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THEORY VERSUS PRACTICE. SEARCHING FOR A PATH OF PRACTICAL EDUCATION

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Abstract: The introduction of a three-tier model of higher education (the Bologna model) has led to considerable changes in the 1st- and 2nd-tier of the technical courses at universities. At present, a student with a bachelor's degree can be employed in his / her profession after completing only 7 semesters of study. A search is under way for methods of combining theoretical knowledge taught at universities with practical knowledge gained afterwards. This is accompanied by technological and economic transformations, creating the need for new programmes and teaching methods in order to keep graduates up to speed with the ever-changing global labour market.
This paper summarizes attempts to incorporate real-life labour market experience into the process of educating students in the Architecture Department. This has been achieved through a series of lectures by business owners delivering construction technologies, hands-on student training, as well as student competitions organized by companies.

Keywords: architecture, student education, theory, practice.

Introduction - the Bologna system

Signed in 1999, the Bologna declaration changed the face of higher education in Europe. Its main goal was to create, by 2010, the European Higher Education Area with similar standards of education. Higher education was divided into three tiers: bachelor's studies, master's studies, doctoral studies[1]. Each of them takes a specific number of semesters: bachelor's – a minimum of 6; master's – 4 semesters; doctoral – 8 semesters[2]. The adoption of ECTS credits (ECTS – European Credit System Transfer) facilitates and promotes student mobility.
In the subsequent years, the Bologna process came to include, as one of its aims, promoting life-long education, creating a National Qualification Framework, ensuring education quality, furthering cooperation between universities and the labour market, as well as internationalization of university education.

The upsides and downsides of the Bologna system

The Bologna system has its upsides and downsides. After completing the first tier, it is possible to continue studying at the same university, apply to a different one at home or abroad as long as it has the same profile, or enrol in a related course. Also, bachelor degree holders may start a professional career and continue their studies later. It is possible to choose a university in a country which has committed itself to the Bologna process and the credit system. This is the main benefit of the Bologna system, the others including opportunities for new cultural experiences abroad, dealing with new challenges and teaching methods, a feeling of freedom and belonging to a global society.

[1] Not all universities have adopted this system. For example, medical, art, and law departments have retained the one-tier model.
[2] At Faculty of Architecture at Gdańsk University of Technology the bachelor's course takes 7 semesters and ends with the grant of an engineer's degree in architecture; the master's course takes 3 semesters, ending with the grant of a master's degree; the doctoral course takes 8 semesters, ending with the grant of a doctoral degree.

However, the Bologna system is not free from flaws. The present economic situation[3] combined with a lack of job experience and skills makes it difficult for students to find a job after 3-3.5 years of study. Employers take advantage of the situation by hiring first-tier graduates for a part-time on a temporary basis. Also, first- and second-tier students in such a system are under increased mental and physical pressure, having to take two final examinations and produce two diploma papers.

The problem here is how to prepare for a professional career in such a short time those students who are planning to complete only the first tier and how the universities should respond to the labour market. Architecture is a very special course of study. It lies at the intersection of exact sciences, technology and humanities. For an architect to properly understand his/her duties, he/she should have both technical and manual skills, as well as the ability to engage in business negotiations with investors and construction companies.

Cooperation with companies

Faculty of Architecture at Gdańsk University of Technology is making efforts to provide first-tier graduates with solid technical knowledge, as well as the ability to design structures and produce basic design drawings. With a wide array of design and construction technologies available, it is necessary to select representative ones among them to be applied in semestral and diploma papers. For that purpose, a programme has been developed to integrate industry-supplied know-how and experience into the teaching process. Lectures have been offered since the academic year of 2012/2013[4] (Fig. 1).

At present[5], in the 6th semester, series of lectures are in progress, conducted by companies which have agreed to share their solutions in technology and materials with students[6]. As the 7th semester in the bachelor's course spans only 10 weeks and lectures are held once weekly, 10 construction companies present their offers. From the academic year of 2016/2017 onwards, the programme will include 15 weeks of classes during which 14 different companies will be able to present their product and technology offerings.

The lecture topics have been selected to give students the knowledge necessary to produce their diploma works[7]. The order, in which the companies will appear, has also been selected to match the contents of classes in a given semester, as well as provide the student with practical knowledge which he / she can apply in his / her diploma work (Table 1).

