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Teaching history for design at TU Delft: exploring types of student learning and perceived relevance of history for the architecture profession

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Abstract

Historical investigation anchors architectural and urban practice. Analyzing two sets of questionnaires distributed in different class settings, this paper explores two questions: how do design students currently learn about architectural history, and how do they translate this knowledge into their design practice? First, tentative conclusions are that (1) physical engagement with buildings outside the classroom is an important inspiration for the students, (2) (assigned) books definitely influence their (design) thinking, (3) different types of pedagogy—lecture, seminar, thesis, studio—affect student learning in different and complementary ways, and (4) students overwhelmingly see history as a relevant preparation and foundation for design, but this understanding is implicit and often unspecific.

Keywords Architectural education · Pedagogies of design · History of architecture · History of urban form · Design education

Historical investigation in design education

Many fields of engineering argue that design is a future-oriented field, and that designers do not need knowledge of the technologies, tools, forms, or practices of the past. TU Delft, a technical university focused on creating the future, has continuously reduced the number of professorships in history and also courses on history; the Chair History of Architecture and Urban Planning remains a strong entity, but one with few counterparts in the other faculties. Yet architecture and urbanism remain fields where structures and theories from the past, references to the past, and reflections on the past all continue to play an important role. Existing urban and built forms, and established actor networks, are historical and cultural frameworks that shape new designs and influence technological developments. New construction needs to respond to the past in the form of existing landscapes, established

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design practices, and building laws. Designers themselves often “practice history,” that is, they turn to history for their work in the present; but they do not always consider the past on its own merits or create links between the historical analysis, their findings on the past and the design for the future.

Discussions of the content of history teaching and of textbooks used are underway among educators. But, so far, from what we have found, no analysis has been done on how students experience the teaching of architectural history in experiential learning, textbooks, or different types of pedagogy, and how they use what they learn in their own design practice. Teachers have positioned history in the design curriculum in multiple ways over time; now, with a growing number of global students, new technologies, and new economic and social challenges, it is time to revisit both the content of history teaching, briefly discussed here, and the educational perspective, at the core of this article.

The teaching of the history of architectural and urban form faces a number of interrelated pedagogical challenges. With the emergence of schools of architecture, pedagogical questions arose, for example, on the choice of historical content, the selection of textbooks, and more recently, methods of analysis. And changing architectural paradigms shaped historical education. For example, in 1949, when functionalist and ahistorical design replaced neo-historical styles and traditional building forms, Robert L. Anderson, Professor of Architecture at Clemson College (Anderson 1949) and his contemporary Turpin C. Bannister respectively called for a new curriculum and a new textbook of architectural history in the same issue of the journal. (Bannister 1949). Today, taught at design faculties, the history of architectural and urban form has evolved as a key to bridge the gap between existing, sometimes ancient buildings and environments, and future oriented design practice. Heritage professionals need historical knowledge to transform, adapt, and repair existing building and urban areas. Designers use historical examples as concrete inspiration for design. (Smith and Hein 2018). And architectural historians have again started to interrogate the content of what is being taught in architectural history classes. Taking a look just at the *Journal of Architectural Education*, we see a number of articles that explore both approaches to architectural history and the role of textbooks. Several authors underscore the shortcomings of current textbooks in terms of provoking critical thinking; they specifically point to the insufficient attention paid to the contributions of women and African Americans in the architectural sphere, and call for challenges to the leading canon (Kingsley 1988; Gürel and Anthony 2006). Other articles address the role of architectural history in teaching in a less Eurocentric way and focusing on cross-cultural exchange or the politics of architecture (Bozdogan 1999; Cohen 2006). Yet others insist on the need to study historical narratives and rethink their role in the discipline of architecture (Legault 1991; Upton 1991). These reflections also include debate on whether history should be taught as a linear chronology or as an “operative conception of the past” as Morgenthaler argues (1995, p. 221), without, however, querying what social and cultural assumption would be transmitted that way.

The focus of this debate is primarily on the methods of architectural and urban historians, and does not address student experiences and teaching practices. This paper takes a first step to address the ways in which forms of pedagogy—hands-on experience, reading, listening—affect student’s appreciation and understanding of historical facts and methods, and in turn the students’ design practice. It specifically explores how MSc Architecture students at Delft University of Technology learn about historical built form in courses taught under the purview of the Chair History of Architecture and Urban Planning. The Chair aims to teach historical understanding as well as analytical approaches and does so through large lectures classes (up to 400 students), smaller seminars (25–30 students), workshops

(15–25 students) and studio education (6–12 students). Systematic analysis of the impact that specific formats have on teaching has not been done.

