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Post-Occupancy Representation: Drawing Buildings in Use for Adaptive Architecture

Representación post-ocupacional: dibujar edificios en uso para una arquitectura adaptativa

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Abstract

This paper presents a teaching and research experience in which Post-Occupancy Evaluation (POE) is used as a drawing method to inform adaptive design in public buildings. Conducted in a ten-week MSc2 Architecture seminar with 24 students, the course employed Research by Design (RbD) to loop between evaluation and intervention. Students combined on-site surveys, questionnaires and behavioural mapping, translating findings into living drawings that register use, comfort and change over time. Layered plans, annotated axonometrics and narrative diagrams turned evidence into spatial guidelines. The approach reframes evaluation from a retrospective assessment into an active driver of design decisions aimed at well-being and environmental performance. The paper outlines the course process, key outcomes across campus buildings, and reflects on the pedagogical value of representation as inquiry.

Keywords: adaptive reuse, architectural representation, post-occupancy evaluation (POE), user-centred, research by design (RbD).

Thematic areas: educational research, architectural design, project-based learning, reflective and creative processes in the studio, curricular integration and interdisciplinarity.

Resumen

Este artículo presenta una experiencia docente e investigadora donde la Evaluación Post-Ocupacional (POE) se utiliza como método de dibujo para orientar el diseño adaptativo en edificios públicos. El seminario, impartido en un máster de arquitectura con 24 estudiantes, aplicó la metodología Research by Design (RbD) para articular bucles de evaluación e intervención. Los estudiantes combinaron levantamientos, cuestionarios y mapeo de comportamientos, traduciendo los hallazgos en "dibujos en uso" que registran ocupación, confort y cambio en el tiempo. Estos planos y diagramas convirtieron la evidencia en pautas espaciales que guiaron decisiones adaptativas. El enfoque transforma la POE de una verificación retrospectiva en un instrumento activo de proyecto orientado al bienestar y al desempeño ambiental.

Palabras clave: reutilización adaptativa, representación arquitectónica, evaluación post-ocupacional (POE), centrado en el usuario, research by design (RbD).

Bloques temáticos: investigación educativa, proyectos arquitectónicos, aprendizaje basado en proyectos, procesos reflexivos y creativos en el aula, integración curricular e interdisciplinariedad.

Resumen datos académicos

Titulación: Architecture

Nivel/curso dentro de la titulación: MSc2

Denominación oficial asignatura, experiencia docente, acción: Adaptive Architecture for Public Buildings: Theories and Practices

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Can architectural drawings capture not only design intent but also the lived experience of buildings? This communication presents a teaching and research experience that explores how post-occupancy evaluation (POE), a method used to assess the performance of buildings once they are inhabited, can evolve into a speculative and graphic strategy to support adaptive design. The approach was tested and implemented within the context of a seminar course of 24 students who, during 10 weeks, questioned the conventional understanding of POE as a purely technical or data-driven task. In exploiting the generative possibilities offered by POE, instead, the course treated POE findings (observations, user experiences, behavioural patterns) as material for what we call “living drawings”: graphic narratives, annotated diagrams and layered plans that visualise how buildings are used, adapted and negotiated over time. These representations shift the focus from a static building to an evolving spatial condition. The main objective was to reposition drawing as a critical tool that can express use, change and feedback, and that can inform adaptive decisions rooted in real-life occupation.

More broadly, in rethinking the entanglement between analysis, observation and design, the seminar course aimed to critically investigate the general meaning of research in architecture, the possible forms through which the relationship between architecture and research can manifest itself, and lastly to define outcomes not only restricted to the academic audience but to a larger and societal public. In these pages, such an entanglement finds its possible definition in a pedagogic approach called research by design. As the core of our educational process, Research by Design (RbD) focuses on design work as a special form of research; it considers theory and praxis, analysis and imagination as inseparable. Research not only intended as preparation, description, and explanation but, more importantly, as projection and speculation. Research is a form of design and design a form of research.

