An Introduction to Architecture and Building Construction: A Starter Module for Freshers of Interior Design

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Abstract: Architecture is an interdisciplinary area itself; a world of design, materials, textures, history, culture, art, technology, construction, visualisation, economics, management and so on. As it consists of many diverse knowledge-areas, the curriculum of architecture is often too loaded with different types of modules. Some modules are delivered only thematically, while some are introductory in order to prepare students to the next core modules. This paper focuses on the content development of the module of Introduction to Architecture and Building Construction, which is delivered to the fresher year of the Department of Interior Architecture and Environmental Design in their spring semestre. The module is required to complete in the four-year curriculum and is formed of two theoretical hours and two practical hours in a week. In accordance with the title as well as the structure of the module, the content was developed in two-folds. The number of the students registered for the module was 24. For the part of Introduction to Architecture, each student was assigned a well-known architect to study, which aimed to make students familiar with the names, their career path, their design approach and building characteristics, the history of movements they followed, their strands in interior design and product design. For the part of Introduction to Building Construction, it was aimed to make the students familiar with the world renowned designs as well as materials and construction technology they used. Using the series of videos explaining the design and construction process of some of the selected buildings in the lectures and the follow-up discussions formed the latter part of the module. Accordingly, the paper explains how the module content was developed, why the rationales were behind and what was aimed to achieve by this kind of structure and content.

1. INTRODUCTION

Architecture means 'the art and/or science of building' [1] with its basic definition. For Sean Lally, who is a futurist and the founder of his multidisciplinary design studio, says: "*Architecture is much more than the building of an object on a site: it is a reinvention of the site itself*". For Blair Kamin, who is an architecture critique and the writer of 'Why architecture matters: lessons from Chicago', says: "*Architecture is not a purely private transaction between architects and clients. It affects everyone, so it ought to be understandable to everyone*" [2]. Even these two quotes are enough to explain the complexity of architecture as well as the complexity of expectations from architecture as a discipline, which is, in fact, not a slight combination but a synthesis of disciplines. Therefore, architecture is an interdisciplinary area. It is a world of design, materials, textures, history, culture, art, technology, construction, visualisation, economics, and management and so on. From the very ancient times to the our space-colonisation thinking times, architecture display all the creativity and novelty of humankind in building shelters, mansions, temples, tombs, settlements from tribal colonies to modern societies, from landscapes to cityscapes. It is impossible not to wonder about the history and the imagination behind as well as the construction technology made it possible to stand when one sees Taj Mahal or La Sagrada Familia. As per these two examples, a design requires one to have an intellectual knowledge of different areas in order to be realised.

Today the education of an architecture student is cumbersome; too much to include in a limited period of time. Although it appears a more focused and a separated discipline, interior architecture/design has also similar problems. Its education needs to establish the link between architecture and interior architecture/design, which can entirely be another topic of another paper, and the link between architecture and further disciplines (e.g. civil and electrical engineering). The link between architecture and interior architecture/design includes history, theory and methodology of design, design principles and inspirations, scales from building layouts to furniture design for a building or historical concept and etc. The latter link includes understanding the design and its buildability, how and why and when a design needs revisions, who takes part in the construction process, how an architect cooperates with other parties and etc. It is not wrong to say that the latter link clarifies the difference between an architect and an interior architect/designer. Hence, this is beyond important to achieve in the very early stage of their education. In universities the academic curriculum of disciplines often includes one or more introductory modules, e.g. introduction to economics, introduction to engineering,

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and introduction to computing for engineers and scientists, in their first year, either in fall or spring semestre. These modules aim to prepare students to the next main modules, which are thematic and contain the in-depth area-specific knowledge of the course being studied. Accordingly, an introduction module is expected to be simple but overarching in terms of delivering the fundamentals such as concepts, models, terminology, and historical flow of movements/ developments/inventions and so on. From an academic perspective, an introduction module is not only to build familiarity with discipline, but is also a medium to increase the interest of students in discipline. This can be achieved through interactive ways apparently, rather than mere oral lecturing for hours.

1.1. Preparation of a Syllabus

It is a great deal of time for a lecturer to construct syllabus well before classes begin in a semestre. A syllabus is a structured layout that shows what topics are going to be covered week by week and step-by-step. Doing so clarifies the lecturer's mind about that the content is sufficient enough and the end of module makes the promise of transmitting the information at a basic level. It also answers the questions of students have in their minds such as 'What am I going to learn in this module?', ' How complicated is it going to be?', and ' How am I going to be evaluated?' [3, 4].

In creating an effective syllabus, it is necessary to articulate module learning outcomes and to include how students will involve in the process of teaching and learning, e.g. by site visits, fieldworks, workshops, assignments, etc. Learning outcomes are statements to describe what students will be able to do in the end of the module [5]. Hence, it is a conditional achievement up to the content of a module. On one hand, for an introductory module, learning outcomes are naturally broad, described on a high-level and often attempt to make familiar with 'key terms', 'key concepts', ' key equations' and etc. On the other hand, for a lecturer it does not mean that a 100-level module is any easier than a 400-level module. Indeed, it means to a lecturer that a student taking such module has no background of the topic or no pre-requisite to pass. Thus, it is often planned with intense information. Taking this assumption helps a lecturer to define a target group and generally an introductory module is planned as a preparation for a next-level module, like Prof. Smith told about his approach to his popular module titled Introduction to Human Evolution [6]. In addition to focusing on developing a full content, a lecturer should also diversify his/her teaching strategies and engage students more with different learning activities to help them learn new and complex information. As Prof. Smith suggests in his talk [7], it should neither be only reading from a textbook in hand, nor reading from a power point slide by turning behind to the students. Moreover, using images should not aim to make class more visual, but it should be used for eye training in terms of making aware of what students look at and what they should recognise and understand in that image, as the way a lecturer sees. The point here is the significance of direct human interaction between lecturer and audience.

Varying teaching strategies is necessary because not every student learn in the exactly same way. Some are traditional learners, who need reading and memorising. Some are auditory learners, who need visuals and sounds. Some are kinesthetic learners, who need more of hands-on activities in class. In traditional methods, we, as lecturers, often ask students show us what they learn in writing short answers in exams or ticking in multiple-choice tests [8]. This comes with a pitfall that our assessment will not treat all students equally. This is why it is much better to construct a syllabus with variations of class activities, homeworks and siteworks and etc.

