

Teaching Timber: The role of architectural students and studio courses within an interdisciplinary research project

CATHERINE SUNTER
The Oslo School of Architecture and Design

As buildings become more energy efficient and emissions related to their operational use are reduced, the importance of embodied energy in materials becomes more significant. This explains a renewed interest in the use of wood-based materials in buildings. When harvested from sustainably managed forests timber offers an effective means to reduce fossil energy use and mitigate climate change, particularly when substituting steel and concrete alternatives.¹ Additionally increasing the use of timber in construction has a potential economic value in countries such as Norway, with an existing forest industry not used to capacity.² In the wake of great city fires, such as the 1904 fire in Ålesund, timber was gradually abandoned in urban buildings as new legislation favoured masonry construction. New timber solutions and technologies for fire safety have facilitated a reinvention of timber as an urban building material. Alongside this reinvention, is the need to research and advance knowledge in its use as a modern construction material.

This article investigates six master-level studios at the Oslo School of Architecture and Design (AHO), held between autumn 2013 and spring 2016. The studios were set up as laboratories for systematic architectural exploration within the Wood Be Better (WBB) research project. WBB was established in 2013 as an interdisciplinary project funded by the Norwegian Research Council's BIONÆR program. The principal aim was to "produce and publicise knowledge that will facilitate increased use of wood in buildings in urban areas."³ The Oslo School of Architecture and Design was the leading and coordinating partner alongside the Norwegian University of Life Sciences (NMBU) and the Norwegian Institute of Bio-economy Research (NIBIO), as well as a number of international research institutions. Networks of Norwegian architectural firms and forest owners were also associated as industrial partners.⁴

The courses were set up in response to a general observation regarding the long time it takes from development of production and solutions to their full-scale testing and application within the construction industry. This was perceived as a particular problem within the WBB research project, which focused on the application of new timber technologies within large-scale urban projects. It was hypothesised that realistic and holistic architectural design could be used as a complementary method

of testing, which could be undertaken by students of architecture sufficiently prepared through lectures and supervision. The research intention of the studio courses was described in the original project proposal:

“The studio courses will produce a series of integrated designs that will explore the effects of wood application on the functional, technical and architectural quality of whole buildings and areas. This is not possible in ordinary research projects because it will be too expensive or too slow. It also represents a type of architectural research that utilises the core competence of architects. This is to structure and transform large amounts of data and complex sets of requirements into integrated architectural solutions.”⁵

The students were introduced to the main course themes and learning outcomes through the course descriptions, introduced by the course leaders during plenary presentations held the semester before each studio. The goals of the research project were described at these presentations and again at the start of the course. The students were given up-to-date information on silviculture, principal properties of timber, different construction systems and the design of timber cladding. They had visits from highly profiled architects with experience in the field; as well as wood biologists, acoustic, fire and structural engineers from within the research consortium; and producers of timber products. From a pedagogic viewpoint, the intention was not to produce a set of timber disciplines, but to teach the students the relationship between architecture and materials through investigative processes that can also be applied to other materials and constructions.

Through conversations with the Project Leader, Professor Marius Nygaard, and interviews with staff and students, this article attempts to explore how these courses developed new knowledge in timber construction and their role in forming future educational systems within the field of architecture.

Course intentions and pedagogic approach

In a conversation recorded in June 2016, Marius described the course intentions and pedagogic approach that had guided the master studios from their original inception.