The goal of a RbD approach was to crystalize the intertwined forms of interaction between space and program, image and materials, people and the environment via modes of knowledge production that include experimentation, imagination, iteration, comparison, morphing. Those imply typological reinterpretations, generative analyses, formal readings, advanced mapping. In this setting, students learn to work through loops of observation, reflection and design. They begin with conceptual aims that are constantly refined in light of user experience and spatial behaviour. Design and research move forward in parallel, each shaping the other. Coherently with these premises, production of knowledge emerges through the conflation of drawing, analysing and imagining. These actions are not sequential but simultaneous, allowing students to test ideas in real situations while proposing transformations based on existing realities

The seminar combined lectures, tutorials and short assignments in two phases. Phase 1 established foundations on adaptability, reuse and user-centred design while introducing POE as a representational practice. Phase 2 operationalised POE into drawing protocols and adaptive scenarios on six public buildings, culminating in a consistent A3 horizontal booklet per group and a public presentation. Weekly loops advanced from site observation and user feedback to diagramming, prototyping of living drawings, and design testing, consolidating RbD as a studio-like learning setting for public buildings in use. The following pages present an overview of the general goals implemented in the course – rethink the relationship between research and design via research by design; the methodology employed – a critical reinterpretation of POE; and, lastly, the outcome produced – students’ living drawings.

1. Rethinking the relationship between research and design: research by design

Our proposal treats RbD not only as a studio ethos but as a transversal pedagogy that links technical, theoretical and graphical subjects through iterative inquiry. In this course, design and research moved together: drawings, models and scenarios became vehicles to ask questions, compare alternatives and externalise knowledge, making the classroom a laboratory where action and reflection co-produce understanding. As mentioned earlier, the pedagogical premises of this proposal have their roots in the urgent need to interrogate students, scholars and teachers on the role that architectural research can play in the production of new knowledge forms. What does constitute research in architecture and what are its goals? What tools do we employ in architectural design? How do we assess the outputs of architectural research?

Over the years, many have been the attempts to give an answer to the above-mentioned questions, by delineating theories, suggesting categorizations, or providing definitions. This seminar course, in merging pedagogic and educational aspects, claims that: 1.) Design has its own ways to formulate questions, investigate issues, produce knowledge. In other words, there are “designerly ways of knowing” (Cross, 1982, pp. 221-227); 2.) Architectural research is a specific form of research that places design at its core. Design is its essential feature. Also, its specificity involves methods and tools that are alien to research in other disciplines; 3.) Architectural research can be for, through, in, by, design.

If design research as a recognized field of study evolved in the 1960s, when for the first time the role that research can play in design was associated to that of other disciplines, in recent years more contributions have focused attention specifically on architectural research, trying to delineate characteristics, methods, and objectives. At the core of these endeavors is the idea that design – and in our case architecture – has its own ways to pose questions, solve problems, or produce innovation. And that designers have very specific ways of working and thinking. In our specific case of a seminar course, one might say that architectural research represented a form of research in which design constituted both the objective and the process through which to investigate certain issues.

At the same time, in order to clarify our position, it is first necessary to distinguish among the possible different forms of architectural research. Jørgen Hauberg, for example, identifies three established forms of research that can be applied both to design and the arts: research into, through, and for design. While, as Hauberg writes, research into design is the most straightforward form of research, including historical, social, technical, material research, research through design consists of experiments, iterations, step-by-step reports, and is fundamentally about development and action research. Lastly, research for design is a form of product-driven research, as it culminates in an artefact / object (Hauberg, 2011, p. 51). To these three forms of research, Hauberg and his colleagues at the EAAE (European Association for Architectural Education) add a fourth one: research by design. Three pillars shape research by design: a.) research by design generates critical inquiry through design work that may include realized projects, proposals, possible realities and alternatives; b.) research by design produces forms of output and discourse proper to disciplinary practice, verbal and non-verbal that make it discussable, accessible and useful to peers and others; c.) research by design is validated through peer review by panels of experts who collectively cover the range of disciplinary competencies addressed by the work (EAAE).

In borrowing Hauberg's definition, the seminar course intended research by design as instrumental to the production of knowledge, via tools and methods that are typical of the architect:

drawings, models, images. In research by design, “designing, making, studio work, practice are the generators of insight, understanding, and knowledge: they are part of the intellectual work and complementary processes of reflection and knowledge creation.” (Verbeke, 2013, p. 150) Research by design is not about research on architecture, but investigates architecture through architecture itself. If in traditional research, including research on architectural history and theory, critical distance is somehow necessary to guarantee rigor and argumentative coherence, in research by design the researcher is also the designer, who develops knowledge through their design activities.

