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Campus NL

Innovative learning environments

Annual report 2024-2025

Editors: Alexandra den Heijer, Thomas Vogl, Monique Arkesteijn, Sophie Schuller

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Preface

In early 2023, the collective universities, represented by UNL, Universiteiten van Nederland, commissioned the Campus NL project to strengthen knowledge sharing on the past, present, and future of Dutch university campuses. The focus is campus management and supporting strategic and operational decisions concerning land, buildings, and facilities. Campus NL is a four-year programme running from 2023 to 2027.

This report summarises the results of the second project year, 2024–2025. During this period, the steering group, project team, and national network of campus contacts consolidated their collaboration and moved from exploratory mapping towards structured synthesis and application. Building on the first year's focus on office environments and hybrid working, the 2024–2025 phase deepened analysis of spatial efficiency, governance structures, multifunctional learning environments, and the implications of campus intensification.

The report consists of three parts:

(Part I) Introduction and research background

(Part II) Results of the year 2024–2025 (following the established ABCD research structure)

(A) Campus data

(B) Campus trends

(C) Campus elsewhere

(D) Campus learning

(Part III) Conclusions, strategies, and next steps

Across 2024–2025, particular emphasis has been placed on translating data and trend analyses into clear strategic implications for decision makers and operational implications for estates and facilities management. This reflects Campus NL's ambition to move beyond knowledge aggregation towards knowledge valorisation and practical application.

Chapters authored by different contributors are marked with an orange page. Given the scope of the collective output, the report includes both a management summary at the beginning and an extended summary of conclusions in Part III. A Dutch version of the management summary can be found at the end of the report.

On behalf of the Campus NL team, I thank all participating universities for providing data, text, and visual material, for their engagement in interviews, workshops, and network sessions throughout 2024–2025, and for their feedback on draft materials. The dialogue has evolved from initial exchanges and the first annual conference in 2024 towards a more structured national learning community in 2025.

Special thanks go to UNL for their continued guidance, and to the TU Delft Campus Research Team and all contributing authors for their sustained collaborative effort in writing, assembling, and editing this report. Last but not least, I am very grateful to research manager Sophie Schuller and student assistant Jet Hagedoorn, who made the last valuable adjustments, added summaries and had the endurance to finalise this report.

Alexandra den Heijer

TU Delft's Campus Research Team

Delft, December 2025

Management Summary and Key Learning Points

Dutch university campuses have undergone sustained intensification rather than spatial expansion. Between 1999 and 2024, student numbers approximately doubled and staff numbers increased, yet total gross floor area remained broadly stable at roughly 4.4 to 4.5 million m². This long-run pattern indicates a structural shift toward higher utilisation intensity and tighter operational margins, with growing sensitivity to scheduling, peak-time congestion, and user experience.

A consistent theme is that learning is no longer spatially contained within formally designated educational rooms. Although administrative classifications suggest educational space constitutes around one fifth of usable floor area, teaching and studying are routinely distributed across offices and, to a lesser extent, hospitality areas. Office space, a substantial share of the campus, appears to hold the greatest latent multifunctional capacity for supervision, group work, and assessment, suggesting that educational delivery and academic work are already biologically and socially entangled across space types, rather than neatly separated by function.

Utilisation patterns are uneven and governance-mediated, not primarily a question of total seat capacity. Building-level analysis shows large variance in realised frequency, with only a small minority reaching target norms, while many buildings operate above moderate utilisation thresholds. Across the portfolio, frequency outperforms occupancy, and average occupancy remains low, implying that the binding constraint is temporal availability and distribution of rooms rather than insufficient capacity. Scarcity and central sharing mechanisms appear to drive efficiency, as large lecture halls achieve higher frequency, while smaller faculty-controlled rooms are more prone to underuse, reflecting the cost of territoriality and fragmented ownership.

The evidence repeatedly points to standards and systems as levers, and to behaviour as the make-or-break variable. Higher m² per student standards reduce realised frequency, while decentralised or combined scheduling approaches increase it. Peak-period measurement effects underline the importance of differentiating peak demand from average demand in both norms and communications. Yet the paper also stresses qualitative limits to intensification. Beyond certain thresholds, further efficiency gains risk degrading educational quality, academic interaction, belonging, and the lived campus experience, because human learning is shaped by social density, environmental conditions, and perceived control, not only by allocated square metres.

Finally, the context is shifting from growth to contraction under deep uncertainty. Student forecasts have been revised sharply downward, international enrolment is already declining, and funding mechanisms amplify the financial consequences. Long lead times mean that near-term decisions must anticipate multiple plausible futures, rather than assuming stable growth. In this setting, campuses are reframed from primary knowledge-transfer sites to hybrid social, cultural, and collaborative hubs, where flexibility, inclusivity, wellbeing, and digital integration become core value propositions. Data-driven management, smart tools, and AI offer optimisation potential, but also introduce governance questions around public values, autonomy, and data stewardship. The consistent conclusion is that resilient campus management requires integrated strategy across pedagogy, governance, space, technology, and operations, rather than siloed optimisation.

Implications for strategy and policy, plus operations and management

Strategy and policy makers, board level and ministry level

- Treat space as a strategic capability, not a fixed asset. The historical pattern of intensification with stable floor area suggests that future advantage will come from organisational adaptability, not expansion. Translate this into explicit portfolio principles, for example, prioritise spaces that can switch function across teaching, collaboration, assessment, and quiet study without major capital intervention.
- Move from single forecast planning to scenario governance. Forecast volatility and long lead times require a small set of reference scenarios, a decision rule for which scenario drives capex, and a quantified flexibility margin. This reduces reactive cost cutting and enables deliberate trade-offs between financial resilience, sustainability, and educational quality.
- Rebalance success metrics from m² efficiency to educational and societal performance. Intensification has thresholds. Set governance targets that combine frequency and occupancy with measures of learning quality, inclusivity, wellbeing, belonging, and pedagogical fit. This reframes optimisation as maintaining adaptive capacity, rather than maximising compression.
- Address territoriality as a structural inefficiency. Evidence that centrally shared scarce rooms are used more efficiently implies that fragmented ownership is a policy problem. Consider incentives and mandates that increase cross-faculty sharing, paired with safeguards for programme identity and specialist needs.
- Invest in digitalisation as campus redefinition, not just IT. Hybrid learning shifts the campus toward social interaction, co-creation, and support. Strategy should therefore fund the connective tissue, integrated AV, booking systems, and inclusive digital access, while protecting face-to-face learning functions that sustain community, identity, and peer learning.
- Adopt ethical data governance as a competitive differentiator. Smart buildings and AI are operational accelerators, but they require clear public-value commitments, cybersecurity standards, transparency on data ownership, and limits on surveillance. This is increasingly central to legitimacy and trust.

Operations and management, estates, facilities, scheduling, campus services

- Optimise frequency before adding capacity. With occupancy structurally low and frequency the constraint, prioritise timetable design, room-turnover buffers, and booking rules that increase temporal availability. Use peak-demand diagnostics to avoid overbuilding for rare extremes.
- Standardise, then flex. Reduce bespoke room typologies where possible and increase the share of generic adaptable rooms, supported by movable furniture, robust acoustics, and integrated AV. This increases utilisation resilience when pedagogy and cohort sizes shift.

- Target the underused tail, not the whole portfolio. Utilisation is uneven. Focus interventions on the lowest-frequency buildings and on faculty-controlled small rooms, where governance, access, and booking rules can yield large gains without major capex.
- Align pedagogy, scheduling, and space use, or the design will underperform. Innovative rooms fail when used for frontal teaching. Implement lightweight change management, user onboarding, and teaching support, so that intended pedagogies are biologically plausible in practice, meaning low cognitive friction, clear affordances, and reliable technology.
- Use cautious overbooking and rapid feedback loops. Where no-show rates and behavioural variability are predictable, limited overbooking can improve frequency. Pair this with real-time monitoring, complaint channels, and clear escalation rules to protect educational experience.
- Operationalise multifunctionality beyond teaching rooms. Since learning spreads into offices and informal spaces, manage these as part of the learning ecosystem. This means zoning for quiet versus collaboration, managing noise and lighting, and clarifying when and how offices can support student work without eroding staff recovery and deep-work needs.
- Build a shared data spine. Integrate space classification, booking, access control, and user feedback into one transparent dashboard. Use it to negotiate trade-offs with faculties and to build trust, because allocation decisions become legible and evidence-based rather than political.



Part I

BACKGROUND CAMPUS NL

Part I – Background Campus NL

Alexandra den Heijer and Thomas Vogl (2025)

1. Introduction

This report introduces the general information of the Campus NL project to the readers. Besides the background information, the overall goals and the planning process are explained and relevant definitions made.