The studio projects and tasks were located in Oslo and Akershus, rapidly urbanising areas in Norway that are in close proximity to AHO and therefore natural objects of study. Typical urban development areas were chosen, such as infills or extensions within the existing city centre, developments at traffic nodes in suburbs, and densification in areas presently dominated by single-family houses. These were considered typical in that they are realistic and taking place in Oslo and Akershus today. They are also central to the planned development of this region and are

typical for a wide range of urbanising regions, especially within Northern Europe. Two to eight storey buildings became the focus of the studios following the research teams hypotheses that this would be a dominant typology in the future timber city. This was subsequently verified as part of the WBB research into future urban development in Oslo and Akershus.⁶

The courses offered teaching in both the production and properties of wood as a material, alongside new types of timber products and constructions. The pedagogical intention was to expose students to big and complex building design tasks on difficult urban sites, challenging them to carry out designs that were convincing both in architectural quality and technological resolution. In addition the students were introduced to the interdisciplinary team of lecturers and studio tutors (described above) at a level not usual in master studios. This necessitated interdisciplinary communication that requires an understanding in the fields of knowledge adjacent to those in architecture. By showing timber solutions integrated in the design of whole buildings the resulting student projects could verify the potentials of new technologies. In relation to other courses within AHO, these studios were more deeply focused on integrated approaches in the design of both the building and its subsystems (construction, ventilation, water, heating and so on). This was in part due to the fact that exposing timber surfaces internally requires a greater level of control of the distribution of technical systems than in other constructions.

In essence, the courses were built on the hypothesis that by maintaining a focus on real life and complex applications of timber solutions, it was possible to produce student projects that could contribute to illustrating, in a convincing way, the characteristics of a new timber city.

Interviews with students and teachers

The interviews that form the basis for this article were undertaken in March 2016. The interview subjects were chosen for their particular involvement in the project and to give a variety of voices to the research. As the total number of teachers and researchers numbered only five it was possible to interview all. The five student interviewees were selected from a total of 75 based on the contribution of their projects to the research project. The author observes that these students represented only three of the six urban timber courses. At the time of interviewing they had recently graduated from AHO (January 2016) enabling a reflection and openness perhaps not available from continuing students. The author notes that all the student interviewees chose to continue with the project and course leaders after concluding their studios, either through their choice of diploma supervisor or working environment, indicating an inherent bias in their answers.

All the participants were familiar to the author, who had joined the WBB research project in August 2015 as project coordinator and teaching assistant. It was anticipated that this familiarity would encourage honest and open participation. A set of 15-20 questions was prepared and used as a guide during the interviews. These were adapted to the various interviewees according to their role in the research and studios: course leaders, teaching assistants, researchers and students. They were not sent out prior to the interviews to encourage a more intuitive and discursive dialogue. The interviews were conducted separately between the interviewer and one interviewee, with the exception of the joint interview with Børre Skodvin and Lars Hamran. The interviews were transcribed and cross-referenced, resulting in the creation of eight common themes, which were used to structure this article.

The author observes that the student interviews show an overall positive response to the courses. This reflects both the anonymous feedback received through AHO's student surveys of learning outcomes, subject content and pedagogic content for each masters' course,⁷ as well as the sustained number of applicants applying for each of the six consecutive studios.

Theme 1: A series of two studios

The timber courses were organised as two masters studios, one in the autumn semester and one in spring, with the first in autumn 2013. The autumn courses, led by Marius Nygaard, explored timber construction in large, complex and typical urban projects, such as the urban block and urban infill. There was a particular focus on the use of Cross-Laminated Timber (CLT) as a material that had been proven to be well suited to urban densification projects, as well as constructions that explored the potential for buildings to change according to different use over time. Teaching assistants Lars and Ute noted that these courses had a "strong technical" and more "structured side". Students Ona and Eskil, who had taken both courses, commented that this course "took more of the engineering point of view, the economics of it, ... flexibility, and the wood industry" and was focused towards the "broader, larger scale of urban development and bigger projects generally".

The spring courses, led by Børre Skodvin, looked at different aspects of timber technology and the timber industry, to develop and explore different constructions and the potential danger to "misuse a material". Marius observed that they were "oriented towards the specialised use of wood, finding the timber resources that have specific properties and then integrating them in the architecture in a deliberate way." Lars commented that they were "more experimental in the approach, where the development of ideas, ... building techniques and ... different uses of wood are emphasised". These courses had an experiential nature, getting to know the quality and character of wood and what it is like to work with. Børre recalled taking the

students on a “winter experience, going into the snow and learning the chainsaw from this old timber guy cutting down the tree”.

