

Evaluating architecture students' knowledge of the history of architecture by tests and by drawings: a comparative analysis

Maria J. Soltysik

Gdańsk University of Technology
Gdańsk, Poland

ABSTRACT: The methods of evaluating students' knowledge in architectural education, and particularly in relation to the history of architecture, are in many ways distinctive due to the specificity of the subject. Apart from checking the general knowledge of history concerning chronology, artistic trends, styles, main objects and architects, the evaluation should also include students' ability to analyse historical architecture in drawing form. Such form of presenting architecture has proven to be the most comprehensive as it demonstrates students' understanding of its development throughout the ages. Thus, in the Faculty of Architecture at Gdańsk University of Technology, Poland, students' knowledge of historic architecture is examined by two methods: tests and drawings. Both methods and their results were closely investigated and compared after the first semester examination in the academic year 2020/2021. A comparative analysis was conducted considering the methods' reliability, efficiency, usefulness and difficulty, based on the students' examination results and a questionnaire undertaken among the students.

INTRODUCTION

The proper methodology of evaluating students' knowledge is a key factor in academic education. However, it differs in various scientific disciplines and courses [1], including architecture, where the evaluation methods of students' knowledge are quite specific. Apart from checking the general architectural knowledge on the subject, the methods are geared to examine the basic skills, inseparable from the profession of architect - the *drawing language* of architecture. Those skills are crucial in the whole process of studying architecture, starting from the entrance procedure [2].

Checking the students' drawing and spatial competence is especially important during the first year of architectural studies, since just at that time future architects are building the foundations of their professional abilities and their understanding of architecture. One of the subjects taught during the first-year studies in the majority of architectural faculties is *the History of World Architecture*. Thus, a proper evaluation of the students' results in the history course should refer to those basic competencies and skills.

There is no one commonly accepted method of evaluating students' knowledge of architectural history during architectural studies as the faculties choose their own individual methods. There is also not much academic discussion on the matter. Therefore, this article is an attempt to fill in this gap by presenting, analysing and comparing two evaluation methods which could be useful in examining students of architecture: one is a drawing method, and the other is a test method. Both methods are used in evaluating students' historical knowledge in the Faculty of Architecture at Gdańsk University of Technology (FA-GUT), Poland.

MAIN AIMS OF HISTORY EDUCATION FOR ARCHITECTS IN EUROPE

The scope of knowledge, skills and competencies to be gained during architectural studies were briefly stated in the Directive of the European Parliament in 2013 [3]. According to that document, the training of architects shall guarantee, among others, the acquisition of:

- *adequate knowledge of the history and theories of architecture and the related arts, technologies and human sciences;*
- *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;*
- *understanding of the structural design, and constructional and engineering problems associated with building design* [3].

Although this Directive gives only brief guidance on shaping the overall architectural education, one can draw from it some conclusions, concerning the history of architecture. The first conclusion is that an *adequate* knowledge of history

applies generally to the scope of factual data concerning the outline of architecture, main artistic styles, theories and the most important architectonic creations of the previous epochs. The second conclusion is that architectural education should also be directed at understanding the history of built environment, and in particular its development in relation to the changing architectural forms, building technologies, constructions, materials and human needs.

In view of the Directive and the ensuing conclusions, the students' knowledge and understanding of the history of architecture also involves their ability to present and analyse architectural objects, notably the most characteristic creations of great epochs and styles. It also involves their ability to present the evolution of architectural forms, structures and spatial solutions throughout the ages. Thus, the proper evaluation of students' results should be adjusted to those specific demands, and be grounded on the most comprehensive method of presenting knowledge and understanding architecture.

DRAWINGS IN ARCHITECTURAL EDUCATION

It is very difficult to talk about architecture without referring to its pictorial views - photos, models or drawings [4]. Both popular and professional books and lectures on architecture are heavily illustrated to make the message more understandable and clear. It is often said that one photo or drawing of an architectural object can replace hundreds of words in its description.

However, in professional presentations of architecture by architects and for architects, a specific media language is being used. The presenter operates mainly with the professional *drawing language* of architecture, developed particularly for architectural design - plans, sections, axonometric and perspective views. Those professional drawings are created at a large scale, giving the most complete, comprehensive and detailed information about a given object.