Project Campus NL aims to consolidate the knowledge and experience of the 14 Dutch universities, integrating these with scientific insights from international contexts and other sectors. The overarching objective is to collaboratively address contemporary campus challenges - including innovation, sustainability, affordability, inspiration, efficiency, and health - while enhancing the effectiveness and efficiency of campus management within each university.

Historical Context and Previous Research

Since the 1990s, when Dutch universities became the legal owners of their buildings and land, they have increasingly collaborated and exchanged knowledge regarding campus management. This collaboration has frequently bridged the gap between practice and theory, resulting in numerous publications (see reference list for a selection).

Building on the positive outcomes of the 2016 Campus NL research initiative, a new four-year research trajectory was proposed to begin in 2023. This initiative seeks to jointly develop, consolidate, and disseminate campus management knowledge across Dutch universities, with a strong emphasis on integrating scientific research and practical expertise, true to the principle: “*Campus NL is for universities, by universities.*”

As outlined in the previous *Campus NL* annual report, the kick-off workshop held in early October 2022 - with representatives from all 14 Dutch universities and affiliated networks - identified an urgent need for inter-university knowledge exchange to support internal decision-making and the justification of campus-related investments. The workshop also highlighted a key opportunity: to more effectively leverage the expertise and innovative capacity of the universities’ own academic communities - essentially, to “practice what we preach.” The insights from this workshop have been incorporated into the *Campus NL* research proposal (Den Heijer et al., 2024).

Additional information about the Campus NL research project is available online via the TU Delft website and the publicly accessible *Campus NL Annual Report 2023–2024*. Both resources are openly available and can be accessed through the following links:

- Press article about the Campus NL project published on the TU Delft website and publicly available online: <https://www.tudelft.nl/en/2023/bk/campus-nl-2023-2027-research-for-and-by-universities>
- Campus NL Annual Report 2023-2024: <https://research.tudelft.nl/en/publications/campus-nl-knowledge-sharing-and-hybrid-working-annual-report-2023>

2. The goal of Campus NL

There are four primary motivations for collectively improving campus management knowledge across Dutch universities:

A. Strengthening Decision-Making through Shared Reference Data

Universities face a growing need for reliable, comparable data when making campus-related decisions and justifying investments. By collectively generating campus management information, institutions can create a robust reference framework informed by experiences from peer organizations. This objective underpins *Part A* of the research.

B. Addressing Future Campus Challenges through Collaborative Innovation

Joint exploration of strategies for the campus of the future is essential, particularly in the light of pressing challenges such as the energy transition, hybrid post-COVID work and learning environments, climate adaptation, and the evolving relationship between universities and municipalities. Universities also serve as living labs, applying their own academic knowledge to real-world spatial and organizational issues. These themes are central to *Part B* of the research.

C. Supporting Education and Research through Evidence-Based Campus Management

World-class education and research require modern, high-quality campus facilities. By embracing evidence-based campus management and fostering innovation, universities can better position themselves to benchmark against international peers and other sectors. This includes exploring models of knowledge exchange and learning from best practices worldwide, as outlined in *Part C* of the research.

D. Enhancing Organizational Resilience in a Changing Workforce Landscape

In the context of demographic shifts, labor shortages, and high staff turnover, universities must strengthen their organizational resilience. A significant amount of institutional knowledge remains undocumented or is lost during transitions. Learning from and with each other helps mitigate these challenges, reduce onboarding time, and retain critical expertise. This need is addressed in *Part D* of the research.

Research Design: Four Pillars of the Campus NL Program

To achieve the four overarching objectives outlined above, the Campus NL research program is structured around four interconnected components (see Figure 1.1). Each component delivers annual outputs that contribute to a comprehensive and evolving body of campus management knowledge:

A. CAMPUS DATA

This component focuses on the systematic inventory and analysis of campus-related data, encompassing both existing facilities and new development projects. Outputs include a centralized project database, time-series datasets, and campus dashboards designed to support evidence-based decision-making.

B. CAMPUS TRENDS

By examining the shifting external context and emerging institutional priorities, this component develops future-oriented scenarios and identifies key campus trends. These insights are grounded in scientific research and strategic foresight, culminating in an annual trend report to inform long-term planning.

C. CAMPUS ELSEWHERE

This component explores how knowledge sharing in campus management is organized in other countries and sectors. Drawing on both theory and practice, it identifies alternative models for structuring and institutionalizing knowledge exchange, with the goal of informing improved practices within the Dutch university context.

D. CAMPUS LEARNING

The dissemination and application of campus knowledge are central to this component. Synthesizing insights from components A, B, and C, it facilitates knowledge exchange through an annual knowledge day, an (online) platform, visual communication tools (e.g., infographics), targeted workshops, and on-demand learning formats tailored for campus staff across institutions.

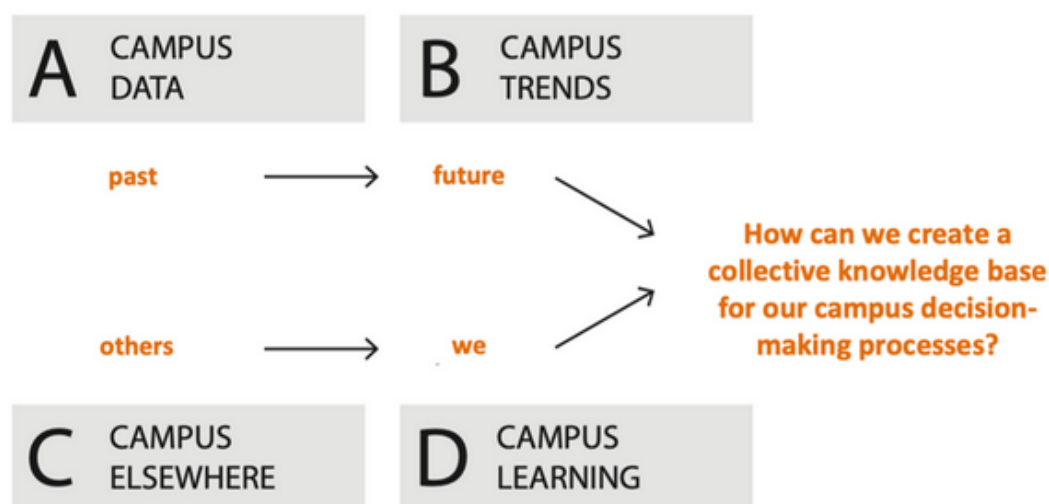


Figure 1.1: Part ABCD of the Campus NL research process (den Heijer et al., 2024)

Expected Outcomes of Campus NL

The Campus NL initiative is expected to enhance the efficiency and effectiveness of campus-related decision-making processes by providing structured, evidence-based management information. The anticipated outcomes for the 2024–2025 period include:

- A. A campus dashboard and a curated database and timeline of recent and ongoing campus projects, offering accessible, data-driven insights for strategic planning.
- B. An annual trend report synthesizing solutions and strategies derived from collective campus practices and scientific research, with each edition focusing on a distinct thematic priority.
- C. Comparative insights from international universities and other relevant organizations, including proposed alternative models for organizing campus knowledge exchange.

D. The development of a knowledge platform and a professional exchange network to support continuous learning and collaboration among university staff involved in campus management.

Project Organization of Campus NL

The organizational structure of the Campus NL project is designed to integrate academic research with practical expertise. This collaboration forms a dual team structure—comprising a **research team** and a **practice team**—collectively referred to as the *Campus NL Team* (see Figures 1.2 and 1.3).

One of the central aims of the project is to bridge the gap between academia and campus practice. To this end, the team includes academics who engage with real-world cases and campus professionals - referred to as *campus contacts* - who possess scientific interests or a desire to deepen their understanding of campus management. These professionals contribute by reflecting on challenges from their own institutions and engaging in peer exchange across universities.