The paper interprets a series of questionnaires developed by the authors to get a better understanding of how students learn about historical built form, practices, tools, and values; and discern how (or if) they apply their findings to design. The paper further asks whether and how students reflect and or build on the relation between designing and history. The article starts by briefly discussing design education. The core of the text focuses first on the research method, discussing both the development of the questionnaire and its interpretation. In a second step, the article explores the results of engagement with the built environment, publications, or historical teaching in a design faculty. In the final section, the article draws conclusions on the implications of history education, suggesting next steps for rethinking the role of history in design education. In particular, it identifies threshold moments, or transformative moments of learning that are irreversible, integrative, and discursive; moments when deep and often difficult learning occurs. Understanding and facilitating various types of threshold moments—social and academic—for teachers as well as students is challenging in itself. (Hein and Abbot 2013).

A note on terminology: The research presented here focuses on architectural, urban, and landscape history in a design-school setting, but for readability uses the shorter notions ‘design’ and ‘history.’

Design education

Exploring the role of history in design education requires advanced understanding of the particularities of design education. For many centuries, teachers were themselves often professional designers, and they based their teaching on more or less explicit cultural and personal views of ‘good’ architecture and on their own experience of design education. For example, historical precedents played a great role in architectural design education at leading institutions such as the Ecole des Beaux Arts in Paris in the 19th and early 20th century. For roughly the last half a century, inspired by the successes in scientific disciplines, researchers have taken a ‘scientific’ approach to architectural designing. Researchers thought the design process to be a process of analysis and synthesis: scientific knowledge and rules should decrease the designer’s reliance on intuition, (historical) types, and rules of thumb; and design methods should be systematised. But designers didn’t recognise themselves in this ‘rational design process.’ Design researchers such as Hillier and Schön pointed out that design problems are pre-structured by constraints and the designer’s own cognitive map. Rather than a ‘rational technology’, design is better described as a ‘reflective practice’ (Schön 1983, 1987) that proceeds by conjecture and analysis (Hillier et al. 1972). This increased attention to the particularities of design goes hand in hand with a changed view of the role of the historian and into historical research as interpretative and narrative based (Groat and Wang 2013).

Advanced understanding of design as research and of the shifting role of the historian raise questions about appropriate ways of teaching design and history in architecture schools, notably about the best ways to teach historical knowledge. Students have to learn to put a specific design situation in a broader context; to interpret ideas and concepts in their historic, socio-cultural context; to use, combine, interpret, and change common examples, ideas, principles, and patterns. They have to learn how to think critically and to reflect on possible solutions. Reflection is even more important in a society

in which quantitative data seem to be the answer, without the accompanying arts and skills of seeing patterns and relations and of evaluating and valuing the data (see also De Bruckere et al. 2015). Building up a library of principles and patterns and learning how to analyse and interpret them are important parts of historical investigation as the questionnaires demonstrates. Education on the history of architecture and urban planning needs to take advantage of the most impactful ways of teaching.

Methodology: questionnaires

To gain better understanding of the current role of history for students in design education, we conducted a pilot study in two courses at TU Delft: a 3 ECTS seminar called Building Green (about 25 students), and a 6 ECTS course, the History thesis, in which students write an individual research paper (about 150 students). We designed questionnaires to find out what and how students currently learn about architectural history and how they translate this knowledge into their design practices. Four sub-questions specifically asked (1) what historical buildings/urban environments inspire each student, (2) what written sources influence them, (3) which ways of teaching they found useful, and (4) in which way(s) they see history as meaningful to design.

Participating students

The students participating in this exercise were all Master's students in the department of Architecture at the Faculty of Architecture and the Built Environment at TU Delft. They have a geographically diverse background. About 50% of the students come from the Bachelor degree program at TU Delft, and the other 50% come from all over the world. With the differences in background, their understanding of history varies, as do the ways they learned about history (from visiting cities and exhibitions to attending lectures, reading texts, and studying for exams).