Clearly, the drawing language of architecture can also be used in presenting and analysing historical architecture - more often than not for educational purposes [5]. In that case, the plans, sections and spatial views of given objects could be much smaller, to include not all, but only the most important information about the objects. That form of drawings allows for not only one, but a few more drawings of individual objects and even of a few buildings, illustrating the analysed problem or process to be presented on a small piece of paper (for example A3, A4 or smaller). They could be defined as the educational analytic drawings.

The form of *analytic drawings* has many advantages; they can be made as brief, quick sketches, providing only as much information as necessary for the presented object. At the same time, they allow for easy comparison of several objects and presentation of the evolution of architectural forms and structures throughout history. Such analytic drawings might be supplemented by short notes concerning general information about the objects, such as authors, time of construction, function and structural features. Nowadays, at the GUT, analytic drawings are very important in teaching world and Polish history [5][6]. These educational analytic drawings and sketches can also be very useful in evaluating students' knowledge in architectural history.

DRAWINGS AND TESTS IN EVALUATING STUDENTS' KNOWLEDGE OF ARCHITECTURAL HISTORY

In Poland, in the faculties of architecture, world architectural history is predominantly offered to students in the first and the second semester of their studies. They are just beginning their architectural education, so the method of evaluating their knowledge should be adjusted to that situation. Moreover, it might not be appropriate to give first-year students for the midterm evaluation an advanced analytic paper for individual elaboration and presentation. Firstly, because they generally might not yet be prepared for such a task; secondly, because first-year students should be evaluated for basic competencies and knowledge in architectural history. Therefore, the most proper method of checking the historical knowledge of students at the beginning of architectural education seems to be an examination.

According to the academic tradition, there are two basic kinds of examinations on architectural history: oral examinations and written examinations. Some teachers choose the oral form of examination, which allows for an individual approach and direct contact between the teacher and the student. But to adequately check the historical knowledge of every student in a cohort of two hundred, might be difficult. Thus, the majority of teachers prefer the written form. Still, there is a question as to which form of written examination to choose. Currently, the most comprehensive way of examining the architectural history knowledge of first-year students seems to combine two methods: a test method and a drawing method.

The main aim of the test method is checking the students' historical knowledge concerning factual information, such as: chronology of architectural development, stylistic features, terminology of historical forms and structures, famous examples of architecture, names of famous architects and builders together with the titles and authors of the most important treatises or books on architecture. This kind of knowledge can be checked either through tests with open-ended questions that allow students to freely formulate their answers or through tests with closed-ended questions including multiple-choice answers. Both forms of tests allow students to give short, written answers on a broad range of subjects. The more questions are given, the more reliable the evaluation of each student.

The main goal of drawing during the History of World Architecture examination is to evaluate the students' understanding of architectural history and its evolution throughout the ages, as well as checking their skills in presenting a pictorial



analysis of those problems. The drawings made during the examination should have the form of concise analytic drawings with simplified plans, sections, details and spatial sketches; they should point to the analysed problems, and present the particular objects in artistic, structural and functional contexts. These drawings should be supplemented with short commentaries on the given subject, which allows students to fully present their knowledge and skills.

Selected examples of students' analytic drawings from the History of World Architecture examination are presented in Figure 1 below:

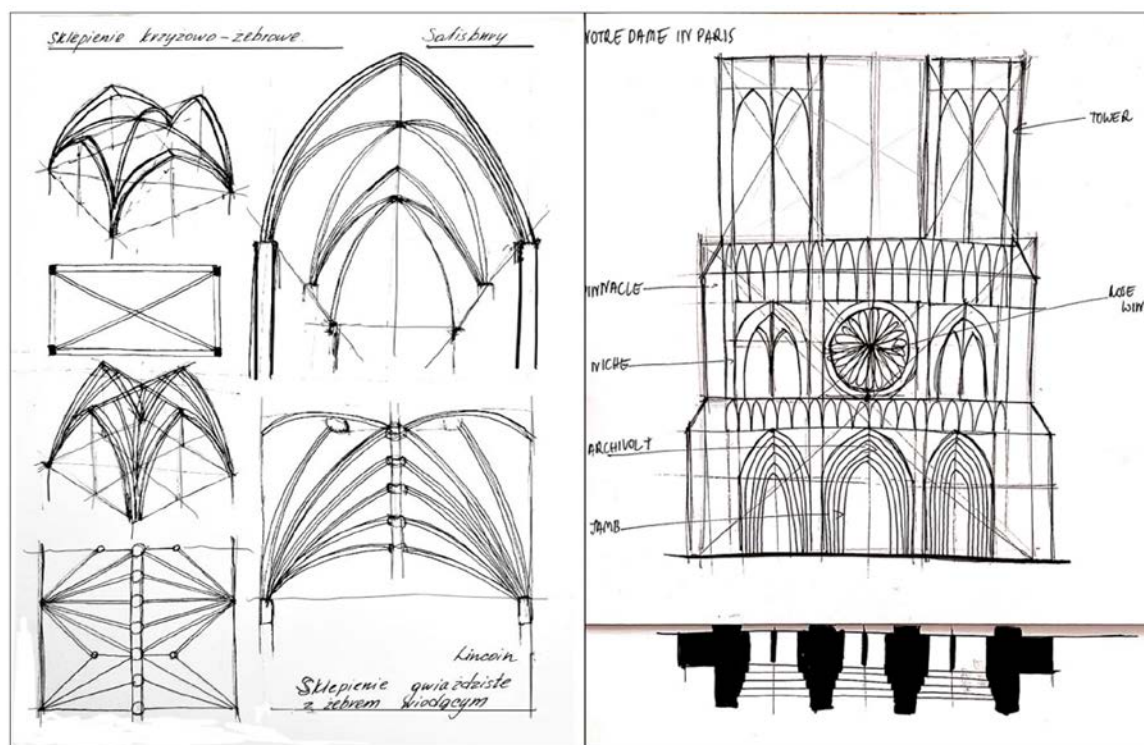


Figure 1: Examples of students' analytic drawings presented in the drawing part of the History of World Architecture examination after the first semester of study in the 2020/2021 academic year in the FA-GUT. Drawings by: Yeva Hetmanenka (left) and Natalia Pardej (right).

HISTORY OF WORLD ARCHITECTURE EXAMINATION AT THE FA-GUT IN 2020/2021

The History of World Architecture examination is conducted every year, after the first and second semester of study. The principles of the examination are more or less the same every year. It consists of two parts - a drawing part and a test part. The drawing part of the examination includes four drawing tasks, to cover the four main components of the course:

- 1) prehistory and ancient Egyptian architecture;
- 2) ancient Greek architecture;
- 3) ancient Roman and Early Christian architecture;
- 4) Romanesque and Gothic architecture.

This part lasts two hours - half an hour for each drawing task. The test part of the examination includes a few selected questions concerning the above-mentioned four components of the course. It is usually a test with open-ended questions to which the student must give a short answer. This section lasts up to 30 minutes. The whole examination is then checked and evaluated by teachers, and the final result is the average mark of both parts for every examined student.

The methods employed during the History of World Architecture examination are aimed at presenting a broad spectrum of the students' knowledge and understanding of architectural history. However, in view of quality assurance in educational assessment, these methods have to be checked and analysed in relation to their reliability, effectiveness and accuracy. Such an analysis was performed in the winter semester of the 2020/2021 academic year and its outcomes are presented in this article.

In many respects, that academic year, which is still continuing at the time of writing this article, has been unique. This is due to the Covid-19 pandemic, and the fact that all academic activities, including examinations have been conducted on-line. At the beginning of the pandemic, the majority of Polish universities introduced special informatics platforms dedicated to performing those activities at that time. At the GUT, all lectures, exercises and examinations in 2020/2021 have so far been conducted through such a platform, called *eNauczanie*, and have been electronically recorded, rated and

noted in an electronic grading log. Thus, an opportunity was created to closely investigate the methods of examining students' knowledge in every educational course at the GUT, including the History of World Architecture course.

Generally, the quality of the winter 2020/2021 History of World Architecture examination did not differ much from the previous, usual ones. The drawing part of the examination was very similar to that performed every year, with the students physically present at the University: four drawing tasks, covering each of the four main components of the course and checked after the examination by teachers. The drawing tasks were constructed in such a way, as to ensure the individual authorship of every student's work despite the lack of direct teacher control.

The test part of the examination, however, was constructed differently from the usual routine of previous years. Firstly, there were more questions in the test, which was possible due to the fully digitalised test delivery. Secondly, closed-ended questions were included, instead of open-ended, with four multiple-choice answers for selection in each question. A test with closed-ended questions was much easier to digitalise and to check digitally.