Figure 1.2: Photo left: Campus NL team members from academia (taken 23 May 2025), from left Julia Kudła, Thomas Vogl, Alexandra den Heijer, Jasmine Bacani, Monique Arkesteijn; Photo right: Campus NL team members from academia and practice (taken 23 May 2025), from left Gerben Smit, Franc van Nunen, Boudewijn Peters, Alexandra den Heijer, Monique Arkesteijn

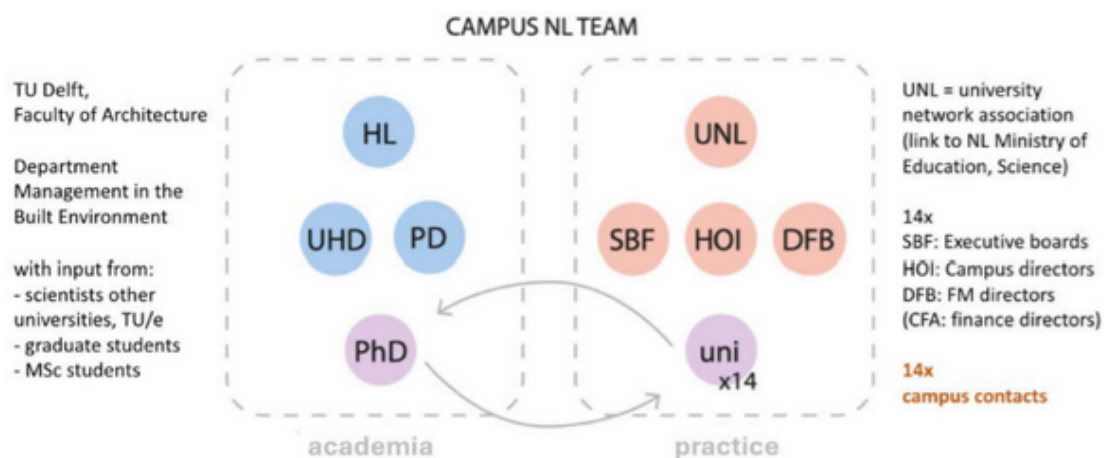


Figure 1.3: “Campus NL team”, the project organization combining (campus management) knowledge from academia and practice (den Heijer et al., 2024).

The scientific focus of the project is threefold:

- Identifying the **management information** required to support and justify campus-related decisions (*Part A*);
- Investigating how such information supports **future-oriented campus planning** (*Part B*);
- Exploring **organizational models and knowledge-sharing systems** used in theory and by peer institutions (*Part C*).

To support this research agenda, a PhD candidate was appointed for the full four-year duration of the project. In addition, a postdoctoral researcher (PD) was recruited to coordinate and support the various research components. The project is led by a full professor and an associate professor, both of whom are actively involved in conducting research. The team is further supported by student assistants and a scientific illustrator.

Engagement with practice is facilitated through collaboration with inter-university networks that represent all 14 Dutch universities. These include:

- **SBF** (Strategic Board of Executive Members),
- **HOI** (Heads of Campus Development & Operations),
- **DFB** (Directors of Facility Management).

The research planning process was aligned, as much as possible, with the meeting cycles of these networks to ensure ongoing input and relevance (see Table 1.1 for an overview of the 2024–2025 research milestones).

3. Four-Year Planning and Overview of the 2024-2025 Process

To assess the impact of the Campus NL initiative over its four-year duration, a longitudinal evaluation strategy has been established. Baseline and endline surveys (see Chapter D1) will be conducted to measure changes in the quality and effectiveness of campus-related decision-making. In addition, periodic evaluations will be carried out - particularly in conjunction with the annual knowledge conference - to assess the perceived balance between the benefits gained and the efforts invested by participating institutions.

The overarching aim of Campus NL is to strengthen the *knowledge function* in campus management by integrating insights from collective institutional practice with scientific expertise drawn from within the 14 Dutch universities. Over the course of the project, the team will test and refine a collaborative model for knowledge exchange. This model may serve either as a foundation for long-term institutional cooperation or as a time-bound experimental structure.



Figure 1.4: The four-year project follows the structure of four academic years, from 2023-2024 as the first year to 2026-2027 as the last year, summarizing all results and insights (den Heijer et al., 2024).

A key element of the initiative is the positioning of Dutch university campuses as *living laboratories*, where academic knowledge on topics such as sustainability, circularity, hybrid working, digital transformation, and the relationship between the built environment and mental health can be tested and applied in practice. In turn, these campus environments serve as real-world case studies through which researchers can identify patterns, develop new insights, and contribute to both scientific literature and practice-oriented outputs such as annual trend reports.

Throughout the project period, the Campus NL team aims to progressively enhance the collective knowledge infrastructure for campus management, while exploring and clarifying the division of roles among stakeholders. Annual evaluations - supported by a to-be-established advisory group representing key inter-university networks - will monitor progress against objectives and guide necessary adjustments. The combined use of surveys, stakeholder feedback, and documented outcomes will provide a multi-perspective assessment of the initiative's effectiveness.

Process Overview 2024–2025

This annual report presents the outcomes of the second year of the Campus NL research program (2024–2025). While the first year of the four-year Campus NL research project focused on “hybrid working” (Den Heijer et al., 2024), for the second year the steering committee, project’s core team, and network of campus contacts commenced their activities and collectively selected “*education / learning environments*” as the central thematic focus.



Figure 1.5: This report focuses on the second year of the four-year Campus NL project, it summarizes the 2024-2025 results and ends with an outlook to the next theme for 2025-2026 (den Heijer et al., 2024).

An overview of all meetings held in 2024–2025 is provided in Table 1.1. The table lists the dates of meetings involving the Campus NL steering committee (Stuurgroep), core team (Kernteam/Kerngroep), SBF-, HOI- and DFB-networks, campus contact groups, and related seminars and workshops. The topics addressed in each meeting are indicated according to the four research components (A–D): Campus Data, Campus Trends, Campus Elsewhere, and Campus Learning.

Excluded from the table are:

- The monthly sixty-minute (60') online core team (Kernteam/Kerngroep) meetings about research matters and the progress of all four research components;
- The 30' online preparation meetings between UNL and TU Delft, which always preceded both core team and steering group meetings; consequently, they took place once or twice a month.
- Presentations to networks other than (international) university networks, like in Cardiff, Southern Africa (online), HIS in Hannover and Siegen, in Germany. Monthly meetings with Campus Research Forum (chair: Finland) and three-monthly meeting University Design Forum Research Group broadens the Campus NL horizon.

The table below also excludes presentations for individual Dutch universities. When locations of universities are mentioned, these universities have hosted network meetings.

Table 1.1: (Continued in next page) All 2024/2025 meetings: rows include the dates for the steering committee, core team, HOI-DFB, meetings with campus contacts (CC), and seminars/workshops; columns list the topics discussed within the networks, sorted according to the research components ABCD (den Heijer et al., 2024).

Date	Type		Research part			
			A	B	C	D
		Planning process / activities				
September, 2024	Stuurgroep HOI-DFB in Tilburg	Discuss final draft annual report 2023-2024 (hybrid working) and giving focus to 2024-2025 theme (education/learning environment)	x	x	x	x
October, 2024	SBF in Utrecht	Presenting and discussing the conclusions & strategies from 2023-2024 (hybrid working)	x	x		
November, 2024	Online CC meeting	Discussing the required documents / data for part A	x			
	HOI in Groningen	Selecting networks to study for PhD research Bacani				
	Stuurgroep	Presenting preliminary results and effective knowledge dissemination through networks	x			x
December, 2024	Universities Finland	Exchanging lessons with network (Syk oy) Finnish universities online after October visit Helsinki				x
	DFB [via Marijke]	Confirming networks to study for PhD research Bacani				

January, 2025	HOI in Leiden	Presenting utilization results, innovations + proposals MSc students to prepare data analysis	x	x		
February, 2025	Online CC meeting Stuurgroep	Discussing results literature review, policy documents Discussing updates and hosting European campus conference	x	x		
			x	x	x	x
March, 2025	HOI DFB in Amsterdam Workshop day with CC in Utrecht	Collecting data about multi-use, shared spaces and multi-use, Introducing the new survey Interactive discussion about all data + trends (and campus tour)	x	x		x
			x	x		
April, 2025	AUDE annual conference	Exchanging lessons with UK-Ireland in Cardiff, UK			x	
May, 2025	Stuurgroep Campus NL annual conference	Finishing the draft, brainstorming about dilemmas and preparing the conference Presenting and discussing	x	x	x	x
			x	x	x	x
June, 2025	HOI+DFB at UvA HIS 10th anniversary conference	[brainstorm with chairs + UNL] Selecting the new theme Exchanging lessons with German universities in Hannover, Germany		x		
					x	
July-August, 2025		Finishing the annual report Preparing the European campus conference (selecting proposals) Closing the second survey about (campus) knowledge exchange	x	x	x	x
					x	x
						x
September-October, 2025	HOI-DFB Stuurgroep SBF in Utrecht	Presenting the final draft, survey results and the research plan for the new theme Discussing dilemmas and possible strategies for the campus of the future.	x	x	x	x

Report Structure

This Campus NL scientific report is organized into three main sections:

- Part I provides the introduction, research background, and a process overview for the Campus NL initiative.
- Part II presents the results of the 2023–2024 research activities, structured according to the four core research components:
 - (A) Campus Data - the current state of education
 - (B) Campus Trends - developments and innovations in education
 - (C) Campus Elsewhere - insights from abroad and other education sectors
 - (D) Campus Learning - lessons and networks for improving knowledge sharing

- Part III outlines the conclusions, dilemmas, strategic implications, and recommendations for next steps and the theme for 2025-2026.