Despite the nuanced categorizations that oftentimes characterize the discourse on research and architecture, the seminar course embraced research by design as main pedagogic model, being aware that it is still extremely relevant to investigate the connection that exists between design and research in the territory of architecture, since the nature of this connection invites us to question the character and the role of architectural design within academia, as well as its general societal impact. At the same time, despite, or thanks to, its growing popularity, as well as to some of its fashionable aspects that an oversimplified interpretation can imply, this proposal maintains that research by design can constitute an answer to the general question of how to conduct research in architecture. In the context of our seminar course, in fact, research by design offered the opportunity to overcome both the rigid demarcation between design and research and, also, the separation among disciplinary fields (architecture providing the project, other disciplines providing theories and methods), by casting light on the act of designing as the key process to develop understanding and knowledge.

In claiming that knowledge can be generated by design projects, research by design demonstrates what Ranulph Glanville calls the centrality of design – both as an object of study and a means of carrying out that study, “insisting on the impropriety of demands that design perform according to criteria of (scientific) research” (Glanville, 1999, p. 89). In comparing architectural research to research from other fields, Glanville suggests in fact, that “we need to learn to believe in design, to live this, no longer apologizing, but refusing to downplay what we do” (Glanville, 1999, p. 89).

The model and the methods of this proposal shared this belief and identified a very specific moment and space for architectural research to take place: the seminar course. The seminar course represented, in fact, the ideal place where research, teaching, and learning could merge to constitute new forms of knowledge production and transmission. A place that could serve at the same time as a battlefield and a testing ground for the emergence of new ideas, models, and strategies in architectural research. This proposal claims that design courses – Architectural Design Studios but also design-oriented seminar courses – are the central space where design knowledge is taught; also, they represent the moment of negotiation among different practices, processes, and forms of knowledge that are essential to comprehend the complexity of certain issues. In integrating these aspects, the design courses are a territory of experimentation, in the direction of what a research-by-design strategy is like: a process made of iterations, curiosity-driven explorations, intuition, and tacit knowledge informed by non-discursive methods of knowledge transmission and production. The way this process of merging teaching, learning and research unfolded in the seminar course was through the critical reinterpretation of the so-called POE method.

2. Post-Occupancy: from evaluation to representation

Post-Occupancy Evaluation (POE) is “the process of evaluating buildings in a systematic and rigorous manner after they have been built and occupied for some time.” (Preiser, Rabinowitz and White, 1988). To investigate the relationship between occupant needs and design, the seminar introduces POE as a key methodology within the framework of data-driven design. POE involves gathering and analysing feedback from building users to assess how well a space meets their needs. However, in this course, POE will go beyond evaluation – it will be reimagined as a representation tool, transforming user insights into architectural drawings, narratives, and other visual outputs. This reframing allows students to not only evaluate the performance of spaces but also use POE as a creative and communicative medium to inform their design proposals.

Students engaged with buildings in active use, collecting qualitative data through observations, interviews and mapping exercises. They documented patterns of discomfort, appropriation and informal adaptation, interpreting these not as failures but as signs of active negotiation between users and space. Their proposals were not comprehensive redesigns but strategic interventions that responded to these findings with subtle and situated changes. In this context, the role of the designer was reframed. Students were not authors imposing solutions from above, but interpreters making sense of occupation through design.

A key pedagogical outcome was the opportunity to challenge traditional architectural drawing. Rather than depicting idealised, frozen plans, students were encouraged to develop representations that acknowledged temporal change, multiplicity and contradiction. These included annotated overlays, sequences in time, user-centred perspectives and mixed-media formats that blurred the boundaries between technical documentation and narrative representation. These drawings served not only to analyse the current state of a building but also to suggest possible futures. They enabled students to understand drawing as a space of projection that mediates between analysis and design.

The seminar followed a methodology rooted in RbD, structured in iterative phases. Initially, students mapped the buildings through spatial observations and user studies. These were translated into graphic forms that illustrated lived experience. In the final phase, students proposed adaptive strategies grounded in these insights. Drawing was used throughout not as a tool for illustrating fixed ideas but as a means of inquiry, a way to test and communicate spatial transformations. It allowed students to produce knowledge while making design proposals that were both critical and responsive. This work emphasises RbD as a teaching model that links theory and practice through iterative processes. It shows how the drawing studio can become a space of research and speculation, and how graphic methods can serve both to analyse and project. It contributes to the wider goal of reframing architectural education as a space for critical engagement with the built environment, centred on the experience of real users rather than abstract expectations.