1.2. Introduction to Architecture and Building Construction

This paper focuses on the content development of the module of Introduction to Architecture and Building Construction, which is delivered to the freshmen of the Department of Interior Architecture and Environmental Design in their spring semestre. The module is compulsory to complete in the four-year curriculum and is formed of two theoretical hours and two practical hours in a week. In accordance with the title as well as the structure, the content was developed in two-folds. For the part of Introduction to Architecture, each student was assigned a well-known architect to study, which aimed to make students familiar with the names, their career path, their design approach and building characteristics, the history of movements they followed, their strands in interior design and product design. For the part of Introduction to Building Construction, it was aimed to make the students familiar with the world renowned designs as well as materials and construction technology they used. Using the series of videos explaining the design and construction process of some of the selected buildings in the lectures and the follow-up discussions formed the latter part of the

Table 1: The First Year Module Programme of the Curriculum of the Interior Architecture and Environmental Design

1st Year FALL				
Code	Module Name	T	P	ECTS
DES102	Basic Design I	4	4	12
DES103	Desigining with Digital Media	2	0	4
ENG101	English 1	2	0	2
MAT101	Mathematics 1	2	0	2
DES101	Orientation in Architecture and Building Construction	2	2	6
ATA101	Principles of Ataturk and Revolution History 1	2	0	2
TUR101	Turkish 1	2	0	2
TOTAL				30
1st Year SPRING				
Code	Module Name	T	P	ECTS
DES105	Basic Design II	4	4	12
INAR122	Materials, Resources and Textiles for Interior Arch.	2	0	4
ENG102	English 2	2	0	2
MAT102	Mathematics 2	2	0	2
INAR121	Introduction to Architecture and Building Construction	2	2	6
ATA102	Principles of Ataturk and Revolution History 2	2	0	2
TUR102	Turkish 2	2	0	2
DES104	Introduction to Art and Culture	2	0	2
TOTAL				30
2nd Year FALL				
Code	Module Name	T	P	ECTS
INAR211	Interior Design Studio 1	4	4	12
INAR212	Structural Systems	2	0	2
INAR213	History and Theory of Interior Architecture	2	0	3
INAR214	Computer aided Architectural Design 1	2	0	3
INAR215	Academic English 1	2	0	3
	Social Elective Module	2	0	3
	Technical Elective Module	2	0	4
TOTAL				30
2nd Year SPRING				
Code	Module Name	T	P	ECTS
INAR221	Interior Design Studio 2	4	4	12
INAR222	Interior Environmental Technologies and Installation	2	2	5
INAR223	Computer aided Architectural Design 2	2	0	3
INAR224	Academic English 2	2	0	3
ARCH001	Summer Practice 1 (20 days)	2	0	3
	Technical Elective Module	2	0	4
TOTAL				30

module. Accordingly, the paper explains how the module content was developed, what rationales were behind, what was aimed to achieve by this kind of structure and content, and how it influenced the students' perspective to the module.

2. MATERIALS AND METHODS

In Table **1**, the first and second year plans are provided. The number of the students registered for the module of Introduction to Architecture and Building Construction was 24. The number matters because the

lectures and tasks for the classes are set according to the number, which helped to manage the content as well as the time throughout the semestre. Following two sections give details of the approach and tasks adopted for each part of the module.

2.1. Part I: Introduction to Architecture

When it is required to develop a content guide for a module, it always starts with searching for examples in other institutions. This aims to inform the lecturer herself /himself in terms of what other peers are doing in their classes, what they teach and how far the module takes their knowledge and skills. This is also beneficial to keep up to date in case the prospective students make an attempt to check what other institutions do in a similar module, to find out whether they run easier or harder, more interesting or rather in a traditional fashion. So this was the preliminary approach for this module as well. For example, the brief of an Introduction to Architecture module, which is taught in the Department of History and Art History (in George Mason University, USA), states [9]*"...introduce students to the history and appreciation of architecture through lectures, readings, and field trips. The module is organized historically, emphasizing basic structural systems, with examples taken from around the world. Supplementary readings will address issues of aesthetics, structure, design, use, and the architect's practice".* In another module brief, which is taught in the Department of Architecture in the College of Architecture and Planning (University of Colorado Denver, USA), it [10] "*... introduces students to the essential ways of looking at and thinking about buildings, sites and cities, exposing students to the various perspectives, positions and practices that they will encounter in both an architecture curriculum and in architectural practice"*. A third exampling brief states [11]: "*Students will come away from this module with an understanding of the vocabulary of architectural form, an awareness of architecture as cultural expression, and an understanding of the world's major monuments and buildings*" as a learning outcome. So what we can understand from these examples is that there is no a certain way of building up a content for an introductory module. It is rather collective and gives the fundamental information that can be delivered at a 100-level module and is usually expected that it will be taken further in a following 200-level or 400-level module.

The question that must be answered here is that 'What does a design student need to know by the end of semestre and to begin the next semestres?'. Naturally, teaching architectural content comes in a historical context, either it is to teach architectural orders or to teach the structural design and construction technologies. For the past few decades, while a student is taught of gothic architecture in classroom, when she/he walks out and go through pages of a magazine or website, encounters the names of Gehry, Hadid and Foster and etc. Consequently, he/she cannot relate how the styles have become so different, how technology dominates all fields of design and, thus, often neglects the past and deems as something to memorise only to pass the exams. However, understanding the past guides to clarify how and why the professions of architecture, interior design, landscape design, urban design, civil engineering and structural engineering and so on are related to each other but become separate professions in time. This is not something to make students acquire by only following a certain chronological order in classes. Therefore, for the part of Introduction to Architecture, the students were asked to do research on the names they were assigned to, which is provided in Table **2**.