Given the multi-institutional and interdisciplinary nature of the project, the report includes contributions from various authors and teams. Each chapter is preceded by an orange title page identifying the respective authors.

Due to the report's length and the breadth of material covered, two forms of summary are provided: a management summary at the beginning of the report, and a comprehensive synthesis of conclusions and recommendations in Part III. A Dutch-language version of the executive summary is included as an appendix at the end of the report.

4. Definitions and Conceptual Frameworks

Throughout this study, references to the *fourteen Dutch universities* pertain to the publicly funded institutions affiliated with **Universiteiten van Nederland (UNL)**. Their main locations are presented geographically in Figure 1.6, along with a table listing their full names and standard abbreviations.

#	university names	abbreviations
1	Erasmus University Rotterdam	EUR
2	Leiden University	LEI
3	Radboud University Nijmegen	RU
4	University of Groningen	RUG
5	Delft University of Technology	TUD
6	Eindhoven University of Technology	TUE
7	Maastricht University	UM
8	University of Twente	UT
9	Utrecht University	UU
10	University of Amsterdam	UvA
11	Tilburg University	TiU
12	Vrije Universiteit Amsterdam	VU
13	Wageningen University and Research Centre	WUR
14	Open University in the Netherlands	OU



Figure 1.6: Dutch universities, names, locations (of main headquarters), and abbreviations used (den Heijer et al., 2024)

The conceptual understanding of the term *campus* follows the definition established by TU Delft's Campus Research Team in Den Heijer's dissertation *Managing the University Campus* (2011), which describes the campus as:

"The collection of buildings and land used for university and university-related functions, not necessarily confined to a single location."

This broader, functional definition was adopted in response to the spatial reality of many Dutch and other European universities, which often operate across multiple locations

embedded in urban contexts. Unlike the single-site, greenfield campuses commonly found in the United States, Dutch universities frequently utilize buildings throughout the inner city or across different urban zones. This distinction is reflected in the spatial typologies discussed in Figure 1.7.

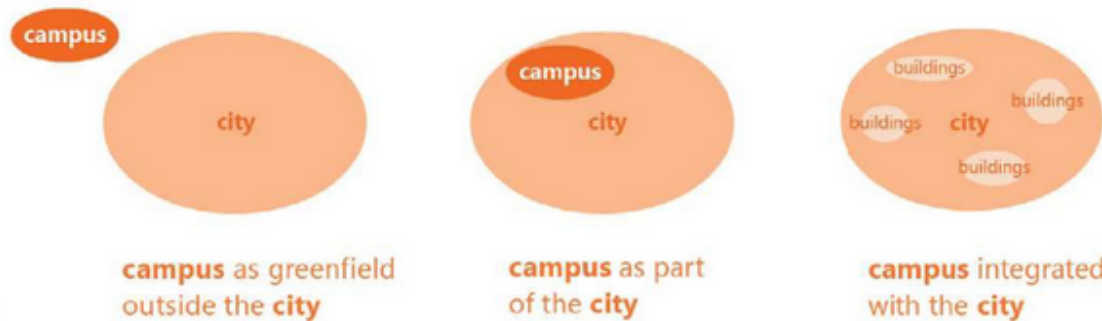


Figure 1.7: “Three different spatial configurations for the campus in relation to the city (den Heijer et al., 2024)

The decision to emphasize *use* over *ownership* as the defining criterion was both practical and theoretical. While most buildings used for university functions in the Dutch context are indeed owned by the universities, the focus of campus management is on the *functional responsibility* for space provision - specifically, the space used by students and staff for academic purposes - regardless of ownership status.

The concept of the campus has also evolved to encompass more than just academic buildings. Studies such as *The Campus as a City* and *The City as a Campus* (Den Heijer & Curvelo Magdaniel, 2018) highlight how modern campuses integrate housing, retail, cultural, and social infrastructure, and how university activities increasingly take place in buildings not owned by the institution. Nonetheless, the present Campus NL research focuses primarily on academic space.

An efficient management of campuses requires a multilayered approach that integrates (1) cultural/organisational, (2) economic/financial, (3) social/functional, and (4) environmental/physical perspectives, that were presented in den Heijer et al., (2016). These perspectives can be identified on societal level (cultural, social, economic, environmental), on institutional level (organisational, functional, financial and physical) and individual level (identity & sense of belonging, health & safety, affordability and sustainability and long-term security) and expressed in (more or less) measurable indicators (den Heijer et al., 2021). Integrated approach allows for efficient navigating numerous challenges in learning environments in higher education. In the course of this work, we deductively applied those four perspectives and interpret them as shown in the figure below.

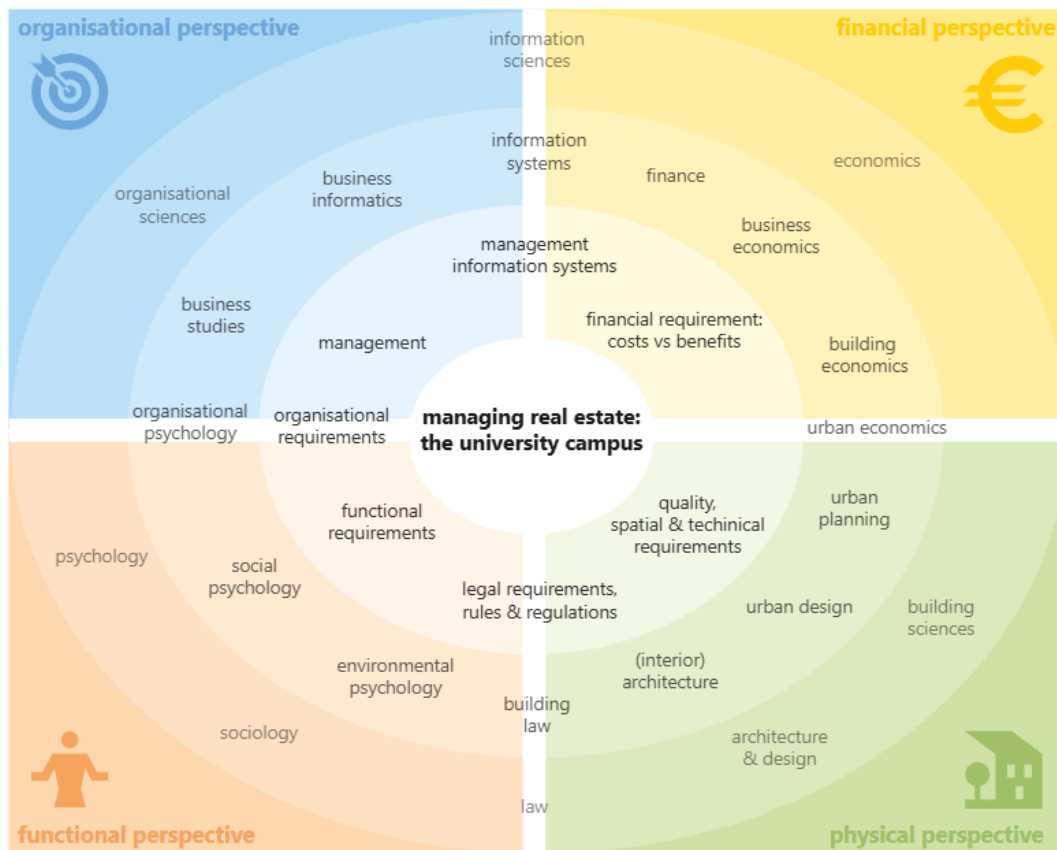


Figure 1.8: four-stakeholder model for (public) real estate management applied to the campus management perspectives (den Heijer et al., 2021, p. 150)

The closer a discipline appears to the centre of Figure 1.8, the more applied it is. The central circle represents some of the requirements these scientific disciplines pose for real estate management. Conversely, these requirements are also shaped by the four stakeholder perspectives connected to them.

It is also important to note that, particularly during the COVID-19 pandemic, the definition of campus space expanded temporarily to include homes as places where university functions occurred (e.g., remote teaching and learning). However, for clarity, this research distinguishes between formal university space and *off-campus facilities*—defined as buildings not primarily intended for university purposes but used periodically for university functions (e.g., churches hosting graduation ceremonies, theaters used for lectures) (den Heijer, 2021).

