</td>
<td>Interdisciplinary Course II</td>
<td>4</td>
</tr>
</tbody>
</table>

Table 2. Interdisciplinary contents in civil engineering master’s program at HTWK Leipzig (specialization construction management).

<table>
<thead>
<tr>
<th>Option</th>
<th>Course</th>
<th>Credit Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>Compulsory</td>
<td>Construction Law</td>
<td>3</td>
</tr>
<tr>
<td>Compulsory</td>
<td>General Business Economics</td>
<td>3</td>
</tr>
<tr>
<td>Compulsory</td>
<td>Business Simulation</td>
<td>2</td>
</tr>
<tr>
<td>Compulsory optional</td>
<td>Communication, Presentation, Negotiation</td>
<td>5</td>
</tr>
<tr>
<td>Compulsory optional</td>
<td>Interdisciplinary Course I</td>
<td>4</td>
</tr>
</tbody>
</table>

4.2 Legal Contents

After analyzing 16 civil engineering and 15 architecture study programs at Germany higher education institutions, the authors concluded that law education currently plays only a minor role. Most of the examined German universities include law topics with 0 credit points to in maximum 6 credit points as compulsory education in civil engineering bachelor’s programs, which corresponds to a percentage from 1.4% to 1.6% of the curriculum. In civil engineering master’s programs, German universities offer compulsory law courses between 0 and 6 credit points that corresponds to a percentage from 1.5% to 2.0% of the curriculum (Quapp and Holschemacher 2020). In most of the programs, teaching contents are introduction in law, procurement and building contract law.

In architecture programs at German universities, the authors found compulsory law courses with credit points between 0 and 6 on bachelor’s level that corresponds to a percentage of 1.5% to 1.8% of the curriculum. On master’s level, there are only two higher education institutions in Germany that offer compulsory law education for architecture students while the module size varies from 2 to 4 credit points, which corresponds to a percentage from 1.7% to 3.3% of the curriculum (Quapp and Holschemacher 2020). In most of the programs, teaching contents are introduction in law and planning law.

5 ALUMNI STUDY AND SURVEYS

In order to learn about the legal knowledge and competencies architects and civil engineers need to work professionally, first the authors analyzed answers of alumni in the Second Saxon Alumni Study of Technical University of Dresden (2019).

Graduates in building-related study programs were asked, in which extent they acquired knowledge and skills in law within their studies and how important this knowledge and these skills have been for their first employment. 75% of the alumni answered that they acquired legal knowledge only to a minor extent, while 43% stated that law knowledge and skills are important or very important in their first employment (see Figure 1). The results show that there is a need for more legal education in civil engineering and architecture programs to guarantee graduates employability.
Additionally, the authors conducted a survey among the participants of two building-related conferences. The questionnaire was distributed to around 220 participants of the conferences “13th Conference on Concrete Structures - New Developments in Concrete Construction” and “5th Leipzig BIM Conference”. In total, 104 people used the chance to submit their opinion that correspond to approximately 47% of the experts attending the conference. For the working fields of the participants see Figure 2.

The questionnaire was developed and evaluated under usage of the evaluation system EvaSys (EvaSys 2019). It contained, among others, questions relating to legal education for building-related professions:
- How necessary is legal education in building-related bachelor’s programs?
- Do you wish further training in law topics?
- If “yes”: in which special field of law?

The results of the study show that, among the asked architects, 92% agree that legal education in building-related study programs is necessary or very necessary (see Figure 3). Of the asked civil engineers, only 60% agree.
5.1 Interest in Further Legal Training

74% of the architects who completed the questionnaire demand further education with legal contents, while only 48% of the civil engineers are interested (see Figure 4).

5.2 Topics for Further Legal Education

To answer the question regarding topics for further legal education, the questionnaire contained the possibility to cross one or both fields named with private construction law and public construction law. 47% of the professionals desire further legal training in private construction law, 29% in public construction law and 24% in both of them. Especially the interest in further training in the field of private construction law is explainable due to a revision of German construction contract law in the year 2018.

Additionally, the participants were allowed to specify the desired legal fields in a free text field of the questionnaire. The participants named the following topics for further legal education:
• German Construction Tendering and Contract Regulations (VOB)
• German Fee Regulation for Architectural and Engineering Services (HOAI)
• Construction contract law
• Neighbor law
• Management of defects
• Building regulations and planning law.

6 CONCLUSIONS
Lifelong learning and continuous professional development are essential to ensure graduates’ employability and the qualification to work professionally. Each day, architects and engineers are faced with various legal issues, whereby breadth, depth and complexity of required legal knowledge and competencies depend on the employer and the field of work. Due to the frequent changes of legal rules and regulations as well as the development of state of technology and technical codes, continuous professional development should be part of the architects and engineers professional routine. In analyzing and offering the required legal knowledge and skills, universities can be a valuable partner in architects’ and civil engineers’ professional development.

References
AS Bau - Alliance for the Accreditation of Courses of studies in Construction, Reference Frame for Courses of Studies in Civil Engineering (Bachelor), AS Bau, Berlin, 2018.