It is not arguable that the names listed above must be known by the students of architecture. Each has a particular purpose that is worthwhile to study. Some would tell about how building materials influenced their architectural style. Some would highlight how post-war environment affected their professional practice, and some would emphasise how clients expectations directed their designs; but, all would strengthen how modern architectural history of 19th and 20th century constructed itself and became the way we observe today. In order to consolidate their research, the students were asked to gather information regarding the architect's life, educational background, awards they received, books they published and/or written about their works, quotations about their perspective and thoughts on architecture, a generic list of 10 buildings they designed (not necessarily built) and structural, design and material details of three buildings out of it. The students were allowed a month to do their research and also were allowed to utilise MS PowerPoint or Adobe Photoshop programmes based on their primary skills. The final two weeks of the semestre were planned to deliver their 5 to 7 minutes presentations to the whole class. The presentations were assessed based on the strength of their research

Table 2: The List of Architects Assigned to the Students

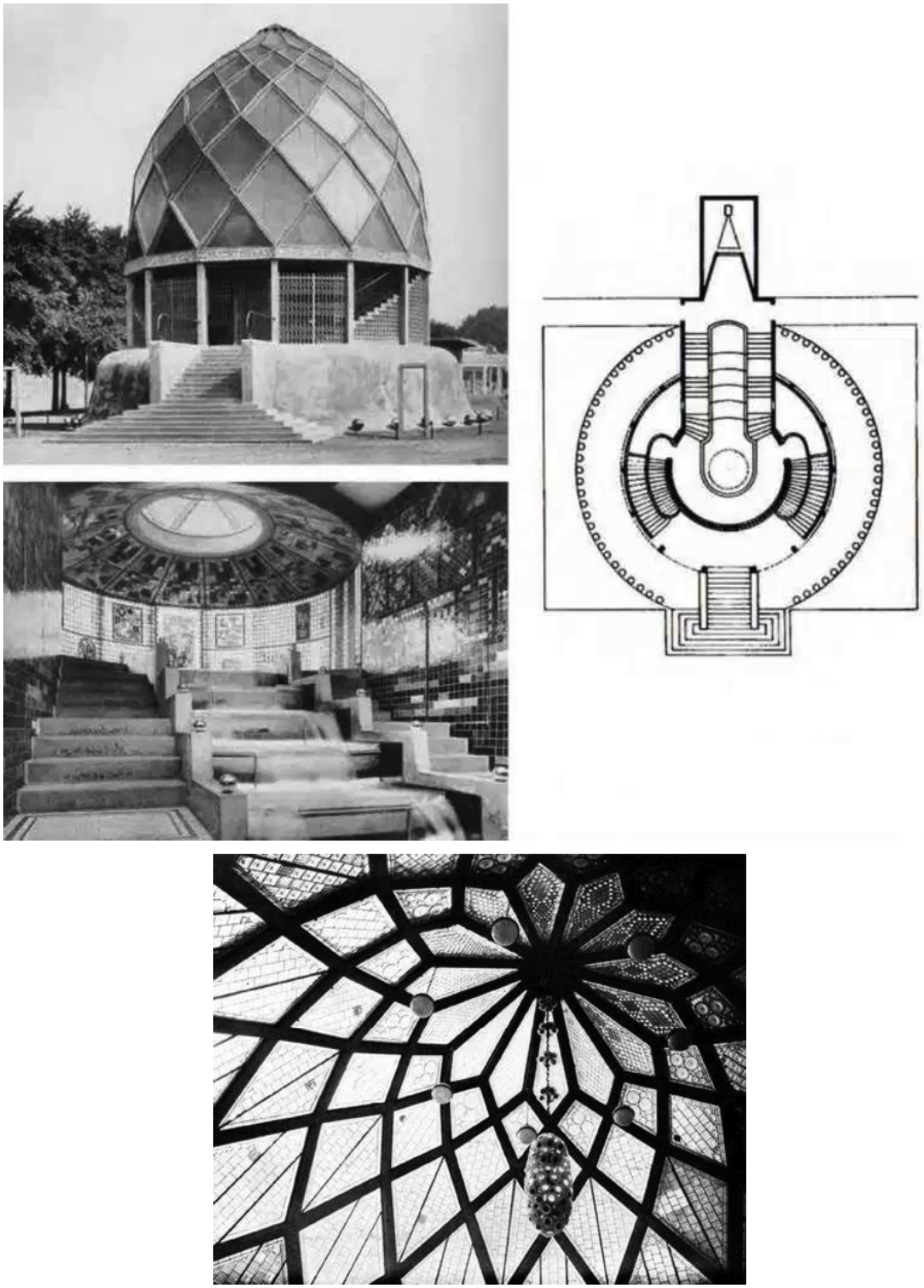
Student #1	Antonio Gaudi (1852-1926)
Student #2	Frank Lloyd Wright (1867-1959)
Student #3	Bruno Taut (1880-1938)
Student #4	Walter Gropius (1883-1969)
Student #5	Alvar Aalto (1898-1976)
Student #6	Louis Kahn (1901-1974)
Student #7	Philip Johnson (1906-2005)
Student #8	Oscar Niemeyer (1907-2012)
Student #9	Eero Saarinen (1910-1961)
Student #10	Frei Otto (1925-2015)
Student #11	Cesar Pelli (1926-x)
Student #12	Frank Gehry (1929-x)
Student #13	Aldo Rossi (1931-1997)
Student #14	Richard Rogers (1933-x)
Student #15	Norman Foster (1935-x)
Student #16	Renzo Piano (1937-x)
Student #17	Peter Zumthor (1943-x)
Student #18	Massimiliano Fuksas (1944-x)
Student #19	Daniel Libeskind (1946-x)
Student #20	Santiago Calatrava (1951-x)
Student #21	David Chipperfield (1953-x)
Student #22	Alejandro Aravena (1967-x)
Student #23	Bjarke Ingels (1974-x)
Student #24	Ma Yansong (1975-x)

and the visual compositions. A time limit for each was set in order to allow enough time to give critiques, by the lecturer of the module and three research assistants, following up their presentations. Below provides few examples of the presentations for Saarinen, Taut and Zumthor.

In education, it is believed that when students are assigned to a realistic task and with a feasible time, they should do their best, and if they do, they learn by heart. This assignment was an opportunity for them to use their skills and to integrate the information available in technological media in the right way. They browsed through Google not to acquire slight information by clicking the first few pages, but to pour as much available information as possible and then eliminate them according to the requirements of the assignment. For example, the student assigned to Saarinen said first she had never heard of him before and so as the rest of the classroom. But as the presentation was delivered they understood why he was an architect they needed to know. Saarinen adopted new structural forms different than his era and even only because of his furniture designs, he is a pioneer in the industry of interior design. His works took attention that many books were published [Figure **1**]. Calatrava was rather known among the class because of his contemporary projects, but not because of his

Figure 1: Some of the books written on the Saarinen's design works. (**a**) Eero Saarinen: Objects and Furniture Design: By Architects Series Hardcover – 2013 by Antonio Román (Introduction), Eero Saarinen (Artist). (**b**) Eero Saarinen: Furniture for Everyman by Brian Lutz (Author). (**c**) Eero Saarinen - 1st Edition/1st Printing by Allan Temko, New York: George Braziller, 1962. (**d**) Eero Saarinen: Shaping the Future Paperback – 2011 by Donald Albrecht (Editor), Eeva-Liisa Pelkonen (Editor). (**e**) Eero Saarinen 1910-1961: A Structural Expressionist 25th Anniversary ed. Edition by Pierluigi Serraino (Author), Peter Gossel (Editor). (**f**) Eero Saarinen: Buildings From The Balthasar Korab Archive Hardcover – 2008 by Long David De (Author), C Ford Peatross (Author).