Additional definitions and conceptual frameworks related to campus and campus management can be found in den Heijer (2011).

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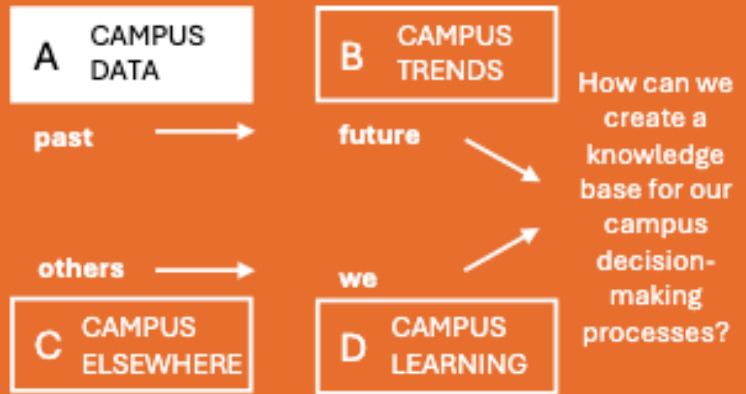
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Part II

CAMPUS NL 2024/2025 RESULTS



Part II Results 2024/2025

Part A – DATA

Alexandra den Heijer and Thomas Vogl (2025), based on UNL and Colliers data

In this part of the draft report - sorted by parts A, B, C and D of the study - chapters have been added with research findings. Between the annual conference / seminar on 24 May 2024 and the publication of the final report in the summer (press release September 2024, after the start of the new academic year), these chapters will still be provided with an introduction and additional conclusions, for which a basis has already been laid in the management summary. Also, the coherence between the chapters will still be improved and, if necessary, the order adjusted.

A1 + A2 Campus in numbers and (educational) functions

Key takeaways

- **Intensification rather than expansion has defined campus development since 1999.**
Between 1999 and 2024, Dutch university campuses accommodated a near doubling of student numbers alongside growing staff populations, while total gross floor area remained broadly stable at approximately 4.4–4.5 million m². This indicates a sustained increase in spatial efficiency and utilisation intensity rather than physical growth, with significant implications for space pressure, scheduling, and user experience.
- **Educational activity extends far beyond formally designated teaching space.**
Although space management data classify only around 20 percent of Campus NL floor area as educational space, teaching and learning activities are widely distributed across offices, restaurants, and other functional categories. Office space, representing roughly 24 percent of total area, shows particularly high potential for multifunctional use through supervision, group work, and assessment, whereas hospitality spaces play a more limited but still relevant role.
- **Efficiency gains have qualitative limits that affect education and academic life.** While flexible and shared use of space can reduce floor area per user and support compact campuses, there are thresholds beyond which further intensification risks undermining educational quality, academic interaction, and the lived campus experience. Campus strategies therefore need to balance efficiency objectives with pedagogical, social, and experiential requirements rather than treating space reduction as an unqualified success metric.

1. Introduction

Collecting campus data is the foundation of Campus NL study. While the team aims at (gradually) providing decision makers with a campus dashboard during this four-year (2023-2027) Campus NL study, the second year 2024-2025 focused on facts and figures about educational space, while also giving an overview of the total space use of the campus.

Research questions for part A1 and A2 were:

(A1) How has the campus been used - also compared to the number of students over the years - and which space functions can be distinguished?

(A2) How is teaching space used over the years and to which extent are other function types (like office space, restaurants etc.) also used for educational purposes?

In this chapter, both research questions are answered, switching from campus level to teaching space and back again.

2. Methodology

Part A presents an inventory of campus data, encompassing both the existing campus in relation to its historical development and current projects that signal future transformations. The following preliminary statements describes the scope and methodological considerations (as also stated in the previous annual report) that serve to contextualize the subsequent conclusions.

- **Campus NL is not intended as a benchmarking tool** for comparing individual universities; it provides an overall picture. Hence, its purpose - both in the previous report (Den Heijer et al. 2024) and in the current study - is to provide a representative overview of the past, present, and potential future developments of the Dutch university campus landscape as a whole. A fully comprehensive dataset is neither necessary nor feasible, as it would require a disproportionate effort from participating institutions. The focus is therefore on aggregated, national-level data, combining inputs from all Dutch universities to create an overall picture.
- To **prevent unintended comparisons or rankings**, university names are often - but not always - anonymized through coded identifiers. Where university names are mentioned (and an exception is made to the confidentiality rule), the source already published data with university names (like Colliers or UNL).
- Consistent with the overarching objective of Campus NL, the emphasis lies on **understanding broad trends** rather than analyzing or judging inter-university differences. Nonetheless, recognizing that individual institutions may wish to identify their own data, campus decision-makers have been provided with their specific codes for internal use.
- The data presented in Campus NL are supplied directly or indirectly by universities and may differ from other resources, such as annual reports, administrative records, or external benchmarks (e.g., Colliers 2022 or 2024). Such discrepancies may result

from differences in definitions or the specific timing of data collection. These variations have been acknowledged in the analysis by adjusting the level of numerical precision where necessary or explicitly noting the sources of divergence. Over the past decade, consistent data collection has become increasingly challenging due to the growing complexity of university structures, many of which now function as networked organizations with shared personnel, infrastructure, and financial systems. As such, precise quantification is not the primary goal.

- Data is used to support strategic thinking and decision-making for Campus NL. The emphasis is on identifying plausible ranges - for example, in space usage, building conditions, or cost levels - that are sufficiently robust to inform scenario development and guide future campus strategies. In sum, the data gathered serves a strategic rather than statistical function: to provide a grounded, representative foundation for shaping the future of Campus NL.

Various sources - both datasets from UNL (2025) and academic publications (2000) - were used to determine space use on campus level. For teaching space specifically and more recent data, we were allowed by all universities and Colliers to use both their 2022 and 2024 benchmark results. This benchmark studies were commissioned by the network of facility management directors (DFB network) and were published in the biannual Colliers “Benchmark facilities and accommodation” report. The underlying database was provided by Colliers to the Campus NL team and includes quantitative values consisting of spatial (in sqm) and financial (in €) numbers of all universities located in the Netherlands from the year 2021 and 2023. These main groups were further subdivided in 13 spatial and 19 financial subcategories as shown in Table 2.1. For this annual report, the total amount of space and the teaching space were most relevant.

Table 2.1: an overview of data points to share – collected by Colliers from Dutch universities – for purpose of Campus NL (source Colliers for Campus NL, 2024)

Category type	Main category	Subcategory	Sharing with Campus NL	Method of sharing
Space use	Key figures	Number of employees	Yes	By university number of employees employed, Also found at www.universiteitennederland.nl
Space use	Key figures	FTE number	Yes	By university number of FTEs employed, Also found in www.universiteitennederland.nl
Space use	Key figures	Students number	Yes	By university number of students enrolled, Also to be found in www.universiteitennederland.nl
Space use	Key figures	Surface areas	Yes	Total GLA managed by universities, excluding medical centres.
Space use	Key figures	number of premises	Yes	According to universities' own property coding systems
Space use	Key figures	Ownership & Rentals	Yes	Share of owned and rented GLA under management
Space use	Key figures	Ownership & Use	Yes	Share own use, rented, vacancy (economic and architectural added up) of the GLA under management,
Space use	Key figures	Age & Condition	Yes	Condition and age in percentages for the total portfolio
Space use	Key figures	m2 per student	Yes	m2 GLA in own use / number of students = data derived above
Space use	Key figures	m2 of teaching space per student	Yes	m2 allocated to space category 'education' / number of students = data derived above
Space use	Key figures	m2 of research space per student	Yes	m2 allocated to space category 'research' / number of students = derived data above
Space use	Key figures	m2 Office space per FTE	Yes	m2 allocated to space category 'office' / number of FTEs = derived data above
Costs	Real Estate	1.1 Housing	Yes	Total absolute costs per university
Costs	Real Estate	1.2 Taxes	Yes	Total absolute costs per university
Costs	Real Estate	1.3 Insurance	Yes	Total absolute costs per university
Costs	Real Estate	1.4 Maintenance	Yes	Total absolute costs per university
Costs	Real Estate	1.6 Energy	Yes	Total absolute costs per university
Costs	Real Estate	1.6 Energy heat	No	
Costs	Real Estate	1.6 Energy electricity	No	
Costs	Services	2.1 catering – Restaurant	No	
Costs	Services	2.1 catering – Coffee machines	No	
Costs	Services	2.1 catering – Meeting service/ Events	No	
Costs	Services	2.2.10 security	No	
Costs	Services	2.2.20 prevention	No	
Costs	Services	2.2.30 reception	No	
Costs	Services	2.3 cleaning	No	
Costs	Services	2.4 moving	No	
Costs	Services	2.5 document mail	No	
Costs	Services	2.5 document repro	No	
Costs	Services	2.6 waste	No	
Costs	Management	5. Management	No	

We thank both the fourteen universities and Colliers for their permission to use their 2021 and 2023 data in this chapter (Colliers 2022, 2024). In this chapter, some findings for teaching space are summarized, while other data will be used for the next research year(s).