The teaching staff agree that both courses had a different perspective on teaching timber, reflecting their course leaders personal interests and affinities, yet were complimentary to one another and the goals of the research project. Lars reflected that the ambition for both courses was “for each student to create a consistent and believable project that can be built … which includes drawings and details that are well thought out and buildable” summarising that “the difference lies in approach, rather than a goal”. The students noticed these differences, as Ona reported, “I experienced them as two very different courses and with a very different focus, and … intention … of where they wanted us to go and what they wanted us to learn”. Student Eskil noted “I chose these courses because of the contrast of those approaches … the chronology was kind of right to me. To first learn about the properties and then trying to implement it in some way that I felt was interesting or trying something new.”

Theme 2: Choice of course

Marius remembered being forewarned not to expect many students in a research-oriented studio, but it turned out that they had many more applicants than the 15 they could accommodate. He suggests the integration of research orientation within the framework of a traditional and ambitious studio course, in which the students leave the studios with full individual projects and not only sub-deliveries within a larger research goal, was looked upon “as a very attractive solution for a course”.

The students had many different reasons for choosing the courses, one of which was the course leaders’ personalities and fields of interest. Student Ona stated “in truth I chose it because of the teachers. I just wanted to have Marius as my teacher”, adding she would have taken Børre’s course “regardless of what he was teaching”, although it also seemed “incredibly interesting”. Student Eskil agreed, “I think that is quite important when choosing a course … who is going to teach you … for a whole semester.” Student Marte raised the sustainability aspect as one of her reasons, citing Marius as one of the main professors tackling sustainability. Interestingly, wood plays a lesser role in the student’s choice of course than learning the principles of materials, detailing and construction. Student Even noted that he chose the course “to learn a little bit about detailing actually … so it wasn’t really about the wood thing”. Student Eskil commented that he was interested in learning about the properties of wood and how that affected the detailing and the final look of the buildings, but “I’m not just interested in wood. I’m not a wood person. So I like to separate the wood and the course a bit. Because when it comes down to it, it’s all about architecture to me.”

Student Shohreh summed up these varied reasons “I felt like the three first years [at AHO], they weren’t so detailed. And not so focused on environment and how to use construction as a positive thing, so I wanted to really dig into details and understand construction and how to use wood as well. Because I think we have a great opportunity in Norway to use wood. And it’s lacking a lot because we don’t know so much as we should, especially in big buildings.”

Theme 3: From concept to detail

The shared ambition of the two courses was to carry ideas all the way from concept to detailed designs and make drawings that resemble working drawings. Marius noted “I think we quickly saw that there were coming rather good projects with a level of detail that was not usual at the school.” Børre added that they “brought to light some interesting discussions”, in particular dealing with architectural possibilities of the exterior shell. Teaching assistant Ute noted this as one of the main advantages of these courses, but emphasised the need to consider both the concept and material together from the beginning to “create a much stronger solution”. It was sometimes challenging to work from the concept to detail level in one semester. Marius commented “we have to increase the students’ competence in wood technology very sharply, and we have to use a lot of time for that.” He added that he would like to “meet the students on a more advanced level … and then work more balanced with the technical and architectural solutions.” Student Ona experienced it took too long “finding the right architectural expression”, which limited how much her research into timber could be integrated within her design. Student Marte found the course “quite well-organised” and noted that “the detailing phase is where I thrive”. Student Even added “we started designing the details really early actually, and that was a really nice experience to develop them alongside the plans and sections while we were still figuring out how everything was going to look… I’ve never made a project that was that holistic where we thought about most of everything from the structure to the design to the city plan to the details. I’m really happy that we got as far as we did.”