artistic sketching and sculptures exhibited in museums. When one sees the drawings and sculptures, he/she can understand Calatrava is amazed by some certain anatomic forms such as birds and human body. Another 'never heard' architect was Taut in the class. This is quite unfortunate and I must say that there are maybe architecture students in Turkey never heard of him. Taut is Germany-born architect who continued to his profession in Istanbul, Turkey, after the burst of the First World War. Taut involved also in architectural education in an academy in Istanbul and wrote a book based on his experiences. 'Glass Pavilion' [Figure **2**] is the most significant design of him as he believed that glass was a holly material since it is translucent of light. The Pavillon was built when *expressionism* was at the highest in Germany [12]. In Figure **3**, some of the



Lamella dome structure of Glass Pavillon by Taut.

Figure 2: The Glass Pavillion by Taut, built for Expo 1914.

Figure 3: Books by and on Taut's works and utopian world. (**a**) Bruno Taut, 1880-1938 (Schriften des Instituts für Städtebau und Architektur) (German Edition) (German) Hardcover – 1983 by Kurt Junghanns (Author). (**b**) Bruno Taut and the Architecture of Activism (Cambridge Urban and Architectural Studies) 1st Edition, 2010 by Iain Boyd Whyte (Author). (**c**) Das japanische Haus und sein Leben. (German) Hardcover – December 1, 1997 by Bruno Taut (Author). (**d**) Bruno Taut's Design Inspiration for the Glashaus (Routledge Research in Architecture) 1st Edition, 2015 by David Nielsen (Author). (**e**) The City Crown by Bruno Taut, Matthew Mindrup, Ulrike Altenmüller-Lewis, October 12, 2017 by Routledge.

books on Taut's works are listed. The latest book is an English translation of the City Crown (Die Stadtkrone) written by Taut under the influence of World War 1. He wrote this anthology to promote an utopian urban concept [13]. Another architect in the list was Zumthor, and his 'Steilneset Memorial' [14] in Norway illustrates how simply a structure could be designed in a single material, timber [Figure **4**]. His 'Therme Vals' in

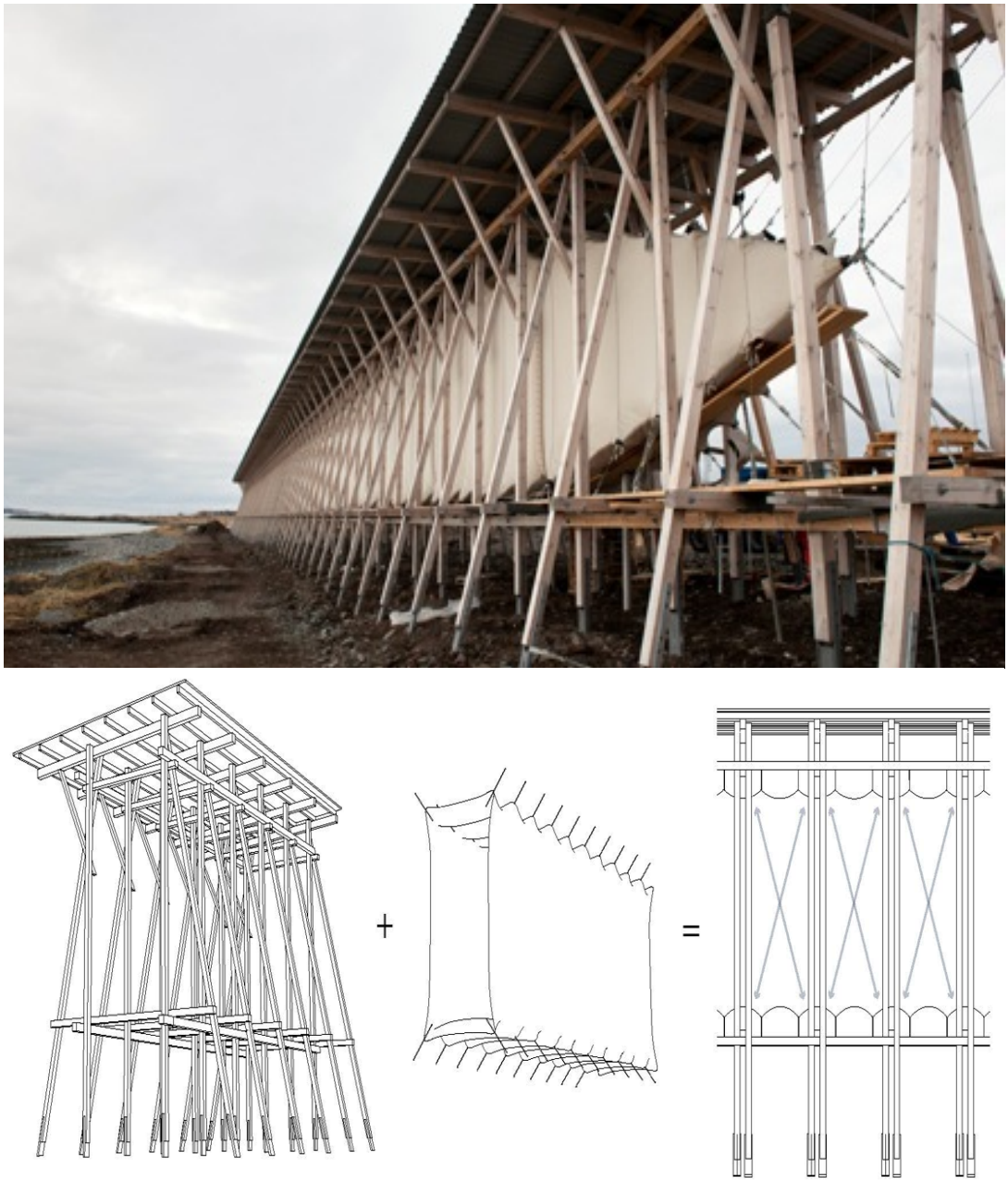


Figure 4: A design of simple timber structure by Zumthor, The Steilneset.

Switzerland also illustrates how far a building could be stoned by building in stone. Some of the works of Foster, Saarinen and Pelli were concurrently heard in the other half of the module: Introduction to Building Construction.