3. Results

This part elaborated on (A1) how the campus has been used - also compared to the number of students over the years - and which space functions can be distinguished and (A2) how is teaching space used over the years and to which extend other function types are (like office space, restaurants etc.) also used for educational purposes.

A) Campus NL in numbers

The basis of assessing the development in the use of the campus is the development of number of students, certainly when "teaching space" or "the learning environment" is the annual theme. For the purpose of the Campus NL project, UNL (Universiteiten van Nederland) provided the timeline of student development, as far as data was available. The next figure shows the development in the past 125 years, since the year 1900.

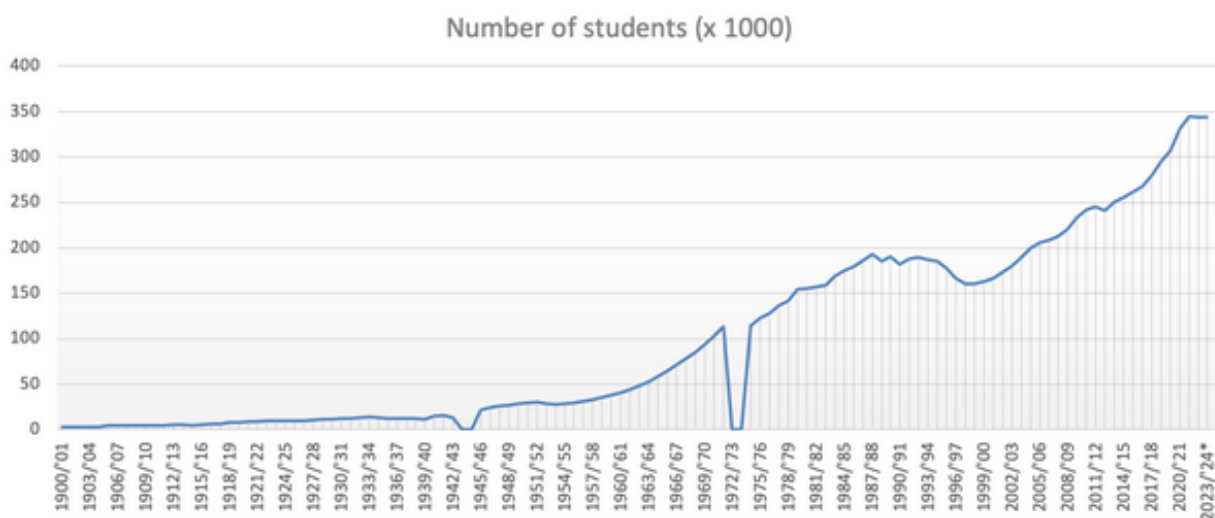


Figure 2.1: Development of student number in the past 125 years, as registered by UNL (source: Universiteiten van Nederland, 2025)

Reading from Figure 2.1 (UNL 2025) the development of enrolled students at the collective Dutch (research) universities and as described in earlier publications about Dutch universities and campuses (De Jonge et al. 2000, Den Heijer 2011), the student numbers have slowly during the first 50 years, rapidly increased in the next 40 years and have - after a short dip - most steeply grown in the past 25 years.

Focusing on the past 25 years - while this aligns with the series of publications about campus management at the collective Dutch universities - the total floor area data (m² bvo, or gfa / gross floor area) can be added to the same figure, leading to Figure 2.2.

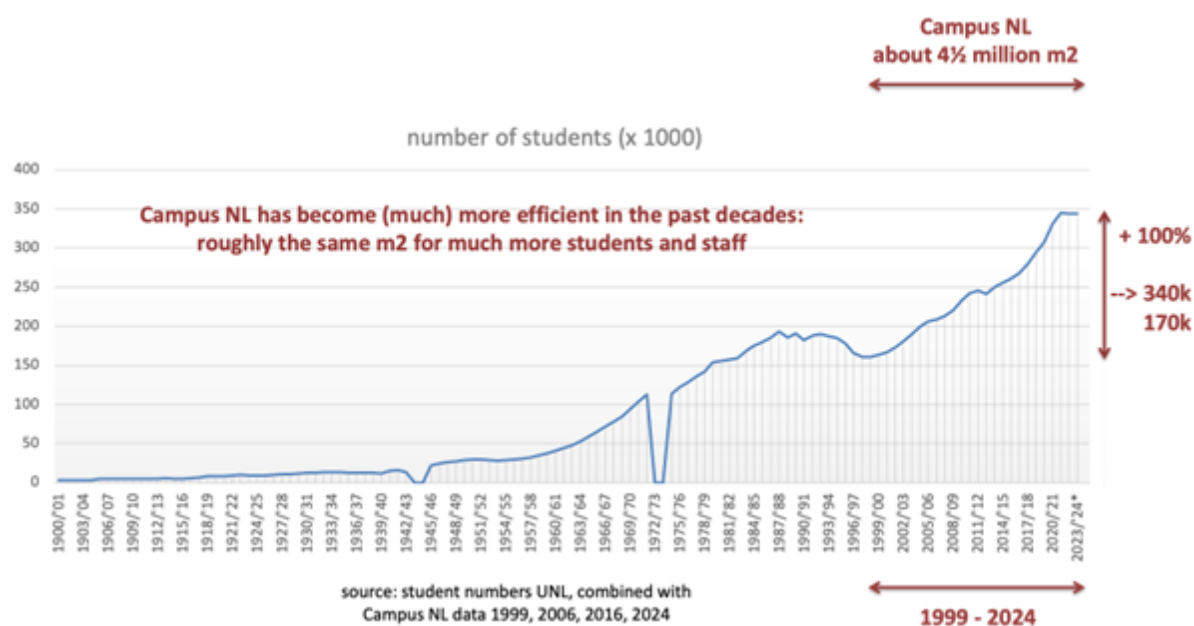


Figure 2.2: In the past 25 years, student numbers doubled, staff numbers increased and the total number of m2 (gross floor area / m2 bvo) roughly remained the same (sources: De Jonge et al. 2000, Den Heijer 2011, Den Heijer et al. 2016, Colliers 2024, UNL 2025)

In the past 25 years, various research projects that studied the campuses of the 14 Dutch (research) universities included the process of collecting data about the size of the campus, contributing to longitudinal data about the gross floor area (m2 bvo) of "Campus NL". Surprisingly, the data of 1999 (De Jonge et al. 2000), 2006 (Den Heijer 2011), 2016 (Den Heijer et al. 2016) and 2024 (Colliers 2024) did not vary as much as expected and stabilized around the amount of 4,5 million m2.

So, notably, in that period of 1999-2024, the student numbers doubled (UNL 2025), staff numbers increased (Colliers 2024) and the total number of m2 (gross floor area / m2 bvo) roughly remained the same (sources: De Jonge et al. 2000, Den Heijer 2011, Den Heijer et al. 2016, Colliers 2024; Den Heijer et al. 2024).

On sector level, this is a compliment for the universities, which managed to accommodate their education and research processes more and more efficiently. Several campus publications have already noted that this efficiency is due to more intensive space use, multifunctional space allocation, and off-campus work (such as working from home or at partner organizations). More inter-faculty and university collaboration, digitalization and hybrid working and learning are some of the important trends that changed demand, while budget cuts and ambitious sustainability goals pushed universities to be more resource-efficient (more background information in Den Heijer 2021). Of course, the (campus) size of individual institutions does have (much) more dynamic patterns in both student numbers and campus size. Concluding, the question remains - considering the campus is already efficiently used - if we want and should aim for an even more efficient campus.

Nevertheless, it is a sign of organizational flexibility that dynamic and rapidly growing Dutch universities still function within relatively static buildings. At the same time, it is precisely the teaching spaces that have become increasingly flexible over the past decade, as seen in the most recent buildings (see part B of Campus NL for trends): lecture halls can now be subdivided using movable walls, and furniture is increasingly mobile and reconfigurable.