The integration of POE into the design process from the beginning, rather than as a post-design assessment, offers a more inclusive and resilient approach to architectural thinking. It encourages a pedagogy in which drawing is not a neutral representation but a space of negotiation. In this space, the voices of users become present not only as data but as spatial agents. It allows architecture to emerge through dialogue rather than imposition, through performance rather than permanence. This experience contributes to the ongoing reflection on how architectural knowledge can be generated through drawing and how education can foster design practices that are grounded in reality, adaptive to change and capable of questioning conventional modes of authorship. It proposes a model in which the classroom becomes a space of co-production, and

drawing operates as a pedagogical tool to connect research, representation, and architectural adaptation through use.

In practice, POE in the seminar followed a short, repeatable protocol. Students conducted multi-time-of-day site walks, brief intercept interviews, and behavioural mapping; they noted comfort cues and simple environmental readings, then translated the material into layered plans and axonometrics. To improve reliability, groups triangulated methods, cross-checked one another's findings, and reported limitations explicitly. The choice of POE was pragmatic: it turns user evidence into draw-able material that can be tested within a ten-week schedule and an A3 booklet workflow. Rather than a post-design audit, POE acted upfront as a representational practice, aligning tools, time frames and deliverables with a studio-like seminar and making the path from observation to proposal transparent.

3. Outcomes: Living drawings as design scenarios

We describe “living drawings” as representations that register use and change over time, turning user observations and feedback into design knowledge. Instead of static depictions, these drawings work as working hypotheses. Each layer – intensity of use, comfort perception, conflicts, affordances – points to a possible rule for adaptation: open or close, add or subtract, reprogram or modify. Pedagogically, the use of living drawings allowed students to work through loops of observation, reflection and intervention in a seminar setting. This met learning goals on adaptability, reuse and user-centred design. It also clarified assessment: each design move had to be traced back to a POE layer.

Assessment combined process and product indicators. Process indicators required an explicit link between each design move and a POE layer, the clarity and consistency of the drawing grammar across iterations, and responsiveness to critique. Product indicators evaluated the intent toward user well-being and environmental performance, the coherence of the adaptive strategy, graphic legibility and oral presentation, and the fit with reuse and user-centred aims. This rubric supported comparability across cases and justified the method pedagogically: students had to evidence a verifiable chain of reasoning from occupant observations to adaptive design, not only a persuasive image.

From the course sequence, three main outcomes were identified: 1.) POE protocols, providing repeatable steps to combine quantitative and qualitative evidence at building, threshold and room scales; 2.) Drawing grammars, including axonometric collages, time-based plans and narrative sections that show how spaces are used and transformed; 3.) Adaptive scenarios, in which strategies were tested on six campus buildings, ranging from microclimatic courtyards and operable façades to modular canopies and decentralised entrances, for example, each directly linked to a POE finding.

Each group delivered a consistent evidence-to-design package: drawings of the building in use (plans, one section, one axonometric), POE diagrams synthesising use and comfort, one 2D and one 3D diagram translating evaluation into intervention, final living drawings of the proposal, and an exploded axonometric with two exterior and two interior perspectives. This ensured traceability from user observations to spatial decisions and made results comparable across cases. To make the outcomes clear and comparable, the results are presented as a set of figures that trace the path from evidence to design. Each figure follows the same sequence: a Post-Occupancy Evaluation (POE) diagram that records the observed condition, a living drawing that translates this evidence into an adaptive rule, and a visualised outcome that tests the rule at the scale of the building. This consistent format highlights the continuity from evaluation to design and makes the different cases directly comparable.

The workflow was codified as a five-step sequence that can be replicated in other teaching contexts and building types: Observe, Map, Synthesise, Strategise, Visualise. It is light enough for a ten-week seminar yet robust in how it binds evidence to drawing-led decisions. Studio tutors can scale the protocol up or down by adjusting the number of observation slots, the depth of mapping, or the resolution of the living drawings. Because the steps produce comparable artefacts, they support cross-group peer review, exhibition and archiving, and they make the approach portable to design studios, methods seminars or interdisciplinary electives.

1. Xpand – Sports Centre

Post-Occupancy Evaluation (POE) identified crowded circulation and stale air around the fitness suite. Living drawings layered occupancy and air-quality notations to test alternative routes and spaces of respite. The final scenario removes the existing gym to carve a ventilated courtyard, relocates an enlarged fitness area, shortens the connection to adjacent facilities, and reuses on-site materials, making the progression from evaluation to intervention explicit.