Student Shohreh reflected on the role of details within architectural education, “I remember when … I studied [Sverre] Fehn’s architecture, and I was kind of falling into this dreamy, poetic world, but then I realised the poetic part is actually in Fehn’s details, … and how the materials meet each other so precisely, and if he hadn’t that detail knowledge, I don’t think his poetry or his story would have come out as professionally as it has come out. So, I think that’s why there should also be a focus on details at school, to really bring out the story and bring out the poetry in the architecture.”

This ambition to develop the students’ mastery of both technical knowledge in construction and materials alongside architectural design skills, sits at the heart of a

common discussion within schools of architecture. The resulting student projects show a mix of results, with some students managing to master and control both elements to develop successful holistic architectural designs from concept to detail. Other students struggled with the additional knowledge requirements and design output set within the constrained period of a single semester. The students' positive feedback to the detailed and technical content of these studios however, supports both the importance of these types of courses within architectural education and the real potential in student projects to test and develop innovative architectural solutions to complex problems.

Theme 4: When is timber appropriate?

In designing and planning the courses there was an aspiration to use the focus of investigating timber as a construction material, as a tool to teach architecture at the level of a masters studio, whilst also exploring the materials versatility in an urban context. However, as Børre emphasised, despite being a timber course the main focus was in the pursuit of the best possible architectural project. Teaching assistant Ute explained "it was quite important to say, it doesn't have to be timber in any case, but to see where it is good". Lars and Børre highlighted that this was a potential problem with this type of course "you could imagine ... that you could have a type of material racism, where you have a preference for a particular material, which was unreflective and which didn't really consider if the material was appropriate". Student Eskil remembered "what I learned during this course was that the hard question is - when is timber appropriate?" This level of reflection on the properties and suitability of a material, in this case timber, was an important learning outcome of the studios.

Theme 5: Interdisciplinary experience

One of the main benefits of the research-oriented course was the access to very highly skilled and knowledgeable people, an ambition set out in the original project proposal:

"Interdisciplinary interaction is required both in research and in education to achieve a rapid spreading of knowledge to all participants in design and construction processes."⁸

Børre described this as similar to "having a laboratory with very nice tools and a very good technician." PhD candidate Jan described the advantages and challenges of "bringing [the students] up to date with the current state of technology" and "in touch with what's going on in the world" in a way that "doesn't overburden them with information." Student Eskil noted that he found it interesting to talk to "non-architect people" and "understand more of what is going on out there." Børre reflected on studio discussions around unsolved problems amid these experts, "I will

expect that gives you a feeling as a student, that you know something that not everybody out there will be aware of. It will give you an edge, and ... shows you that no material, however well-known or well-studied, is ever finally completely exhausted as an object of study." Marius reported "when we have had people from the industry in the studio, they are very positive and they are very impressed by the level of knowledge achieved by the students", and reflected on the potential for architects to work more closely with industry in the future, developing building systems to enable them to be more adaptable for different types of applications.

The interdisciplinary element of the research played a particular part in one masters project, where a student of engineering at NMBU and a group of architectural students at AHO worked together. The students of architecture defined a typical block of flats as a basis for the structural analysis. After the engineering student had studied the cantilevering potentials of CLT walls in a Finite Element Analysis, the AHO students were able to explore and illustrate the architecture implications.

Theme 6: Study trips

Study trips were a key contribution to each of the courses, with visits to Finland, Japan, Ireland and the alpine regions of Austria, Germany and Switzerland, countries with a long-standing timber culture and an advanced knowledge of detailing and technical development. The study trips enabled the students to experience first-hand built examples of both traditional and contemporary architectural projects. In addition the students could learn about the technical processes from visits to timber factories and module production sites, often containing advanced CNC equipment. Reflecting on the Japan trip, teaching assistant Lars observed "just being able to see it and touch it makes you able to try to reverse engineer it and think of how you could achieve this at home, and it's definitely possible."