B) Space use on campus – administrative functions

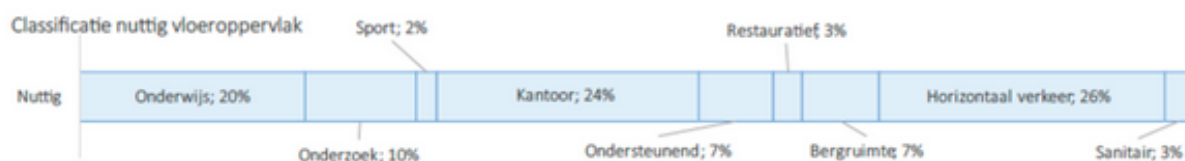


Figure 2.3: the classification of "nuttig oppervlak" (m² NO) - usable floor area - in % of the total (Colliers 2024), demonstrating that 20% has "education" ("onderwijs") as the (primary) 'administrative' function

Figure 2.3 shows that 20% of the (usable) campus floor area is 'administratively' allocated for "education" - based on the 2023 space use administrations (and information systems) of the 14 Dutch universities, aggregated on sector level by Colliers (in 2024). In practice, this does not mean that only 20% of the campus is used for educational purposes. The other 80% (see Figure 2.4, source Colliers 2024) is administratively categorized as research m² (10%), sports m² (2%) office m² (24%), support m² (7%), restaurants (3%), storage (7%), sanitary space (3%) and - last but not least - horizontal circulation space (26%). The latter includes atriums and corridors. Many of these administrative function categories are also incidentally, frequently or even structurally used for teaching, studying, collaborating or experimenting by students and/or teaching staff.



Figure 2.4: the classification of "nuttig oppervlak" (m² NO) - usable floor area - in % of the total (Colliers 2024), demonstrating that 80% has "administratively no educational function"; in practice, this floor area can also be used for educational purposes

To which extent 'the other 80%' is used for educational purposes, was discussed with a group of campus and facility directors in March 2025. The following propositions were discussed:

- Our office spaces are also used for educational purposes (see Figure 2.5).
- Our restaurants/coffee bars (outside mealtimes) are also used for independent study, appointments, and/or group work (see Figure 2.6).
- We could also use storage space (e.g., the basement) for things like phone booths for (individual) video conferencing (see Figure 2.7).
- Horizontal traffic areas, such as corridors or the central hall, are also used as meeting or study areas (see Figure 2.8).
- Education often takes place off-campus: at home, in the city library, etc. (see Figure 2.9).

The results can be found in the following figures, which were generated by menti.com based on a discussion in Dutch. The Dutch text and conclusions will be explained in the captions and text.

Alternative use of office space

Figure 2.5 demonstrated to which extent, office space - which on average is 24% of Campus NL (source: Colliers 2024) - is also used for other purposes. The proposition was: "On our campus, we use office space for educational purposes as well" with 16 respondents, allowing more than one answer per respondent. The responses varied from "hardly" (1) to "yes, meeting rooms for groups/exams" (12), "yes, office workplaces by graduate students" (8), "yes, offices for guiding graduate students" (15) and "yes, in a different way" (2). Again, the data was retrieved March 10th, 2025 (HOI-DFB network).

Bij ons worden kantoorruimten ook voor onderwijs gebruikt...

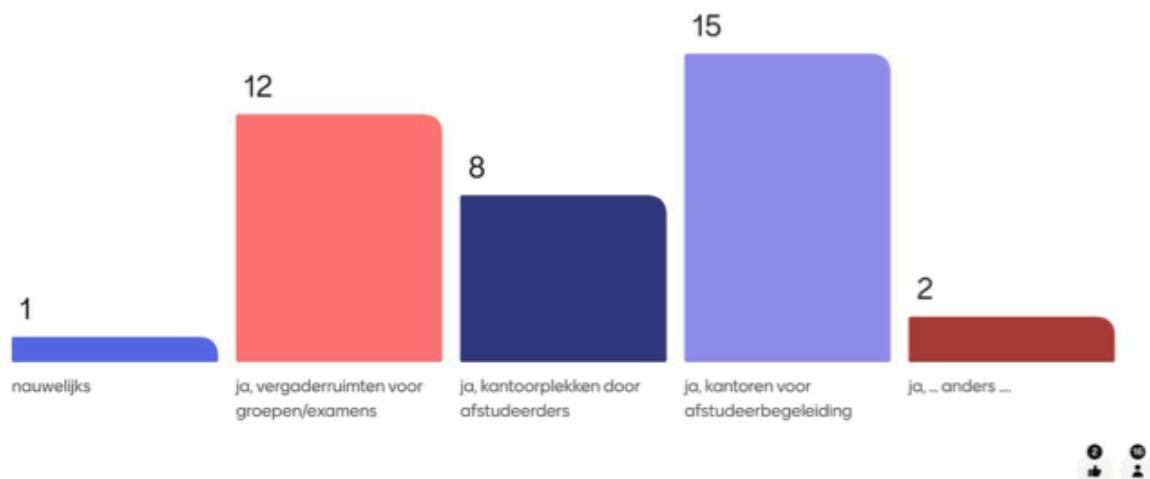


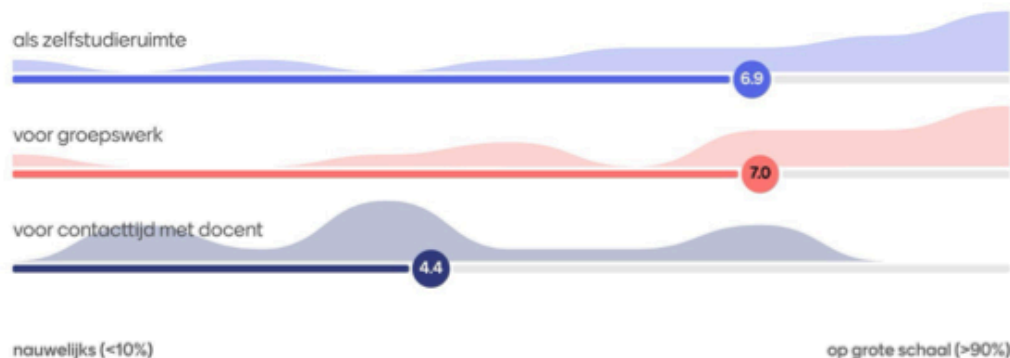
Figure 2.5: "On our campus, we use office space for educational purposes as well" (16 respondents, allow >1 answer) - from "hardly" (1) to "yes, meeting rooms for groups/exams" (12), "yes, office workplaces by graduate students" (8), "yes, offices for guiding graduate students" (15) and "yes, in a different way" (2); data retrieved March 10th, 2025 (HOI-DFB network)

Concluding, the data demonstrates that office space is abundantly used for educational purposes. Even the one university that replied "hardly", also indicated the use for meetings with graduation students. More than half of the respondents mentioned 3 different uses.

Alternative use of restaurants and (espresso) bars

Figure 2.6 shows to which extent, restaurants and (espresso) bars - which on average is only 3% of Campus NL (source: Colliers 2024) but is often available beyond the opening hours of the catering function - is also used for other purposes. The overall proposition was that "Restaurants & (espresso) bars are also educational space". This general proposition was specified in three explicit uses (15 respondents, 3 sub propositions) - on a scale from "hardly" (score 1) to on a large scale (score 9). The use "as self-study space" scored 6,9. The use "for groupwork" scored 7,0 and the use "for contact time with teachers" scored 4,4. Again, the data was retrieved March 10th, 2025 (HOI-DFB network).

Restaurants & (espresso) bars zijn ook onderwijsruimte



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bij vergadering HOI-DFB in maart 2025 – © Campus NL, 2025

Figure 2.6: The overall proposition "Restaurants & (espresso) bars are also educational space" was specified in three explicit uses (15 respondents, 3 sub propositions) - on a scale from "hardly" (score 1) to on a large scale (score 9), the use "as self-study space" scored 6,9, the use "for groupwork" scored 7,0 and the use "for contact time with teachers" scored 4,4. The data was retrieved March 10th, 2025 (among members of the HOI-DFB network).