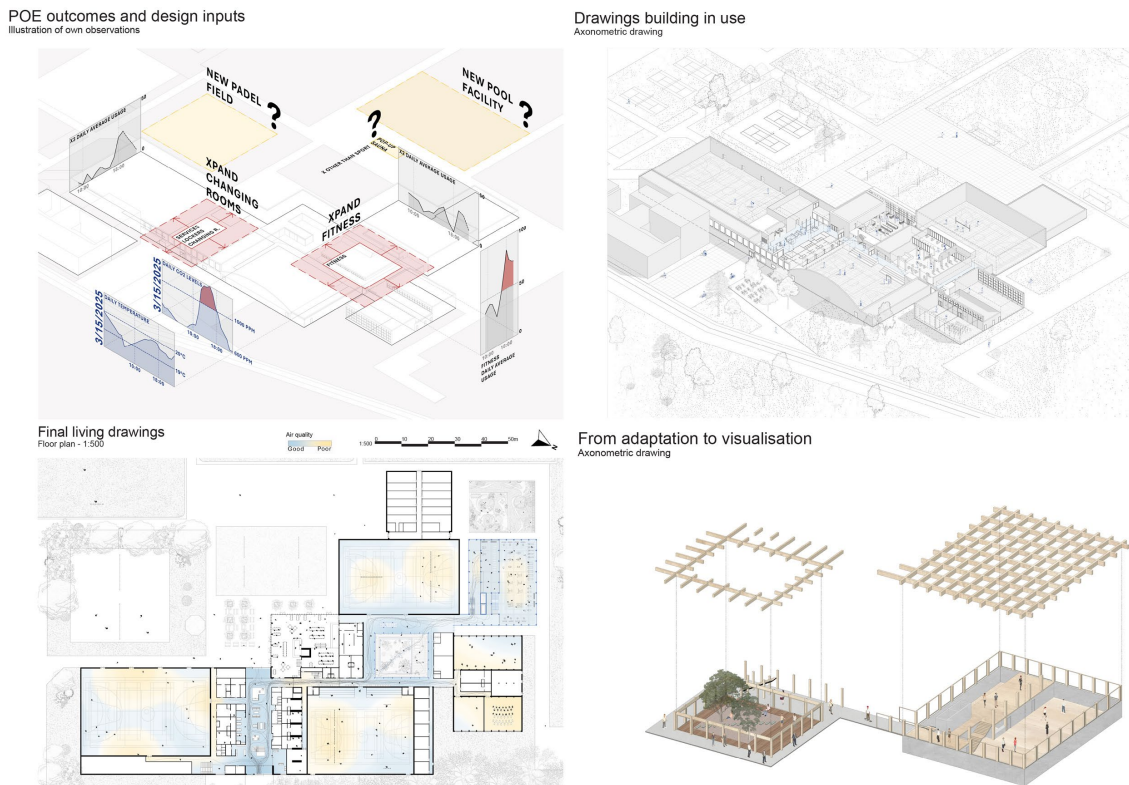


Fig. 1

2. Hanging Garden – High-Rise Educational Building

Wind studies, occupant feedback, and movement mapping revealed façade turbulence and discomfort near the perimeter. Living drawings consolidated these cues into a two-level roof garden with windbreakers and adjusted double-skin openings, while relocating circulation to the façade and pulling workspaces inward. A café connects the terrace and patio to activate shared use.