University cooperation with the construction companies is mutually beneficial and conducive to the exchange of experience. The students receive accurate information directly from the most knowledgeable experts and have the opportunity to ask questions. They are also guided as to where to look for product information and solutions for a construction design. This will benefit them greatly in their professional work after graduation.

The companies which hold the lectures benefit through the opportunity of presenting their products and technology, as well as finding future clients, who will use these in their professional work.

Two of the companies organize annual competitions, in which students make drawings presenting selected products and technologies for the company. The most important criterion is to create an innovative solution, using DORMA and KANUF products. Each edition of the competition hosts around 20 students (Fig. 2a and 2b, Fig. 3).

[3] The main problems include a shortage of small investors, as well as the predominance of large corporations (very often, design offices are just branches of star-chitect companies) with a limited number of permanent positions.

[4] Initially, the lectures were intended for students working on their diploma paper at the Department of Maritime and Industrial Architecture under the supervision of PhD arch. Piotr Marczak. Since the academic year of 2014/2015, the lectures have targeted all students of the 6th semester.

[5] Until the academic year of 2015/2016, the lecture series took place in semester 7.

[6] Some of the companies have refused, for various reasons, to conduct lectures, training sessions or presentations for students.

[7] The topic of the diploma work was a building with a utility surface of approx. 2,000 m^2 intended as a collective dwelling (hostel or dormitory) in selected locations around Gdańsk, for which a Local Spatial Management Plan had been developed.

Fig. 1. A lecture by a company KLIMATHERM (P. Marczak).

Table 1. The order of company presentations in the summer semester of 2015/2016

	Company name	Industry	Adaptation to the stage of the project
1.	KNAUF	general building: drywalls system, AQUAPANEL indoor and outdoor system	technological design, construction of walls and enclosures
2.	MERCOR	passive fire protection systems	identification of dangers, choice of fire protection.
3.	DORMA	sliding and folding movable glass partitions, automatic door systems	partition of the space, accessibility oof the rooms
4.	LEIER	general building: walls, ceilings	choice of the structural system
5.	KLIMATHERM	ventilation, air conditioning	choice of the mechanical ventilation and air conditioning system
6.	AGC	glazing for house and buildings	choice of the glazing system, thermals, acoustics
7.	ALUPROF	window and door systems, facade systems, anti-burglary systems, passive and energy-efficient building	choice of the façade systems
8.	BAUDER	green roofs	environmentally-friendly solutions
9.	GEBERIT	sanitary products	choice of installation systems and sanitary drainage of rainwater and snowmelt
10.	KONE	passenger and cargo lifts	choice of lift systems, universal design

a) *b)*

Fig. 2. Diploma works entered in the competition organized by 2a. DORMA (by A. Zawora), 2b. KNAUF (by A. Kusiak)

Fig. 3. Competition results and awards ceremony (E. Marczak).

Student competitions

Another way for students to gauge the real needs of the market is to participate in competitions organized by companies or institutions. The competition requirements are representative of real-life situations in everyday practice. It is a great exercise for students to tackle investor demands, functional requirements, as well as the regulations imposed by the Local Spatial Management Plan (if applicable).

In the last few years, the following student competitions have taken place: competition for a layout design and functional description of a children's play area in Infobox – a research centre in Gdynia established to observe changes in the urban landscape of Gdynia, located at the intersection of 10 Lutego and Świętojańska streets. The competition was organized by the city of Gdynia together with Department of Maritime and Industry Architecture. The aim of the competition was to design the interior of a room for children aged 6-12. The conceptual design featured:

- a play area located on a level surface positioned to match children's height, with the aim of developing children's manual skills (modelling, building with blocks, etc.),
- interactive game area,
- a scenario for a game which uses the existing and under-construction structures in Gdynia.