2.2. Part II: Introduction to Building Construction

"Architecture is the result or the product of several sequences and efforts, the combination of many talents and skills, the real manifestation of a real concept. (...) The process of delivering the finished project is simply called 'construction'. (...) Construction and architectural projects are not a series of isolated events (...)" [15].

The above explains why architects need to know about the process of construction since it inevitably starts with architecture at first. For an architect, it is necessary to know about building materials, structural designs, site and project and time management. One does not master all of them, but need to have a background enough to anticipate how it is going to be easy or challenging, economically feasible or pushing the budget hard, and so on. Particularly, an architect needs to understand when and why he/she must compromise his/her design due to the engineering systems (e.g. modeling calculations, material and component production and transportation, and etc.).

Yet again, teaching of all of these topics is a quite ambitious task to achieve and, in fact, not all candidates of architecture are necessarily interested in learning them all. Thus, schools build their curriculums in a way to introduce them at a basic level, which omits details and not in an integrated fashion.

For example, teaching structures to architecture students has always been a challenging issue in the schools. Applying mathematical procedures to find out whether a structural system design can stand alone or requires a better design is found complicated by architecture students [16]. There also has been the dilemma of who should teach the topic to the students? By an engineer, who knows all about the mathematical estimations that need to be run to make a design buildable, or by an architect, who has an innovative perspective to design new building forms by considering the fundamental physical principles of structural components [17]. Taking modules related to the construction of structures (statics and strength, structural design and analyses, etc.) is often a burden, and even *obnoxious* by the words of Mario Salvadori (one of the significant structural engineers of the 90s), for the most of architecture students, and likely worse for the interior design/architecture students [18]. Wood (2006) argues that many schools of architecture barely include a serious teaching of construction technology; rather they heavily rely on design concepts, aesthetical values and theory of architecture, which makes it an intellectual pursuit. In addition, he also argues that 'construction' is often seen as an add-on activity and usually is taken into consideration "*after the design is finished*" [19].

On the other side, structural engineers can sometimes judge architects by not respecting the principles so as not anticipating the structural consequences of their designs [17]. In between the clash of the disciplines, a common issue concerns both: "*Most architectural graduates possess a good understanding of the design process and broad design concepts but lack a knowledge of the practical and technical aspects of construction (…) Most engineers and architects leave school with inadequate knowledge of the role of technology in their profession (…) Technology has been largely eliminated from the engineering curriculum in most schools so as to focus on science, math and basic engineering principles*" [20].

Nevertheless, it is indisputable that an architect must understand the basics of structural behaviour of what he or she designs even without dealing with pages of mathematical analyses and verification models. Hence, usually through project-based analyses, case studies or haptic learning exercises lecturers attempt to teach the principles behind the assembly of elements [19, 21, 22].

Mario Salvadori, an Italian structural engineer who had taught at Princeton and Columbia Universities, looked for ways to simplify and explain the logic behind structural designs and their construction. His book, the Art of Construction, explains the basic principles of why we build structures in their contemporary shapes today, how their design evolved, e.g. from making a primitive tent standing alone by the support of a single pole in the middle to its modern look, and name, membrane/tensile/cable structures. Telling about structural designs from their architectural exposure as a design value was another approach in the literature by Charleson. In his opening in the book [23], he wrote that *"This book therefore seeks to change a view of structure, common among architectural students at least, as a purely technical component of architecture, and at worst, a necessary evil"*. And, he continued by that *"As designers, we need to ask ourselves how structure might assist us to add aesthetic and functional value to our design work, thereby enriching it"*. This emphasises that architects should appreciate the structural design and its elements which stand-up their design. In another way, to understand the design-specific structural system development, it is better to focus on the conceptual designs.

Understanding structural systems does not happen by putting numbers together for an architecture student, but it happens through learning building materials in terms of their strength and weaknesses, their capacity to be used in certain structural systems, and their advantages and disadvantages. Let us think of why the Giza Pyramids were built in rocks and given that certain shapes, or how rammed earth is different than fired bricks, or why Brunelleschi's Dome of Florence Cathedral is significant not only by its large masonry dome, but also by its building-up scaffolding system around. These questions can be multiplied and up to date. For example, how did we start building skyscrapers? In order to answer questions, one should focus on materials and building technologies. Furthermore, an architect is also responsible of delivering what exactly they designed for their clients, and to achieve this he/she needs to cooperate with other technical people. Particularly, the pressure is big when it is about a prestigious building. Accordingly,

Table 3: The List of Videos Used for Lecturing, all are from the Series of *Mega Structures* by *National Geographic*

Link Available to Watch	Project Title
https://www.youtube.com/watch?v=7_pRQjLylWc	Aldar Tower, Abu Dhabi
https://www.youtube.com/watch?v=HRdMRzvnVwc	Marina Bay Sands, Singapore
https://www.youtube.com/watch?v=g3kj-kJwQk0	Petronas Tower, Malaysia
https://www.youtube.com/watch?v=zL7izruKpE8	Khan Shatyr, Kazakhstan
https://vimeo.com/91965266	Alhambra Palace, Spain
https://www.youtube.com/watch?v=uMAKWq8FCcU	Colosseum, Italy
https://www.youtube.com/watch?v=Wo66kiQeUyw	Hagia Sophia, Turkey
https://www.youtube.com/watch?v=jO8hiV3BtfA	Science of Steel
https://www.youtube.com/watch?v=paS6KhzpCbk	Science of Brick
https://www.youtube.com/watch?v=eigBF19aYmA	Skyscraper

instead of lecturing in a monotonous way by following chapters of a structural design book, or putting material use in historical order and neglecting talking of the kinds of problems that can be encountered in such projects, it was aimed to be more collective visually. Using videos as tools to transmit the information was the method for this part of the module.

Video demonstration has become a widely preferred practice in all levels of teaching. However, it is not widely documented why and how videos are used and how far this method is effective on students. Hoxley and Rowsell (2006) explained their experiences of using videos for the Building Technology and Services module which is an introductory module for the first year of architecture, civil engineering, construction management and surveying in the Department of the Built Environment of the Anglia Ruskin University [24]. What they focused was an active learning through testing students about the videos at different stages. For example, they first gave a short quiz to the students to fill during the playtime; but, they noted that "*students spent more time looking down at the quiz than watching the screen*". As Wood (2006) put in words, "*As academics, one of the major pressures facing us is the fact that the majority of students only take an educational activity seriously if it is assessed*" [19]. In this regard, it is quite true to say that a short test or a quiz is required in order to make sure the student pay attention to the video, but surely it should not be in front of the student meanwhile the video is on screen. In the end, they found that giving an introduction before the video and feedback of the quiz answers after the video played was the effective mode as to the results of the students' survey. The survey also revealed the reasons behind the students' support for the use of videos, and that was because they showed the actual site processes and made the subject come alive in the eye of the students.