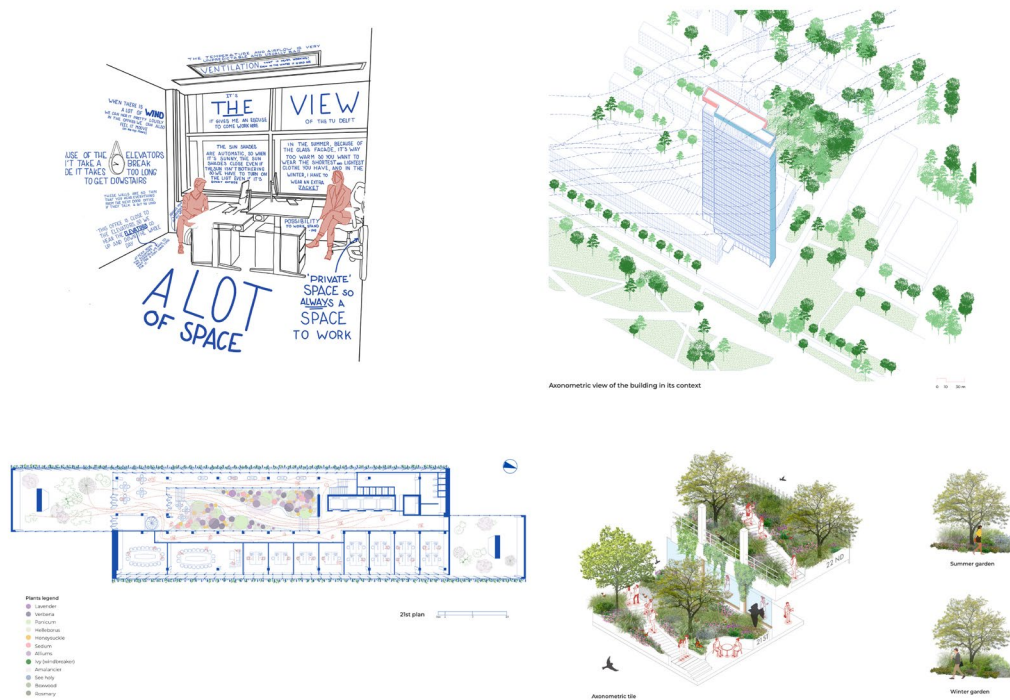


Fig. 2

3. New Thresholds – Faculty Building

Movement maps exposed bottlenecks and stagnant pockets along the ground level. Iterative axonometric collages translated these into rules for clarifying flows and programming edges. The scenario combines operable façade segments, modular threshold units, slight level shifts, decentralised entries, ramps, and cross-ventilation to transform the passage into a social “urban living room” while retaining familiar paths.

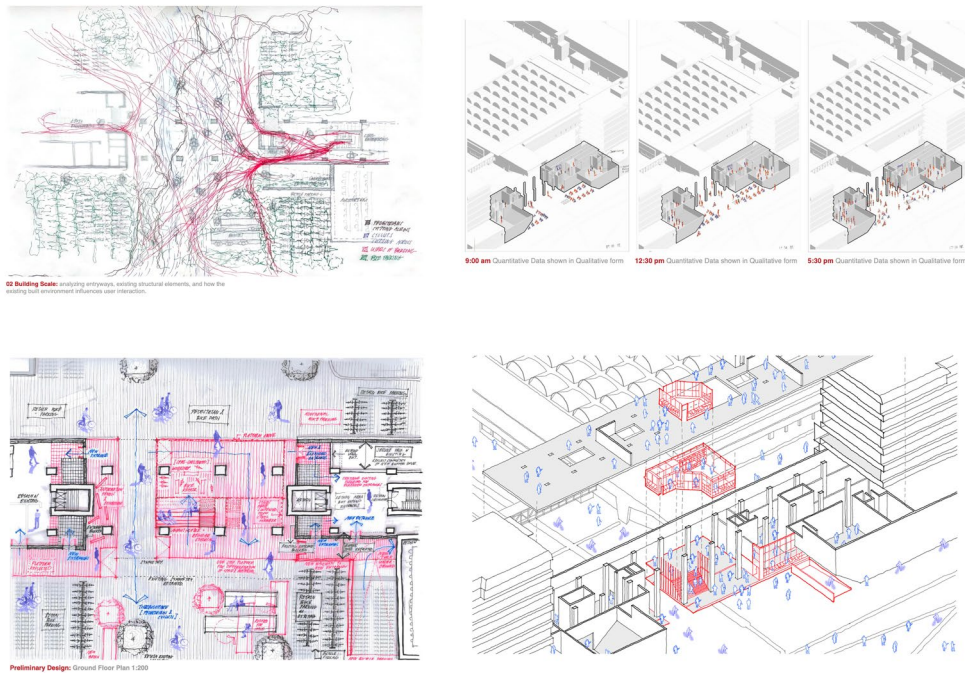


Fig. 3

4. The Education Machine – Teaching Facility

POE combined spatial analysis, occupancy counts, and user interviews to map circulation conflicts and the lack of informal areas. Living drawings layered flow diagrams with feedback on desired amenities, deriving rules to redistribute access and add social thresholds. The proposal introduces an external circulation framework wrapping the building, with new entrances, modular programs such as kiosks and terraces, and activation of the adjacent park. This adaptive layer addresses congestion while allowing flexibility for future use.