The students queried here were taking courses in the Chair History of Architecture and Urban Planning in their first year of the 2-year masters' program (first and second semester, with an occasional student from the 3rd semester):

1. Building Green (BG) (Carola Hein), a 7-week elective seminar in which about 25 students investigated issues of sustainability in architecture and urban design as part of historical development. Through careful analysis of buildings and cities, it helps students understand the importance of ecological, economic, political, cultural, social sustainability in architectural and urban form and design over time and through space. The course is based on close reading of texts, student presentations, and discussion.
2. The History Thesis (HT), a required research seminar in which each Architecture student writes a research paper of 9000 words based on individual primary research. The course starts with 6 weeks of group-based thesis writing that accompanies students' investigation. In the second part of the course and with individual meetings with the professor, students write a draft and finalize a thesis.

Material

Two questionnaires focused on these courses' projects, sources, and ways of teaching and learning, seeking to understand which elements inspire students and what their relation is to designing (see Table 1). At the start of the course, the first questionnaire inquired about knowledge that the students had before starting the course, thus taking into account prior experience of the built environment in their everyday life, both inside and outside the classroom. The questionnaire also inquired about readings that had inspired them, whether assigned or not. It asked students who had also earned their Bachelor's degrees at TU Delft about earlier courses and teachers that had inspired them. The second questionnaire, handed out at the end of the course, focused on the same topics, but now in direct relation to the course that they attended.

Procedure and analysis

Teachers handed out the questionnaires in the seminar and the thesis writing class running in spring 2016. Students wrote out answers to the first questionnaires by hand, but on encountering the difficulties of reading student handwriting, we switched to computerized questionnaires.

Overall, we received 133 questionnaires (numbered 1–133) back. In the Building Green, course 20 students handed in their questionnaires in week 1 and 14 responded in week 5. From different sections of the History thesis, 61 students handed in their forms, and 38 responded in week 5.

We analyzed the results of the questionnaires in two rounds, with four people adding coding (labels) with the help of the program ATLAS TI.

The entire investigation took place over a period of six months. During this period, the two authors, with the help of two research assistants,¹ distributed, gathered and transcribed the questionnaires and developed the labels. One research assistant helped us develop a first set of labels; the other tested the first set of labels using 40 questionnaires, and identified new labels. Ultimately, the labels (see Table 2) were defined in close relation to the main topics and the kind of answers. During the coding, we adjusted the labeling terminology to avoid overlapping and inaccuracy and to deepen our understanding of the answers. We aimed to identify and capture subtle differences in meaning, while acknowledging the subjectivity that underlies the coding activity.

We identified four categories and labeled them: INSPIRATIONS+ENLIGHTENMENT, SOURCES, TEACHING+LEARNING, and MEANING FOR DESIGN. Under the label inspirations we tried to use sub-labels to identify whether physical forms (of different scales), people, or socio-cultural values inspired students most and whether particular time-periods played a role. We used the term enlightenment in the second questionnaire to capture moments when student thinking changed across the term. Under the category sources we marked whether students showed a preference for assigned books or whether they chose their own readings, whether they preferred textbooks or manifestos. In the category teaching and learning, we looked at the importance of teaching strategies (including self-study) and people, and tried to elicit suggestions, comments, and criticism. Finally, we

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Table 1 Questionnaires

Main topic	Questionnaire 1	Questionnaire 2
inspirations + enlightenment	Describe a historic building, urban area, or city which has influenced your thinking about design (including your desire to study architecture/planning/heritage and to become a professional in the field)	Has the course given you a new moment of historical experience? If so, please describe
Sources	What historical text on architecture and planning have inspired you, name two or three and describe how they influenced your design thinking	Has the course provided you with a new reading that you will recommend to others (or use in your design practice)?
Teaching and learning	Describe how you have learned about the history of the built environment and which course form (seminar, lecture, this studio) has taught you most about history. Explain why	Which part of the course (lecture, discussion, writing) has most influenced your understanding of history and why?
Meaning for design	How do you see the role of history in design practice, in general and for yourself?	Please explain if and how this course has deepened your understanding of history of built form in relation to design practice

Table 2 Labels

Labels	Explanation	Sub labels
Inspirations + enlightenment	Capture everyday experiences that made students aware of historical buildings, professionals. Gain insight into the inspirations that students have gained from living in a historic city, visiting monuments, interacting with design professionals	Inspirations: Physical forms/individual experiences/people/innovative values Enlightenments: Architectural terms/political, economical value/natural, ecological value/socio-cultural value
Sources	Understand the type of readings that students appreciate and the lessons that they draw from diverse sources related to architectural and urban history, including textbooks as well as doctrines	Individual selected text Assigned text Visual information No/not sure
Teaching and learning	Gain insights into the type of teaching pedagogies and learning strategies that students find most helpful in learning about historical facts, practices and methodologies. Understand which role different types of education can play in improving academic skills and design tools	Course forms Combination of course forms Pedagogical tools Self study Teachers
Meaning for design	Gain first insights into the ways in which students use precedents of historical knowledge, methodologies, and whether students consider history as a means to sharpen their critical and analytical skills. Understand if and how historical knowledge has meaning for design or is used as a tool for design. Explore if and where students use historical examples, methodologies as a toolbox, and whether they have been working on and understanding concepts and ideas for design	Critical thinking Emotional motivation Future Informing design Toolbox