Accordingly, a collection of the videos displaying the construction and design process of some of the most significant buildings in the world was put together in a list given in Table **3**. The videos preferred were narrated in Turkish, and displayed during the class hours. In the end of the video, a follow-up questions and answers session was held.

To begin with the Aldar Tower [Figure **5**], which they had never heard before, the video narrated the story of how simplicity inspired an architectural design. It was planned to be a symbolic structure to promote the city. The architect, Marwan Zgheib, was asked to design what was extraordinary, and when he came up with the idea of a circular shape, the question was how to balance the shape on the ground to make it stand. The geometry was the answer again that he placed a pentagram into a circle to find the two base points where the building would have foundations. The design was truly new that no skyscraper in this shape was built before, which required unconventional approach to the construction. Throughout the video the students learnt how many different disciplines involved, from architect to project engineer, from wind engineer to construction manager, in order to accomplish the delivery of the project on time. A wind engineer had to involve

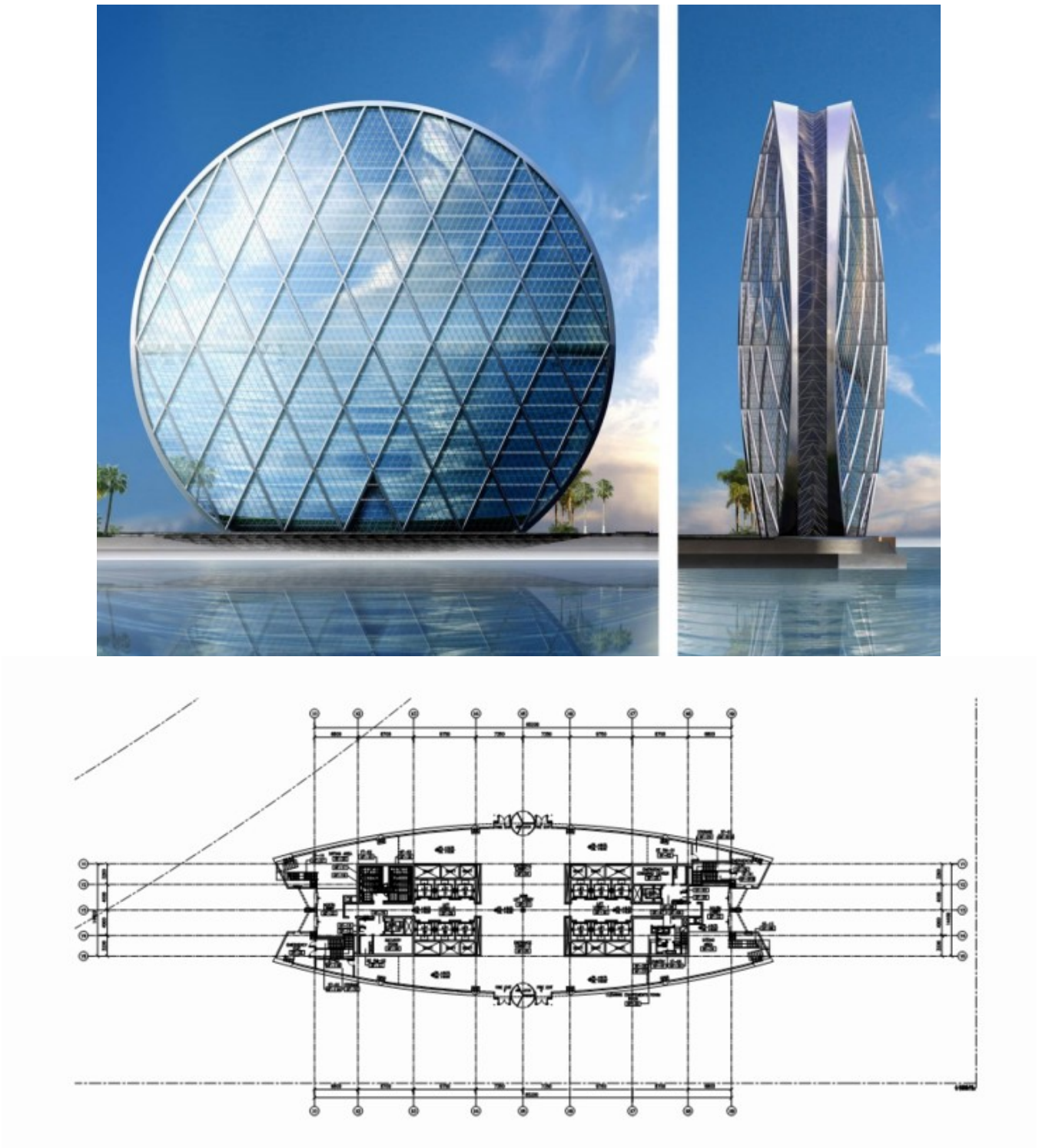


Figure 5: The Aldar Tower project and its floor plan showing the axes and cores.

because of the geometry and the height of the building. Structurally, the geometry required two cores [25] built in reinforced concrete, which was different from the conventional approach to the square and rectangular shaped skyscrapers, in order to prevent the rotation of the building by the wind forces and ground water pressure. Besides, to make sure the site work was in a line with the schedule, the construction workers of the cores were divided into two teams and drawn into a competition as which team was going to finish first. The same method was also used in the construction of the Petronas Towers. So, the students learnt how such simple idea could be utilised in this kind of profession and used to excite workers to speed up the building

Figure 6: The Khan Shatyr by Norman Foster and its section showing the tripod structure.

process. Another architectural lexicon the students heard of was ‘diagrid’, which was used to describe a type of exterior facade built in steel in order to carry large triangular glasses. In the video, it was also explained why the diagrid facade glasses had to be in triangular form and not in rectangular form, which was simply because of the geometrical behaviour that a rectangle shape has four sides in two direction, x and y, and so is bendable only in two sides in same direction, both in x or both in y. In contrast, a triangle shape has three sides so in addition to x and y, it has also z direction, though in two dimension. This makes it bendable in all of three sides with a slightly flat centre. This was fitting to the convex form of circular facade of Aldar Tower.