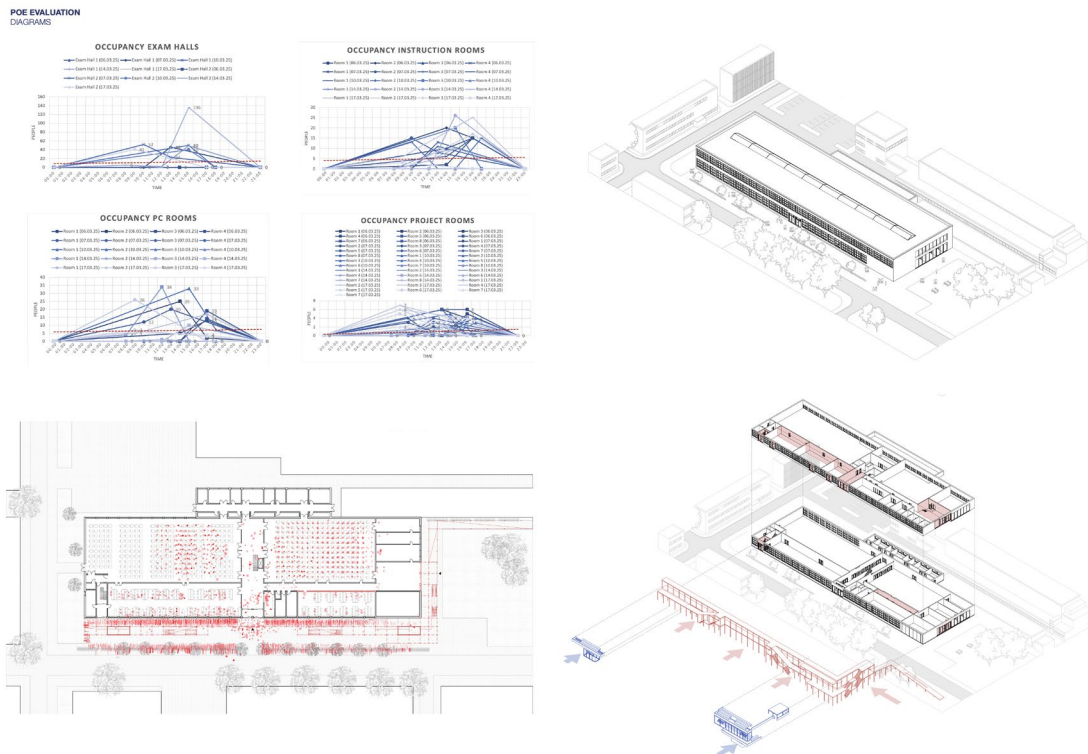


Fig. 4

5. ADAPT² – Parking Structure

Quantitative mapping of vacancy and mobility policy highlighted the underuse of a large parking facility. The scenario repurposes the structure for cultural events, networking, and workshops, aligning with campus development strategies and illustrating how a POE-informed brief can redirect an infrastructural asset toward community-building.