also identified and explored their definitions of the role of history in design, coding their answers as direct historical design concepts drawn from the past, history as a timeless toolbox for design, or the use of critical thinking skills as a means of using history.

Interpretation of the findings

Question 1: physical experiences with the built environment

The first question aimed to gain a better understanding of the degree to which students physically engaged with the buildings around them, and whether they traveled and studied the built environment before and while attending architecture school. Student responses showed the importance of this engagement with built form. Their responses also show the diversity of geographic and cultural backgrounds that teachers need to address.

The answers to question 1 are often related to a specific country ($n=8$), urban area ($n=22$), city ($n=49$) or iconic building ($n=36$), often in a place where students grew up (home/hometown $n=18$ times), where they traveled on holidays, or where they found their inspiration to become architects. Personal inspirations are mentioned 44 times. Study trips are particularly memorable events in their lives. The people with whom they traveled are also referenced. The section 'INSPIRATIONS: Individual Experiences' encapsulates some of the varied experiences that inspired students in different ways, including specific architectural details ($n=7$). Many students have a clear understanding of a famous architect/designer or named building. Students particularly appreciate aesthetic ($n=20$) and socio-cultural values ($n=25$); but political economic values of architecture are mentioned only 5 times.

A few examples show the diversity of student background, knowledge, and inspiration:

(St. 81) "Rotterdam has influenced my choice for architecture. Getting to know important architectural developments encouraged my curiosity for the built environment. For example the Van Nelle Fabriek impressed me a lot."

(St. 80) "I remember I visited Barcelona once with my mother, and I was really fascinated by Parc Guell, designed by Gaudi. I really liked the way it was designed. Especially the colors, columns, materials in combination with the warm weather of Spain. I was really young by that time, but at this moment my desire to study architecture started to grow."

(St. 83) "Le Corbusier—Villa Savoye=the freedom to create what you want to design in a way that shapes a building. I felt the urge to do so myself."

(St. 92) "New York when I was fourteen. High rise very imposing but not my main interest. Rome, the beauty of ancient city. Amsterdam and Delft."

(St. 73) "Lilong in Shanghai city: it is a kind of historical residential area, developed about 100 years ago carrying the daily lives about Shanghai inhabitants. When I walked through this area I could experience both history and life, which can not be discussed separately."

In the first questionnaire, students felt often inspired by their experiences, but generally did not identify specific reasons for their selections. They did not engage critically with the sites that they had seen and did not assess historical processes that led to the emergence of these buildings, or reasons for their preservation or select heritage decisions. In the second

questionnaire students were much more conscious of the opportunities for and challenges of historical analysis. We therefore developed the label group 'ENLIGHTENMENT', as students talked a lot about what rational enlightenment they gained from the course(s), instead of perceptual 'inspiration'.

(St.84) "'Hospicio Cabanas' is an XVIII century building in my hometown city, Guadabjana, which has Arabic and French inspiration. It is very interesting its treatment of patios and the several micro climates it creates in each space. To study this spatial arrangement has influenced me in looking to integrate nature in non-conventional schemes."

(St. 94) "The historical island area of Bangkok captures my interest in architecture. The area is a visual expression of the economy, culture, identity, and architecture."

(St 119) "The Amphitheater of El Jem influenced me in a way that it allowed me to be "truly" aware of the Roman past of Tunisia, and as such, of part of my origins. [...] Ascending the many stairways of the monument, experiencing the impressive view on both the stage where performances took place, as well on the city of El Jem allowed a physical as well as a mental connection with a past time of the country. This influenced me to understand the potential of architecture in a way that it can allow these clear connections with history, cultures, landscape, and climate. In other words, an architecture of belonging."