Theme 7: Contribution to research

The main contribution of the studio courses to the WBB research are the many and varied student projects exploring timber as a main building material in different urban scenarios in Oslo. Marius noted that the student projects "illustrate what a new timber city might look like," whilst student Eskil observed that the studios had created "a huge selection of works" and a valuable resource. The projects illustrate the link between designs on an urban level, building level and detailed level, showing as teaching assistant Ute reported "the different aspects that we are interested in, but combined into a real product, because you can look at isolated aspects but they really only make sense when they are combined into a meaningful whole." The teachers also observed a greater interaction between the students' architectural intentions and the restrictions imposed by the properties of timber and its available structural systems. Marius observed that the resulting projects could be

used to “formulate central themes for further research and technological development”, highlighting solutions for acoustic insulation between apartments that can allow for exposed timber constructions, fire solutions that consider whole building designs, window details, façade treatments and continuity of character in urban quarters, all of which he noted “have been studied and illustrated in a very large number of projects.”

Theme 8: Additional perceived value

All the interviewees were asked to reflect on the overall value of these master courses. The student responses emphasise contributions noted earlier in the article. Student Marte mentioned “the possibility to contribute and influence” this new field and the “cooperation across disciplines, which really was helpful and inspiring for our professional career afterwards.” Student Shohreh reflected on the value of these types of courses to the “students’ variety of knowledge” and “because we are architects, and at the end, we are going to build our buildings.” PhD candidate Jan commented that “organising a studio around real-world problems has the potential to give the students the feeling that their ideas, their exercises, their efforts are really capable of influencing the world.”

Børre emphasised the embedding of knowledge and interest in timber as a building material to the students, which “in a small country like Norway … is a very efficient seedbed” adding “it’s kind of a future yield, a little bit like in the forest. You plant the seed and you wait for a generation, and maybe you get a nice tree.” Students Marte and Even agreed that they would like to continue working with wood as a construction material, which student Ona observed would “shift industry in the long run.” Student Shohreh had already influenced an architect to consider the use of timber instead of brick on a façade.

Marius reflected on the value to the architectural school as a whole, “I think it has had a rather dramatic effect … because it actually has created a new permanent area for teaching… And it creates a platform for further cooperation with industry because they see that we … have reached a level of detail … which approaches the level that they need to develop new products.” Børre was similarly excited about the implications on the teaching and research environment at AHO, and the potential to become “experts in a field for which we have a talent” adding “it would be precisely this kind of place, you know, - Who are you going to call? - Well, we’ll call the timber department at AHO, because if they don’t know, then nobody knows.”

Reflections on teaching timber

In a concluding conversation with Marius, he reflected on the experience of the courses and the feedback from the interviews. He was particularly surprised by the student responses to their choice of these courses and the weight that the students

were putting on the teachers, noting that “it appears that you can make the world’s best course descriptions, but you will not get students unless you build a reputation for being a teacher who is present and is able to communicate in ways that are understandable and inspiring.” He also emphasised the significance of the group dynamic within each course and the importance of establishing an understanding between the students in the early phases that they are working towards a common goal in developing new knowledge in the field of urban timber architecture.

In relation to the content of the courses he noted that it was “important to keep up the ambitions on behalf of the students, and embrace complexity instead of artificial simplicity” by challenging them to handle real world architectural and urban development projects. He also highlighted the importance of giving the students access to knowledge of building processes and material technologies, to develop a “kind of mastery”, enabling them to steer their design process towards an architecture that they are really engaged in creating, and become better prepared for the real world that awaits them.

He concluded by saying that architectural education should aspire to combine inspirational openness with technological and real-world rigor, “I think it’s very important to maintain a very liberal attitude when it comes to what can be the sources and inspirations of architectural design, but at the same time build a competence in discussing, arguing and showing how these inspirations are integrated and developed into sensible and sustainable architectural solutions.”

Discussion

Following a presentation at the ACSA Conference in 2016⁹, a participant observed that these masters’ courses are essentially teaching architecture through the use of timber as the building material. The author translates this to mean that timber was used as a means for enabling the students to explore complex and interlocked architectural issues on various scales; such as urban form, structure, cladding, detailing and service integration. This could of course be applied to many other building materials. However, a key advantage of timber is its ability to act as both the structure and surface finish (internally and externally). In this way it may have more in common with studies of brick, or ceramics than with concrete or steel.