This fully digitalised examination process allowed for a system-supported analysis of the examination results, for checking the reliability of the examination methods and for their clear comparison. That analysis was then supplemented by a students' questionnaire, focussed on the evaluation methods of their knowledge during the History of World Architecture examination, specifically, the efficiency, usefulness and difficulty of those methods.

RELIABILITY, DIFFICULTY, EFFICIENCY AND USEFULNESS OF THE EXAMINATION METHODS

The comparative analysis of the two evaluation methods of students' knowledge in architectural history was conducted for two separate instances of the History of World Architecture course scheduled in the year 2020/2021 at the GUT - one for Polish-language students and the other one for English speakers - including the Erasmus programme students. The Polish-language group had 170 students, while the English-language group - 30. The analysis included the results of the first-term examination, with a high presence of students; only three students were absent in the Polish-language group and six in the other group.

In analysing the two methods used for the History of World Architecture examination, the first issue raised concerned the general accuracy and appropriateness of those methods, in view of the students' results. This issue was investigated through the University's *eNauczanie* platform. For both methods - drawing and test - the outcome of this investigation was presented graphically as a system of coordinates with the number of students taking part in the examination on the vertical axis, and the number of points achieved by these students on the horizontal axis (see Figure 2 and Figure 3 below). The points were directly related to the final grade for the examination, which ranged from grade 2 for the minimum points, up to grade 5 for the maximum points.

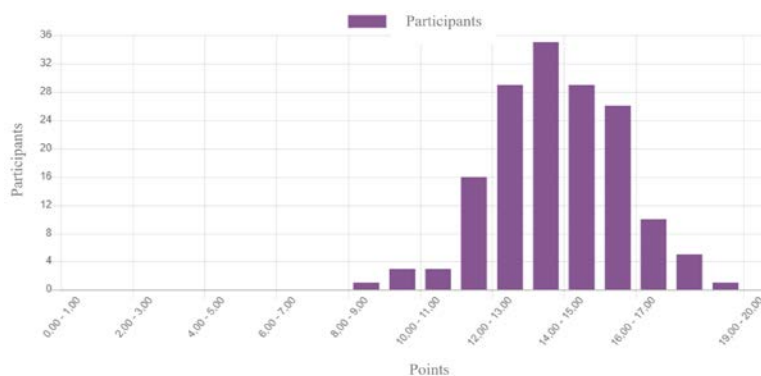


Figure 2: Analysis of students' results of the drawing part of the History of World Architecture examination after the first semester of study in the 2020/2021 academic year at the FA-GUT.

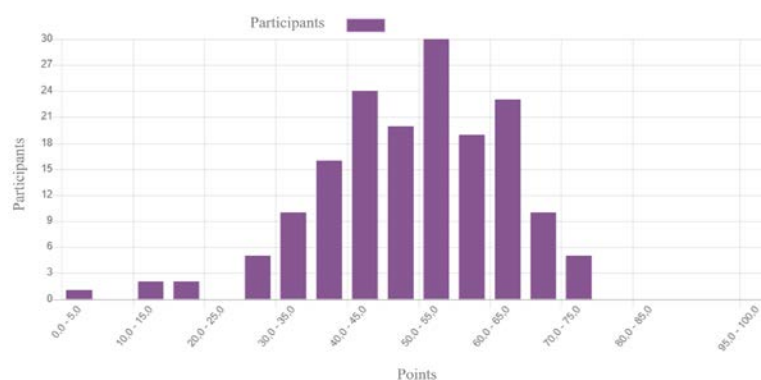


Figure 3: Analysis of students' results of the test part of the History of World Architecture examination after the first semester of study in the 2020/2021 academic year at the FA-GUT.

The IT-supported analysis showed a Gaussian curve result for both of the examining methods, which means that both of the methods were reliable and appropriately used to evaluate the students' knowledge. Besides this, the comparison of the two Gaussian curves indicated that the overall results of the drawing part were better than of the test part. For the drawings, the average student grade was between 3.5 and 4.0 (13-16 points, with a maximum of 20 points), and for the test part, the average grade was between 3.0 and 3.5 (40-65 points, with a maximum of 100 scores). The difference between the grades of the two examination parts was even more visible in the English-language course, where the average grade for the test part was lower and stayed around 3.0 (40-55 points).