The Khan Shatyr [Figure **6**] project was the first time the students heard of ‘tent’ structures since it was promoted as ‘the biggest tent in the world’. This was yet another significant project by Norman Foster, to

which a student was assigned to do research about in the first part of the module. The video narration began with an emphasis on that the construction was two years behind the schedule and the president of Kazakhstan was putting pressure on the construction team to deliver the project for its opening on his birthday. The look of the capital city, Astana, had a similar look to what Las Vegas in USA had, i.e. skyscrapers built in concrete and steel in many different forms. Nevertheless, this was not satisfying for the president as he dreamed of a giant building that provides tropical climate inside while it is minus degrees outside, as the natural climate of the country, and serves to ten thousand people at the same time. So, like that happened in the Aldar Tower project, the pressure was again on the architect, who was the person being asked to design something 'never seen' before. The inspiration to Foster came from 1960s, the futuristic idea by Buckminister Füller who introduced geodesic dome to the world of architecture. His utopian project was never built over New York, but Foster took this opportunity and used existing technologies to make it real over the rural Astana. This was an example of the fact that how the pioneer people still amaze today's *'starchitects'* who design our cities. Gropius, Otto and Taut along with Füller were, thus, the names that the students were becoming familiar with eventually. Structurally, building a giant geodesic dome has the risk of large deformations. Therefore, today's easy-build-up technology was adopted: tension cables. A giant tent, Figure **6**, was going to be wired with cables and supported by an asymmetrically positioned tripod. This kind of construction approach was more beneficial considering the proportion of the mass of structural materials to be used and the area to be covered. Besides, choosing a tripod was also a deliberate decision since building with concrete was almost impossible in such frosty climate. Similarly, not only deformation was a problem of geodesic dome, but also how to translocate such heavy and large structural components from manufacturer to the site. It was a burden for the budget and delays were very likely. To solve the construction problems a consulting engineer involved. For students, seeing a Turkish engineer, Selami Güler, in such a big project as a construction consultant was exciting. His ideas were in consideration of saving time and budget so that, for example, the hydraulic crane to pull the tripod up was built on site as well as the tripod itself. In addition, the students learnt why snow load matters for structures and how it can be manipulated for a tent structure. For the Khan Shatyr [26, 27] the answer was to give an inclination to the tripod with a rotating tension ring according to the direction of wind and snow loads. Regarding the tent, the fabric-look was going to be created by fixing more than 800 air-filled pillows made of ETFE. This was the first time the students heard of such popular fabric name. They learned through the video how fabric part was manufactured for its exact fit in the tent mesh. As the schedule was tight yet again for this project, the site engineer trained the workers to work in groups to complete fixing process, which eventually turned out a competition between the groups.

If it is about studying great buildings, it is impossible to exclude the Hagia Sophia. It was built to revive the Roman magnificence as the ambition of the Eastern Roman Emperor. Such huge ambition brought huge structural problems throughout the construction process which required the designers push their limits of functioning structural components. The plan began with placing a large dome on top of a square frame supported by four pillars at the corners. Then, it experimentally turned out one of the greatest structure in the world. The square frame turned into an octagonal one and the main dome was extended by the support of two half domes longitudinally positioned so that the main hall was as long as 140m with no support in the middle. The structure reached high with the support gained from the *buttresses* by the exterior walls. Beside its structural design story, the choice and application of building material was also particular. Pozzolana and pozzolanic mortar [28] were used to strengthen mortar and brick. They both were lightweight and since were of same material, their surfaces attached strongly. It was also about the fire temperature of bricks that was less than 800'C and made them more porous, thus, lightweight.

Every project comes with its unique difficulties. To speak of Alhambra Palace, which was more than a fortress, one of the problems was to supply fresh water to serve almost five thousand people [29], which was also important for their religious rituals. The builders channelised water from the nearest River Darro by using mills. Structurally, it was not quite perfect since the masonry arches were crashed down under the forces given the material they were built in and the height of the defence tower. To prevent this, the arches were filled with bricks and aimed to behave like walls under forces, which only slowed down cracking but did not stop effectively where the video showed an inspection from the underground level. Golden ratio is

well-known around the world, but how many would heard of *Rashashid codo* applied to the walls of Alhambra Palace? It is referenced as a Hispano Muslim unit, like Romans' foot, and is a widely used measurement in the examples of Islamic architecture in Spain, e.g. in the Great Mosque of Cordoba. Particularly, the geometric patterning is found striking in the Court of Lions of Alhambra. Irwin [30] wrote that "*Alhambra, (...), is as much a masterpiece of mathematics as it is of art. The mathematics is latent in the proportions of the building and its visual effect is all the more potent for its not being immediately obvious to the eye"* (p:112). Furthermore, the use of Lapis Lazuli from Afghanistan for colouring the wall ornamentations was significant for the Alhambra and was another architectural lexicon to learn for the students.

From the time of the Hagia Sophia was built to the Khan Shatyr, the ambition of being unique and being the name to be remembered did not change. Although the underpinning idea is open to arguments, the results we studied in this short paper are undeniably victorious for investors, architects, engineers, manufacturers and workers. The projects including Aldar Tower, Marina Bay Sands, Petronas Tower and Khan Shatyr were desired to created new urban silhouettes and for advertising the cities in a competition with the popularity of London, New York and Paris, as widely emphasised in the videos. Hence, the designs were expected to be the symbol of the city and the country. People like prince of emirate, president of country, and municipals put pressure on architects to think of building designs that to be mesmerising to the eye of the beholder and redefining the identity of cities so that they could be the person who put forward their country.

Through the videos, the students learnt that local climate and seasonal changes are more than important for construction process, as that seen from the Petronas Tower, the Khan Shatyr and the Aldar Tower. Through a focus on skyscrapers, they were able to answer what issues had to be solved to build high-rise buildings. A change from masonry building to frame structures, the invention of elevators, the capacity of materials, all-glass facades, wind and earthquake loads, and evacuation of building in an emergency were the titles viewed. In general, through the videos used as a part of lecturing provided information at a basic level regarding structural systems and building materials, construction methods and process, design process from architects' perspectives and engineers' approaches. The students were given two quizzes as part of midterm and final exams for assessment. The following discussion provides the evaluation of the students of the module.

3. DISCUSSION

The end-of-module evaluation is a structured survey and is activated automatically by the student office of the university in the academic system in order to allow students evaluate the module run in the semestre ended. The survey consists of 15 statements, all of which can be rated on a 5-point scale, from 5 as strongly agree to 1 as strongly disagree. In terms of comparing the content of the survey, as today many universities adopt similar approach for the evaluation, it can be said that the statements are similar to the example that Wood (2006) provided for his module's evaluation, which was a hand-out survey differently [19]. Students are required to fill the form in the system before they can view their final grade for that module. The language is Turkish. The statements along with their translations into English and the mean result of each one are given in Table **4**.