Question 2. Written sources and inspirations

The answers to question 2. are intriguing in several ways. In those situations when we were in the room when the students filled out the questionnaire (BG and Hein/HT), we observed that many of them filled out this question last. It seemed that it took students more time to identify relevant book titles. A few books that had been assigned in preceding courses such as the History of Architecture Lectures appear to have influenced the students. The *Brown Decades* by Lewis Mumford was mentioned 20 times and had been assigned in van Bergeijk's history lecture course. Whether or not they liked the book, it definitely influenced their thinking, including their design thinking. Some must-reads for architects were mentioned at least once, notably those of a more doctrinaire nature, such as writings by Alfred Loos, Siegfried Giedion, and Rem Koolhaas. A few students also mentioned readings that were more analytical; they also use these mentions to provide insights into their interests in historical and design approaches, in the fields of materials, landscape, or feminism. In general, the natural and to be expected principle that 'the content teachers focus on, is focus of students as well' seems to be confirmed in this study.

Some examples to illustrate this.

(St. 59) "We recently read the brown decades of Lewis Mumford. I did not really like the book, however it did influence my design thinking. I look closer and try to notice the small things in buildings. Also how social and cultural problems can have a huge impact on architecture"

(St. 60) "Brown Decades—By Mumford. How Architecture can respect a certain period in a culture."

Some students had clearly done some additional readings, one pointing out for example

(St. 103): “Vitruvius and Alberti about the origin of architecture. It changed my way of thinking about the main point of architecture.”

(St. 193) “Moa sun is a book about traditional Chinese joints of woodwork. Before modern, there is no architects but craftsmen who built buildings. The spirit of craftsman is underneath the joints they show to us. Yuen Ye is a book about traditional Chinese Gardening. Not like the western education way we get today, it shows people in the past create a garden interior with paintings etc.”

(St. 93) “Reading the text by More about the rituals of space of women in 17th century Holland. That the domestic life was largely influenced by the space arrangement of the houses. The architecture sometime can even be the unseen boundaries to fence the women of from the public space of the city. “

(St. 63) “The text by Elise van Dooren for AC3 how you design, this really made me think about design based on research but also the more intuitive part of it.”

In the second questionnaire, students talked more and in stronger terms about readings that had inspired them. Most references to specific book titles came at the end of the course after we had specifically studied texts. Students were really engaged and could explain why a book mattered to them, some even pointing out that it might serve them in their later careers. Their comments made it clear that many had read classic texts by Le Corbusier, Howard, or Frank Lloyd Wright, for the first time in this class (and 19 appreciated this), as well as more recent ones such as *Cradle to Cradle* by (Michael Braungart/William McDonough 2002), which inspired a sustainability debate.

Discussion-based classes such as BG seem to help students gain an advanced understanding of the role of historical investigation. Almost all assigned readings from the course were mentioned. Particularly in a field that is not focused on reading and writing, careful attention to analytical, reading, and writing skills, trained through the selection of texts is thus important and can provoke important threshold moments. Some students appreciated the more analytical and academic texts: Kennedy’s *Evolution of Great World Cities* (5) and Girardet’s (3) “*Cities, People Planet*” found surprising interest despite being more difficult to read (Kennedy 2011, Girardet 2008).

(St. 185) “I especially enjoyed Kennedy’s ‘The Evolution of Great World Cities’ and Girardet’s ‘Cities, People, Planet’. The Kennedy reading I found extra interesting because it studies socio-economical trends in cities and their growth which I think is critical to understand to be able to implement sustainable policies and ideas.

(St. 191) “Cradle to cradle. I’ve heard this phrase used in TU Delft many times, but only had a basic understanding of the idea. Reading the book gave me a much better understanding, and gave me a lot of hope for the future as an architect.”

(St. 180) “Yes, it has. I had never read some of the most classical writings of architectural history [...] In my home university we use textbooks and notes of the lectures to study and learn, and actually I think the part that I enjoyed the most it has been reading all this material and discovering new ways of understanding it instead of learning an “already made” interpretation by someone else. I should have probably done it before by myself but it was now that I needed it for the course when I decided to do it. [...] I had the idea of garden city based on my Urban design courses and examples but it was the first time I read and understood fully the conception of this urban layout.

Question 3. Pedagogies in architectural and urban history

In answer to question 3, students give insights into different types of pedagogy and their appreciation of them. Students specify pedagogical tools they thought had learnt most from, but no clear favourite way of instruction emerges. Some students (n = 10) mention field trips as a good source of learning. Others appreciate lectures (n = 50), at least when they are taught by engaged teachers, such as Reinout Rutte, mentioned 5 times by name. Yet others appreciate the research part of the history thesis as an efficient way to learn about history (n = 38). In general, discussion seems to inspire students (n = 36). Overall, students seem to prefer more engaging and participatory pedagogical approaches. After the 'thesis writing course,' many students named writing as the most helpful approach to understand history. The general conclusion seems to be that a variety of teaching approaches still is the best way to teach.