A distinguishing characteristic of timber today is the speed of innovation and the rate of growth in its use in construction. Academic institutions play a key role in developing and disseminating this knowledge. In Norway, timber-based architectural studies have good access to researchers from other disciplines and new products and solutions. These courses also benefitted from the students’ implicit knowledge of wood as part of a Norwegian building culture. Many had experience from physically working with the material and nearby forests and sawmills provided

access to materials and typical production facilities.

These master courses reveal that there is a great potential and value for architectural students to be involved in research projects, if the course leaders maintain a balance between the research objectives and the student learning outcomes. Interdisciplinary processes can be of particular value in providing contact with people and knowledge outside of the students' own discipline. In this way they may be better prepared for the complexity of architectural practice.

The many and varied student projects contributed to research by showing the potential of wood in a wide variety of urban buildings with diverse architectural strategies. The projects were able to resolve detailed solutions to difficult technical issues related to fire, acoustics, structure etc. Key to the success of the courses was their ability to achieve these research objectives whilst allowing the students' freedom to develop their own solutions and architectural expression.

The interviews with the students reveal a lack of awareness of their role within the research project. Emphasising the link between the consecutive courses and showing the progression in exploration of form and technical solutions in previous projects may have improved this. An exhibition held during the National Conference of Timber Architecture (Trearkitekturkonferansen) in November 2016¹⁰ attempted to consolidate the work produced during these courses, revealing both the scope and depth of the material produced by the students. This is particularly evident in the high level of technical proficiency achieved that is not typical to other courses within the school.

1. Lenny Bernstein et al., “Climate Change 2007: Synthesis Report. An Assessment of the Intergovernmental Panel on Climate Change” (adopted at IPCC Plenary XXVII Valencia, Spain 12-17 November 2007).
2. “Skogavirkning for salg” Tabell 252770, <https://www.ssb.no/252770/skogavirkning-for-salg>, published 21 January 2016.
3. “WOOD/BE/BETTER”, http://www.skogoglandskap.no/en/projects/wood_be_better/project_view
4. WBB partners - Architectural practices: Arne Henriksen Arkitekter AS; Brendeland & Kristoffersen Arkitekter AS; Code: arkitektur; div.A arkitekter; Helen & Hard AS; Jarmund Vignsæs Arkitekter; Knut Hjeltnes AS; LPO Arkitekter; Reiulf Ramstad Arkitekter; and, Saunders Architecture. Forestry partners: AT skog BA; Lunner Almenning; Splitkon AS + Martinssons Byggsystem AB; Viken Skog SA; and, Norwegian Forest and Landscape Institute. International institutions: Edinburgh Napier University; Oregon State University; SP Technical Research Institute of Sweden; and, University of Pennsylvania T.C. Chan Center.
5. Marius Nygaard et al., “Increased use of wood in urban areas” (WOOD/BE/BETTER: Oslo School of Architecture and Design response to the Call for Proposals. 2012, p7)
6. Marius Nygaard et al., “Potential for and positive climate effects of an increased use of timber in building projects in Oslo and Akershus.” Awaiting publication.
7. Student surveys responses from Autumn 2013, Spring 2015 and Autumn 2015. (Surveys from Spring and Autumn 2014 were not recorded, whilst the survey from Spring 2016 was unavailable at the time of writing).
8. Marius Nygaard et al., “Increased use of wood in urban areas” (WOOD/BE/BETTER: Oslo School of Architecture and Design response to the Call for Proposals. 2012, p3)
9. Association of Collegiate Schools of Architecture Summer Conference. Cross-Americas: Probing Disglobal Networks. Santiago de Chile, June 29-July 01 2016.
10. Trearkitektur nasjonale konferanse 2016. Oslo, 16 November