

Explorative Teaching – From Additive Manufacturing to Architecture

Explorative teaching breaks with common and standardized design teaching methods. It is the quest for a new symbiosis of ecological materials and digital fabrication. How we design (space and design) and what we design with (materials, processes and simulation techniques) are two inseparable aspects of our future activities as architects and engineers. Substantial sustainability only emerges when all these aspects are combined into a complex whole. The obvious danger of "technification", as unfolding at the latest with Material Cultures (see Material Cultures: Material Reform, Building for a Post-Carbon Future), versus the potential to combine ecological materials with the benefits of robotics, needs to be explored by experienced architects in research-based teaching. While the first generations of digital developments focused on the challenge of advanced geometry, the urgency of how we treat nature differently is now the driving force. Without innovation in building design, we will not be able to create the buildings of the future. This is where teaching and research must realign to play a leading role in recalibrating the design process.



Figure 1. Construction concept / Kremer, Schlinker / IKON, ITE

Explorative teaching was investigated within the project "From Additive Manufacturing To Architecture" in the summer semester of 2022. In a cooperation between TU Braunschweig and TU Munich so-called "A-Projects" from the collaborative research center AMC TRR 277 were examined. This led to the development of constructive structures in digital fabrication. In a second step, concepts for buildings were drawn up from the structural solutions, giving the constructive idea an aesthetic and architectural form. Finally, these student designs were technically refined and manufactured as collaborative demonstrators on a scale of 1:1.

Innovative research approaches were integrated into the design and construction planning process of master student projects from the very beginning. The resulting architectural and technical findings were subsequently critically reflected upon within the scientific spectrum of the AMC TRR 277.



Figure 2. Architectural Design / Kremer, Schlinker / IKON, ITE

Explorative design thereby promotes the interaction of technology and design and transfers individual inventions into a coherent overall construct. The holistic questions that come to light in the course of an architectural conception change the perspective within the research work. In turn, scientific findings offer designers a broad spectrum of new procedures and techniques that result in a sustainable architecture within the planetary boundaries.



Figure 3. Collaborative Demonstrator / IKON, ITE / AMC TRR 27

Plenty of inspirations emerged from the collaboration and interaction between teaching and science. Profound questions within the design process opened up various new perspectives on the current research approaches. The format of an interdisciplinary and explorative master project accompanying the science process will therefore be established in a regular manner for the next semesters. In a fruitful exchange between students and researchers Additive Manufacturing can be brought to the scale of Architecture.

From Additive Manufacturing to Architecture
Teaching collaboration 2022

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