Many quotes illustrate this:

(St. 83) "Learned the most during the GR [Grondslagen/Foundation course in the Bachelor] courses. Especially BK4GR4 which included a trip abroad to Budapest."

(St. 80) "I think writing a thesis of a certain subject of history will be more efficient to learn it. Because then you decide for yourself what you want to learn and to which extend. It is easier to keep your attention and interest then."

(St. 98) "I think thesis is good. Through this course form, we can have a deep reading and research on the topic were interested in."

(St. 59) "Reinout Rutte is a great teacher. He tells everything very enthusiastic about history and inspires you. His lectures were great. Most times I think lectures are very old fashioned and should be abolished."

(St.118) "The discussion part, interaction and different opinions of people from different countries [in BG] are definitely the best way to learn."

(St. 131) "I particularly enjoyed the discussions around different conceptions of planning and from different historical perspectives [in BG]. I would say that a course is the most valuable when it entices its students to discuss and give their opinions on different matters, which this course accomplishes very well."

(St. 119) "This course [BG] provides me an good opportunity of reflection, like I could think about why sustainability is important and necessary for future generation, which I just took it for granted. This reflection helps to provide deeper learning by looking at situations through a history lens. In the past, I thought that history lessons was just about cramming events and data about past, but this course just is more about letting students find the answers about academic issues by themselves instead of telling them standard answers directly. And I believe design practice is always the process of self-learning and on one would give you a standard answer directly and you need to find ways out by yourself."

The connection of history to studio design is a key aspect for many students that becomes even more evident in the responses to question 4.

Question 4. Meaning for Design

The fourth question asked whether students value history for design and the answers found here are perhaps the most powerful outcome of the research so far. The questionnaires show that the students are keenly and overwhelmingly aware of the importance of history for design. Throughout, they underscore the importance of historical buildings, and of awareness for as a foundation for design. 37 see history as a hint to architecture and future development. 37 appreciate history as a means to promote critical thinking. Many of them are aware that people learn through historical investigation about the political and economic conditions of architecture ($n=12$), of natural context ($n=12$), socio-economic development ($n=15$) and culture and architecture, applying these findings to design. 16 identify historical precedents as a 'timeless' generic toolbox, 42 specifically state that history informs their design, and 75 identify history as a general or specific motivation for pursuing the study of design.

There are too many answers to list here, but the ones we have selected show the relevance of historical analysis as a foundation for design. Their comments are often rather general and unreflective, but still very insightful.

(St. 62) "I like to refer my design ideas to historic examples, create a link between modern, new and old. The existence of history is obvious and so should be present in design and architecture."

(St. 68) "I think we all have to look and learn from the past before moving forward. We can use precedent in architecture to improve our skills. We should learn from the greatness as well as from the mistakes to find the most suitable way to design and to give the best meaning to our own work."

(St. 72) "Architecture is culture and there is past of history. So you could state that architecture represents its own time period."

(St. 73) "History is the root of culture. It carries conversion at a certain area. History helps architects how to think about the precedence and the future. I can also learn from history in order not to make a wrong choice."

(St. 74) "History gives an insight how why some functional solutions developed. It can give you an idea how architecture was used to expands someone's power, wealth. For me it's a tool to understand about people needed in architecture throughout the years and it's source of my inspiration."

(St. 78) "I think every new design is partly based on previous work (history). You see stuff and you take it with you, consciously or unconsciously. We build on what is there in our own and new way."

(St. 83) "History is the base for new buildings. In an inspirational way, but also physical. Some old buildings function as new, so they're literally the base for new design. History in the other way, seems the source for new designs, for architects/designer's history is like a catalogue where you can add something."

(St. 89) "I think the role of history in the design practice is extremely important, especially because knowledge of the history of our practice can help with discovering the implications that the built environment had on society."

(St. 94) "I see history as highly relevant, especially to use current design thinking where innovation and difference became more important than history and heritage in many cities, including Bangkok. I see history as a source of identity (personally and

collectively) Without which design (arch or not) would not be sensitive/meaningful (becoming uniform and placeless).”

(St. 116) “Design in the XXI century has detached itself from history either by neglecting it or trying to be a response to what’s Modern and new. This point of view has to change because they are not learning the lessons that for example vernacular architecture can teach.”