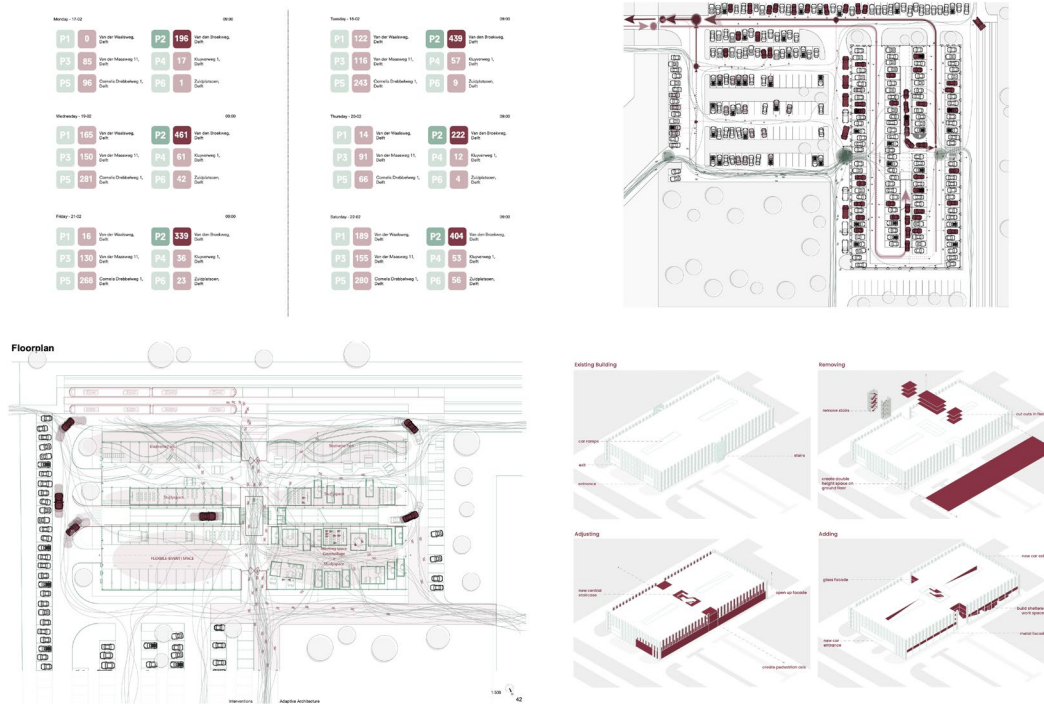


Fig. 5

6. Symbiotic Alliance – Auditorium and Library Complex

POE revealed uneven occupancy rhythms: the auditorium building peaks at lecture and lunch hours but sits underused the rest of the day, while the library maintains more stable density. Living drawings combined flow and density mapping with environmental data to frame rules for balancing use between both. The proposal introduces a central axis linking the two through a patterned pavement and modular furniture-planter units that support study, dining, and meeting functions. These can be reconfigured for exams, events, or daily use. The adaptive strategy creates a symbiotic alliance that levels occupancy curves and activates underused ground-floor areas.

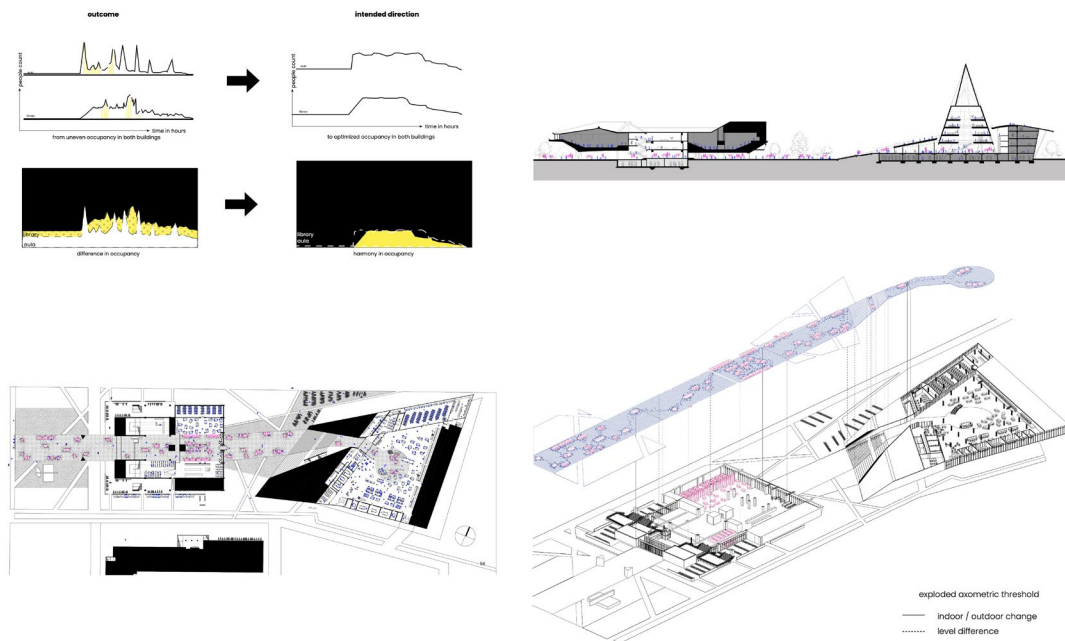


Fig. 6

Taken together, the six cases show that treating POE as a representational practice reliably moves a studio from observation to architectural action. Living drawings made evidence visible, comparable and actionable: they codified mixed-method inputs, anchored adaptive rules and supported assessment by tracing each design move back to a POE layer. The format proved light enough for a ten-week seminar yet transferable to other building types and teaching contexts. Limitations include short observation periods and potential sampling bias; future iterations will widen participation and add longitudinal checks. Future iterations will widen participation, extend observation periods, and include simple longitudinal checks at key moments of the academic year. A short consent and data-ethics protocol will also be standardised to strengthen the method's robustness.

Even so, the work outlines a clear path for RbD courses to couple user-centred evidence with adaptive reuse, improving spatial quality, well-being and environmental performance. These experiences suggest that post-occupancy as representation reframes architectural design education as a living practice, showing how drawing buildings in use can generate transferable methods for teaching adaptability and reuse.

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