A good supplement to that investigation was the students' questionnaire, which conducted shortly after the examination presented the problem from the students' perspective. The majority of students who participated in the written examination took part in the questionnaire, i.e. 128 students from the Polish-language course, and 20 students from the English-language course. All the students were asked to evaluate and compare three aspects of the test and the drawing method:

- 1) efficiency in examining the student's knowledge and understanding of the History of World Architecture course content;
- 2) usefulness in the delivery of the History of Word Architecture course;
- 3) difficulty of the method in examining the students' knowledge and understanding of the History of Word Architecture course content.

The range of possible answers were: very high, high, medium, low, do not know. Table 1 shows the Polish-language students' responses within that range.

Table 1: Responses of the Polish-language course students to the questionnaire comparing the efficiency, usefulness and difficulty of the test and drawing methods implemented during the History of World Architecture examination. The questionnaire was conducted in February 2021 at the FA-GUT.

	Very high	High	Medium	Low	Do not know
Efficiency					
Test	9	64	39	12	4
Drawing	37	62	23	3	3
Usefulness					
Test	20	51	44	12	1
Drawing	40	60	24	4	
Difficulty					
Test	47	51	30		
Drawing	35	61	29	3	

The first overall conclusion from the questionnaire was that almost all students have formed very strong opinions about the examination methods. Out of the 888 total answers given in the questionnaire (768 by the Polish-language students and 120 by the English-language students) only eight chose the *do not know* option - all in the Polish-language course. The following conclusions were also important. When comparing the two examination methods, the majority of the students in the Polish-language course evaluated the efficiency and usefulness of the drawing method decidedly high: 78% of them marked the *high* or *very high* option. At the same time, the test method was recognised by 57% as highly efficient and useful.

By contrast, the difficulty of both methods was rated almost the same in every category: 75% of the students rated it as *high* or *very high* and 25% as *medium*. The meaningful difference in judging the difficulty of the test method by the English-language course students must also be noted. As many as 85% of them indicated the significant difficulty of the test method, which may explain their relatively poor average grade for the test. A possible reason for this might be related to language problems, because the participants of the English-language course were students from many different countries, and none of them was a native English speaker.

CONCLUSIONS

The results of the IT-system analysis and the students' questionnaire responses indicated that both the test and drawing methods used in the architectural history examination are methodologically appropriate, efficient and useful. The drawing method was rated as more efficient, and the test method as more difficult. But, both of those methods proved to be appropriate in examining students of the History of World Architecture course, and can certainly be implemented across every academic course in which the general knowledge is as important as the ability to present it via drawing [7].

REFERENCES

1. Kim, M-S., The effects of a capstone design course in industrial and management engineering: students' evaluation. *World Trans. on Engng. and Technol. Educ.*, 18, 4, 410-416 (2020).

2. Ilkovič, J., Špaček, R. and Ilkovičová, L., Internal and external evaluation in entrance procedures at FA-STU. *World Trans. on Engng. and Technol. Educ.*, 16, 4, 325-333 (2018).
3. Directive 2013/55/EU of the European Parliament and of the Council of 20 November 2013, amending Directive 2005/36/EC on the Recognition of Professional Qualifications and Regulation (EU) No 1024/2012 on Administrative Cooperation through the Internal Market Information System. *Official J. of the European Union*, I, 354/132, 46 (2013).
4. Nyka, L., Cudzik, J. and Urbanowicz, K., The CDIO model in architectural education and research by design. *World Trans. on Engng. and Technol. Educ.*, 18, 2, 85-90 (2020).
5. Sołtysik, M.J., Developing students' spatial skills and teaching the history of architecture through *structural drawing*. *World Trans. on Engng. and Technol. Educ.*, 18, 1, 12-17 (2020).
6. Kowalski, S., Samól, P., Szczepański, J. and Dłubakowski, W., Teaching architectural history through virtual reality. *World Trans. on Engng. and Technol. Educ.*, 18, 2, 197-202 (2020).
7. Borucka, J. and Macikowski, B., Teaching architecture - contemporary challenges and threats in the complexity of built environment. *Proc. IOP Conf. Series: Materials Science and Engng.*, 245, 082058 (2017).