(St. 97) “I think this role is underestimated, we should learn much more from the past to avoid similar mistakes in the future and to reflect on current times.”

(St. 102) “I think history is the start, the basis of all design. You never start over again, you should always learn from your past.”

(St. 104) “History is essential. If you don’t know your history you can’t deal with the future. Every building has a connection with its surrounding and so with the past and this can’t be ignored.”

(St. 116) “History gives us the opportunity to learn from references, so our designs have a wider support on how to solve them. So in my point of view, history is the best tool for architecture design.”

(St. 170) “Personally I like history so much and I think the role of it in design practice is lacking sometimes. We always focus on the design idea and urban context, pay less attention to the historic stuff. If I got the chance to receive a feedback that related to the history of the site. I would be glad to explore its past by myself.”

(St. 163) “History is the foundation and resource for architect to design good buildings. The one who know nothing about history is impossible to do designing very well.”

(St. 162) “History creates a framework for the future it is the most steady source to rely on for anything you want to achieve in the future.”

(St. 118) “It’s a pity that history is not emphasised enough in design practice. While I don’t think it is compulsory for everyone to feature the history of the site or architectural type in their designs, I do feel that it is indispensable in understanding and creating a narrative for the design.”

(St. 104) “History is essential. If you don’t know your history you can’t deal with the future. Every building has a connection with its surrounding and so with the past and this can’t be ignored.”

(St. 142) “It sounds pretty basic, but it reminded me once again that everything has several stories and that it is so easy to look at locations, at ideas and at designs with the knowledge of today. I hope to use the depth that is suggested by thoughts of history in my further design education.”

Students consider historical precedents as proven principles or patterns, tested sometimes over centuries. Some also request more breadth in history teaching. There is enormous potential for critical historical investigation as a foundation for design practice

Conclusions and discussion

We conclude that the physical experience of architectural and urban sites, of monuments and everyday environments (queried in question 1) plays an important role in student learning about history. Students are clearly inspired by visits and field trips, connecting these sites to their individual experiences (travelling, hometown and studio field trips, etc.). We find that assigned books are clearly important to students (the topic of question 2): whether

or not they liked the book, it definitely influenced their thinking, including their design thinking. Written sources gained in importance for student understanding of historical facts and approaches after the course. Regarding the pedagogies in architectural and urban history education (question 3) we conclude that students clearly appreciate engaged teachers and more engaging and participatory pedagogical approaches. There also seems to be a relation between the form of the followed course and the preferred way of teaching. The conclusion seems to be an expected one: that a variety of teaching approaches are the best pedagogy and that students are eager to engage with critical thinking. Regarding question 4, the meaning of history for designing, we see that students evaluate history highly; they see it as important, but the relation between history and design is often rather general and unreflective.

The second round of questionnaires at the end of the course showed that taking the course has made a difference in students' perception of the importance of historical knowledge and experience. Students' learning becomes deeper and more reflective when a professor provides guidance in a course, for example, in studying a book, writing a thesis, or making a field trip. While this is not an unexpected conclusion, it is an important one. These questionnaires underscore the earlier finding that students are convinced of the importance of historical environments, and interested in understanding their specificities. Their response to historical environments is mostly spontaneous and unreflective. Some students have a wide range of experiences and understandings of history, historical text, and historic built environment. A few students understand history as 'a hint of architecture development and future' and appreciate critical perspectives.

Of course, the study has its limitations. For example, the return rate varied between courses. Students were much more responsive when they filled out the forms in class than when asked to email the forms. Another limit may be in the process of labeling. We tried to stay as close as possible to the findings, but to a certain extent it is always a matter of interpretation. Finally, the overall number of students ($n=133$) is not large. Nonetheless, this pilot study provides a foundation for more focused research on history education at a design faculty.

To improve history education in a design school, two aspects seem to be particularly important. First, education needs to focus (even more) on sharpening and developing student's analytical and reflective skills, cultivating 'a research way of thinking'. Second, the relation between learning to design in the design studio and the role of history in all its aspects should be made more explicit, cultivating a 'designerly' way of thinking. In this conclusion, we can only sketch some possibilities.