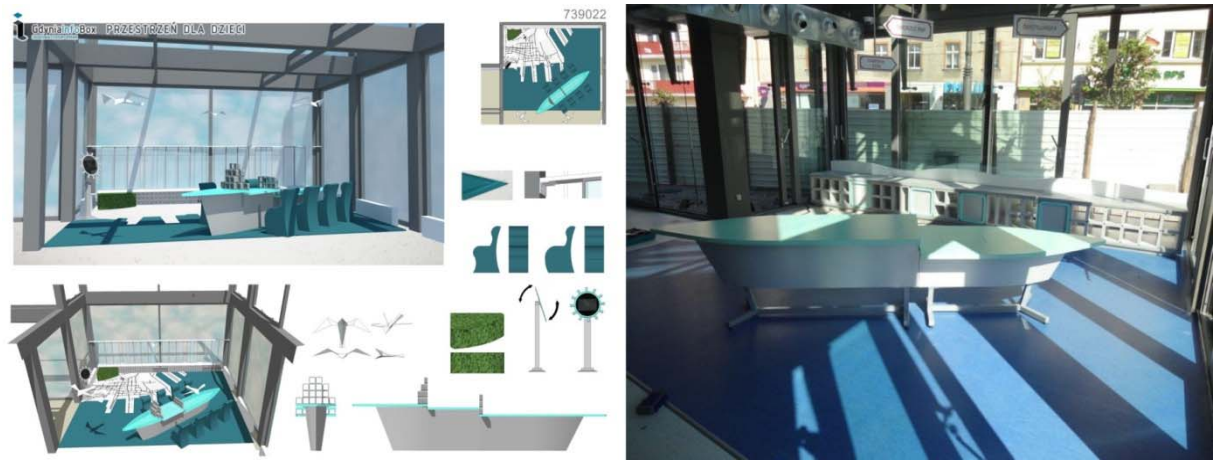
The winning project was executed in real life (Fig. 4a).

The competition was open and hosted students of the 3rd semester master's tier taking elective seminars *Architectural education for primary school children*. For these students, entry in the competition was necessary to obtain a pass for the course. At the execution stage, the conceptual specification of the project was adjusted to include elements from other designs (Fig. 4b).

Other competitions were organized in cooperation with National Maritime Museum in Gdańsk and Society of Friends of National Maritime Museum in Gdańsk. The first, which took place in the academic year of 2013/2014, was for a *Conceptual design of the roof of the exhibition around the Museum* in a prestigious location in Ołowianka Street in Gdańsk. The competition was aimed to find a solution to allow weather protection for museum exhibits displayed in the open. The contest entries allowed the organizers to evaluate the feasibility of various designs in that location (Fig. 5).

The contest was closed and hosted 2nd-semester master's students taking their elective seminars.

The second of the contests, which took place in the academic year of 2014/2015, was for a C*onceptual design for a disabled lift in the Rozewie 2 lighthouse.* The students were to design a passenger lift in such a way as to make it fit in with the lighthouse tower without blocking the sea view. The first-prize winning project was supposed to be executed, but no lift manufacturer took up the challenge of constructing a lift according to the bold student specifications (Fig. 6).



a) *b)*

Fig. 4. a) The winning project (by A. Kunikowska), b) Infobox interior with a children's area constructed on the basis of the winning project (D. Wiśniewska).

Fig. 5. 2nd prize in the contest (by M. Skołucka and M. Napiórkowski).

Fig. 6. The winning project (by T. Jażdżewski and M. Lis).

The competition was open and hosted students of any semester of the bachelor's or master's tier.

The last competition, this time for a *Spatial Plan for the Football Academy grounds* Gdynia, Inżynierska Street, was organized in cooperation with SKS Bałtyk Football Academy in Gdynia in the academic year of 2014/2015. The contestants (3rd-semester master-tier students) were tasked with developing a conceptual design consistent with SKS Bałtyk Football Academy's guidelines and in line with the specific needs of teenagers and children attending the football school. The task also made it mandatory to make the facility available to outside users.

Conclusions

It is assumed that students entering university education are aware of their needs and have a precise plan as to their future career path. When at university, students decide on the extent of their commitment to gaining an education and how much time and energy to spend on studying. This is an individual matter and one which may decide the student's future career.

The original programmes developed by the teaching staff are intended to show students the potential of education, as well as the direction which they should be taking in order to gain, while still at school, useful practical knowledge and skills. Students should be able to develop architectural concept plans. But to produce premium quality documentation, they need to be well-versed in modern technologies and building materials. This gives them a competitive edge on the labour market. Nowadays, the design offices are looking for employees who can handle the design process on their own. The classes conducted by construction companies make the design process more life-like, giving young engineers a chance to align with the market.

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