According to the results, the module was highly satisfactory as all of the statements were measured above 4 on a 5-point scale. The highest score was of the statement #11, which highlighted the significance of objectivity of the lecturer in assessing the student. The second highest score was of the statement #1, which highlighted that handouts of the syllabus of the module are important in terms of clarifying what is expected from students and also to set a deadline for their submission so that they could plan their research on time. The third highest score was given for the statements #2, 3, 9, 14 and 15. To put in words, the #2 highlights that the students expect the lecturer to follow the syllabus and (probably) would less like to have changes on the run. The #3 can be understood as the students like the lecturer to use various technologies (probably) instead of going through slides after slides and textbooks. To explain the #9, it can be said that particularly the freshmen in universities have many questions when they are given a task, so they like to ask their questions one-to-one either in the class when the lecture ends or in the lecturer's office, rather than doing it in front of the whole class. This is also probably because they either feel less confident yet or they assume the lecturer would give a detailed answer instead of a generic one if do so in the class. To

Table 4: The Module Evaluation form and the Mean Results

#	Statement	Mean Score: x/5.0
1	Ders müfredatını içeren haftalık ders planı dönem başında öğrencilere verilmektedir. *The syllabus including weekly workplan is handed out at the beginning of the semestre.*	4.53
2	Dersler önceden belirlenen plana uygun olarak işlenmektedir. *The lectures are delivered according to the syllabus as stated.*	4.47
3	Derslerde öğretim teknolojileri (projeksiyon vb.) etkili olarak kullanılmaktadır. *Teaching technologies (projector and etc.) are used effectively in the lectures.*	4.47
4	Derslerle ilgili kitap, ders notu gibi basılı ve görsel material yeterli ve günceldir. *Books, fascicles and similar written and visual sources shared for the lectures are up-to-date and sufficient.*	4.4
5	Dersler öğrencilerin aktif katılımını sağlayacak şekilde verilmektedir. *Lectures are delivered in a way to involve students actively.*	4.4
6	Derslerde verilen ödev içeriği ve miktarı amaca uygundur. *The amount of homeworks and their contents are compatible with the aim of the module.*	4.4
7	Öğretim elemanları derslere hazırlıklı olarak gelmektedir. The lecturer(s) come(s) to classes well prepared.	4.4
8	Öğretim elemanları ders saatlerini etkili olarak kullanmaktadır. *The lecturer(s) use(s) the class hours effectively.*	4.33
9	Öğretim elemanlarına ulaşmak kolaydır. *Reaching the lecturer(s) of the module is easy.*	4.47
10	Dönem başında ölçme ve değerlendirme ölçütleri açıklanmaktadır. *The methods of assessments and evaluation are shared at the beginning of the semestre.*	4.4
11	Ölçme değerlendirmede öğretim elemanları objektif davranır. *The lecturer(s) are objective at the assessment and evaluation of student(s).*	4.6
12	Derste edinilen bilgi ve beceriler mesleki yaşantıya katkı sağlar. *The information and skills gained throughout the lectures are helpful in professional life.*	4.4
13	Dersin kredisi ve saati dersin içeriğiile uyumludur. *The credit value and hours set for the module are compatible with the module content.*	4.4
14	Derste mesleki vizyonu geliştirici bilgiler yer almaktadır. *Lectures provided helpful vocational information and expanded vocational vision.*	4.47
15	Genel olarak dersin içeriği ve işlenişinden memnunum. *Overall, I am satisfied with the conduct and the content of the module.*	4.47
Average		**4.44**

interpret the result of the #14, it is better to look at the #12, which resulted slightly lower, a sharp 4 on a 5-point scale. This statement is to assess whether the information gained throughout the lectures was helpful for the profession. The higher score of the #14 points that the information gained throughout the lectures expanded their vocational vision, rather than just informing them. This is worth to highlight for the promise of the module content. Finally, the #15 resulted also with the fact that the students liked the module overall.

The lowest score was of the statement #8, regarding the use of lecture hours. This can be explained by the fact that due to the lacks of the facility in terms of establishing the connection between laptop and projector was often failing and the students were asked to change classroom or they needed to wait until it was fixed, which caused delays in starting the lectures and sometimes ran out of time of the class hours.

CONCLUSION

The paper examined the teaching approach for the module of Introduction to Architecture and Building Construction. This was a compulsory module in the second semestre of the freshmen of the Interior architecture and Environmental Design, under the Faculty of Natural Sciences, Architecture and Engineering in the Bursa Technical University. It was the first time the module was delivered in the academic year of 2016-2017. As Temple (2005) begins her preface, "*Most design faculty were educated to be designers, not teachers. Consequently, there is a tendency for architectural design instructors to resort to teaching as one has been taught*". She particularly emphasises two arguments. The first one is that

whether the content of a design-based module should have much focus on improving technical skills such as graphical representation, vocabulary, design elements, or should be aiming to develop the students' creative and critical thinking. The second one is that whether the content should be formed by "*remainder of the curriculum*", or should be formed in a way of driving the rest of the curriculum, in contrast [31].

As a lecturer, I attempted to transfer some fundamental information regarding architecture and building construction in an intellectual way, in sense of combining theoretical and historical background with contemporary stories of construction of some significant architectural designs. Doing so, to some extent, the content of the module prepared the students to the next level modules. For example, in the module of Structural Systems, in the fall semester of the second year, I used the floor plans of Aldar Tower when teaching of axial systems and reinforced concrete frame structures. For the module of Interior Environmental Technologies and Installation, which is in the spring semestre of the second year, they learn from simple to complex systems of air-conditioning the interior of buildings, which they began to hear with the videos of skyscrapers and Khan Shatry. For the part of Introduction to Architecture, the students were also informed of modernism, post-war architecture and of some other movements influenced the architects. This was also a preparatory approach for the module of History and Theory of Interior Architecture, which is in the fall semestre of the second year.

It is believed that this kind of approach assisted the students to understand the scale difference that an architect deals with. The content built for this module is also applicable to architecture and civil engineering students since it joins both disciplines and gives a comprehensive information and terminology that they will hear throughout their studies. Besides, it also directs them to follow contemporary sources like documentaries and to use browsers in the right way to do their research other than skipping through images.

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