In history education, 'a research way of thinking' means that students learn historical facts and figures, but more importantly they learn historical methods, and understand how to assess and evaluate historical findings and writings. Different pedagogical tools—lectures, discussions, primary research, field trips—can all play roles in order to help students understand the multiple ways in which they can use historical facts and methods as an analytical basis for design. To give a few examples:

- Writing texts and discussion enables students to assess and challenge their understanding.
- Pairing a limited number of assigned readings with a larger number of suggested readings—and presenting this as a treasure chest—allows students to develop at their own speed.
- Design students have often an affinity with visuals more than with writing. Students can learn to recognize, analyse, and compare patterns by making mental maps on a

field trip, abstract schemes of historical buildings, and so on. Asking them to do mental maps or mindmaps, that is maps that visualize their understanding of texts, to draw a mindmap before writing, or visualizing their experience in mindmaps during fieldtrips and excursions can be an important tool in preparation for critical reflection and analytical writing and as visual material for designing. It would emphasize the connection between historical thinking, spatial learning, and individual experience.

In all of these pedagogical forms, it is important to choose content carefully. Students often react more strongly to doctrinaire texts; reading them in conjunction with a good discussion can help improve both (visual) knowledge and critical reflection skills. Both are needed to prepare students for their individual historical research in preparation of their studio design. The most important challenge in teaching architectural history consists of expanding beyond the pure transmission of historical knowledge to teaching students the analytical and methodological elements of historical research. In a 'data-focused' society, people seem to forget that what matters are not data but seeing patterns and relations and being able to evaluate and value that data.

In design education, 'a designerly way of thinking' means that teachers have to make the relation between history and designing more explicit. Students have to understand the development of patterns and ideas in their contexts, why these patterns and ideas are valued as they are in time; and they have to be able to decide if and how these patterns and ideas can be valuable in a design situation at hand. To a certain extent history is a timeless toolbox, with an endless amount of patterns, principles, and ideas. Students have to learn to experiment with these patterns, to use, combine, and transform patterns and ideas. At the same time, history is a context-bounded toolbox. Students have to learn to understand patterns and ideas in their context and their conditions. Historical ways of approaching problems may help them understand how to approach current conditions and challenges in designing.

Students seem to have implicit and unspecific understanding of the relation between designing and history, so we must refine the underlying goals and methodologies of the curriculum, and their meaning for design. Elise Van Dooren has developed a framework of five generic elements to make the design process explicit to students and to train them in essential design skills (Van Dooren et al. 2014, 2017). She has based it on the work of researchers who have explored designerly ways of thinking' (Cross 2007), the design process (Darke 1979; Lawson 2004, 2006; Lawson and Dorst 2009), design education in the design studio (Schön 1985, 1987), and differences between novices and expert designers (Eastman et al. 2001). It makes design skills the foundation of design education. These skills include insight into historical and current architectural debates and the shifting role of the designer in society. Contemporary design education is largely based on learning-by-doing tasks, and again, on personal views of 'good architecture'. It seeks to bring design education to a 'higher' level than describing product-based learning goals and assessment criteria.

The framework identifies five elements that have to be present in the design process, beyond personal styles and approaches. They are not meant to be a description or recipe for design but a guideline for teachers and students in design education. The most visible part of designing is what the framework calls the *domains* (1). These are all aspects designers have to pay attention to: space, composition, and function; and material and socio-cultural and historical aspects. Many of these aspects are subject of discussion in design education. However, the process of designing doesn't stop there, and design education should focus much more on the other four elements identified in the framework. (see also Schön 1987,

Oxman 2001). The design process includes *experimenting* (2) in a physical *laboratory* (3): with the help of sketches and models designers explore and reflect, they think open and freely, and they play around. They also have to think critically and make choices for the particular design situation at hand. Designers experiment with(in) a *frame of reference* (4), building up a professional (mental) reference library and expanding it over time: they use, combine, and alter examples, ideas, principles, and patterns. And last, but not least, the process of experimenting is given direction by a *guiding theme* (5), an overall idea regarding the design task at hand, a focus or value. In this personal and cultural way, designers frame the design task at hand and come up with a design.

Van Dooren currently focuses on tutoring dialogues in the design studio in which professors make the design process explicit, including fostering discussion about socio-cultural examples and references (Van Dooren et al., to be published). Meanwhile, Hein explores the shifting role of historians and its meaning for design education in parallel with revising history education. She also explores the role of architectural space in learning building on earlier research (Abbot et al. 2014). Drawing on design, historical and spatial approaches, the next step in this research project will be structured intervention both in the setup of historical education (seminars, lectures, history thesis) and in the design studio, combining fieldtrips and hands-on study with discussion of textbooks to consciously connect historical analysis to design.

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