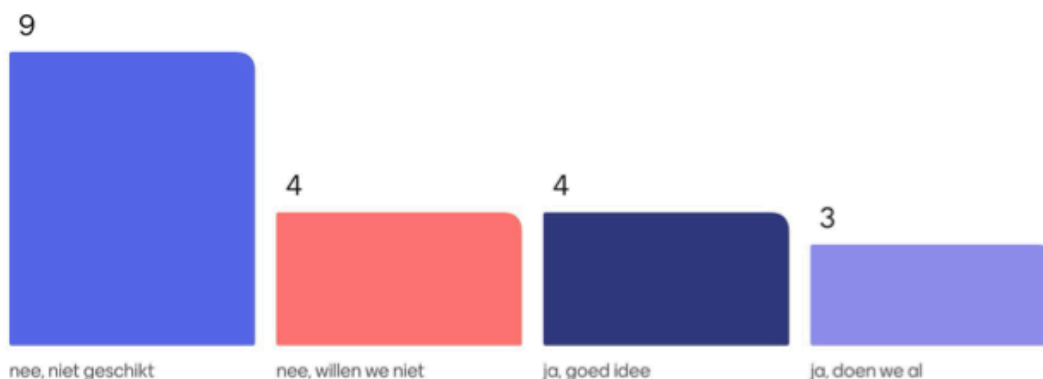
Concluding, the data demonstrates that restaurants and (espresso) bars are used for educational purposes. It was not specified if that equally applies to restaurants and (espresso) bars for each purpose. And even though, this space function is only a limited percentage of the total, it is often publicly accessible - without a campus (key) card - which differs from the office space, which needs to be opened by either academic or administrative staff.

Alternative use of storage space

Figure 2.7 illustrates to which extent storage space - which on average is 7% of Campus NL (source: Colliers 2024), so more than twice the amount of space that is allocated for restaurants and (espresso) bars - is used or can also be used for educational purposes. The proposition about storage space was asked as a question: "Use storage space (for instance the basement) for education?" (16 respondents, >1 answer possible). The following answers were given: "No, not suitable" (9), "No, we do not want that", "Yes, good idea" (4) and "Yes, we already do that" (4). The data was retrieved March 10th, 2025 (among members of the HOI-DFB network).

Concluding, both the data and the following discussion emphasized a mixed response, with combined answers: a negative group (not suitable and/or desirable) and a positive group (embracing the idea and/or the possibility already). The negative group is larger than the positive group, but that also had to do with the specific use "for educational purposes" in the proposition. Adding other purposes like video calling or short (staff) meetings to the possibilities, harvested more enthusiasm.

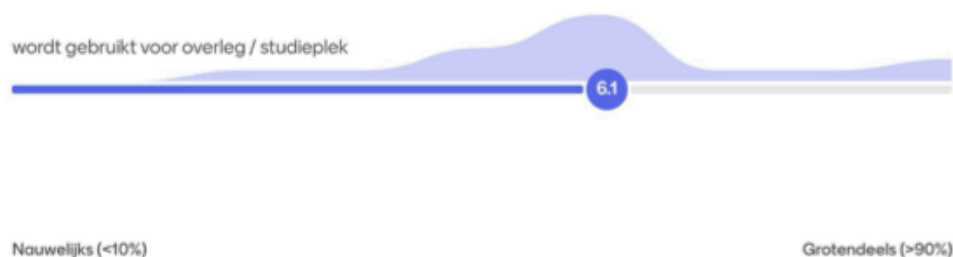
Opslagruimte (bijv. kelder) gebruiken voor onderwijs?



Bron: stellingen voorgelegd via menti.com bij vergadering HOI-DFB in maart 2025 – © Campus NL, 2025

Figure 2.7: The proposition about storage space was asked as a question: "Use storage space (for instance the basement) for education?" (16 respondents, >1 answer possible). The following answers were given: "No, not suitable" (9), "No, we do not want that", "Yes, good idea" (4) and "Yes, we already do that" (4). The data was retrieved March 10th, 2025 (among members of the HOI-DFB network).

Stelling "horizontaal verkeersoppervlak" (gangen, hal, ...)



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bij vergadering HOI-DFB in maart 2025 – © Campus NL, 2025

Figure 2.8: The proposition "Horizontal circulation space such as corridors and atriums are used for (informal) meetings and study places" was scored (by 15 respondents) on a scale from "hardly" (score 1) to "largely" (score 9) and scored an average of 6,1 with a few universities that scored 9. The data was retrieved March 10th, 2025 (among members of the HOI-DFB network).

Alternative use of horizontal space

Figure 2.8 illustrates the results of discussing the proposition "Horizontal circulation space such as corridors and atriums are used for (informal) meetings and study places". It was scored by 15 respondents on a scale from "hardly" (score 1) to "largely" (score 9) and scored an average of 6,1 with a few universities that scored 9. The data was retrieved March 10th, 2025 (among members of the HOI-DFB network).

Concluding, it can be stated that horizontal circulation space is used for educational purposes on a substantial scale. On campus scale, this is more than substantial, since horizontal circulation is 26% of the 100% total of usable space ("nuttig vloeroppervlak").

C) Zooming in on teaching space

While the previous propositions focused on other function types on campus - offices, restaurants, (espresso) bars, storage and horizontal circulations space - the last proposition zoomed out to the (preferred) location of education: on-campus or off-campus. More specifically, the following proposition was discussed "Where does education take place: what is the ratio on-/off-campus?".

While the proposition was first posed as "Education takes place off-campus more often (at home, in the city library, etc.): ratio on-/off-campus presence", many commented that it was unclear what to score, until the proposition was rephrased as stated in the paragraph above and Figure 2.9. Consequently, the results are less reliable but do indicate that studying on-campus is still more popular than studying off-campus. This was confirmed during the discussion that followed, even though the differences between (alfa, beta and gamma) profiles of educational programmes (curricula) are also acknowledged.

Waar vindt onderwijs plaats: verhouding on-/off-campus (schaal) ?



Figure 2.9: the proposition "Where does education take place: what is the ratio on-/off-campus?" was scored (by 15 respondents) on a scale from "100% on-campus" to "100% off-campus" and scored an average of 3,5. The data was retrieved March 10th, 2025 (among members of the HOI-DFB network).

Educational space, specified in categories

Earlier results showed that "educational space" is 20% of the total usable floor area (source: Colliers 2024). This percentage cannot easily be compared with earlier studies (like Campus NL 2016), because the categorization of university campus space has been changed over the past five years. The current UVIP coding system - referring to "Universitair Vastgoed Informatie Platform" in Dutch and translated to University Real Estate Information Platform in English - was introduced to unify campus management information systems, also with the purpose of being able to compare data. The Colliers benchmark study, which is conducted once every two years, has benefited from this synchronization process (only) since 2023 and

so do the universities that use their reports as management information for campus decision making. Below, in Table 2.2, the relevant codes for educational space can be found (source: Colliers 2024 data), expressed on 3 levels ("niveaus"): A ("onderwijs" / education), A1-A7 (from "Collegezaal" to "Tentamineer-ruimte") and A1-1 to A7-1 for more subcategories from different types of lecture halls and study places to different libraries and exam rooms.

Table 2.2: universal space measuring codes "UVIP" (Universitair Vastgoed Informatie Platform) and the relevant codes for educational space (source: Colliers 2024, used with permission for Campus NL)

niveau	Codering	Ruimtesoortnaam	Omschrijving
0	PA	Primary Area	
1	A	Onderwijs	ruimte t.b.v. onderwijs
2	A1	Collegezaal	ruimte t.b.v. college / klassikaal onderwijs
3	A1-1	Collegezaal amphi	collegezaal met vaste, (meestal) amfi-opstelling
3	A1-2	Collegezaal plat	collegezaal zonder helling en (meestal) losse opstelling
3	A1-3	Onderwijsruimte - specifiek	ruimte t.b.v. specifiek onderwijs met daarbij behorende specifieke voorzieningen
3	A1-4	Onderwijsruimte - met patienten	ruimte t.b.v. (medisch) onderwijs, met specifieke voorzieningen voor patienten (die als casus dienen)
2	A2	Practicum	ruimte t.b.v. practicum-onderwijs
3	A2-1	Practicumzaal	ruimte t.b.v. practicum-onderwijs, met algemene voorzieningen
3	A2-2	Practicum-specifiek	ruimte t.b.v. practicum-onderwijs, met specifieke (hoogwaardige) voorzieningen
3	A2-3	PC-Practicum	ruimte t.b.v. practicum-onderwijs, met specifieke ict-voorzieningen zoals pc's e.d.
3	A2-4	Tekenzaal	ruimte t.b.v. praktisch-teken-onderwijs
2	A3	Werkgroep-ruimte	Ruimten t.b.v. interactief onderwijs
3	A3-1	Werkgroep-ruimte	werkgroep-ruimte, zonder specifieke voorzieningen
3	A3-2	Atelier / studio	werkgroep-ruimte, met specifieke voorzieningen
2	A4	Studiezaal/-plek	Ruimte t.b.v. zelfstudie
3	A4-1	Studiezaal	studieruimte, met studieplekken met geen of beperkte pc-voorziening
3	A4-2	PC-studiezaal	studieruimte, met studieplekken voorzien van pc
3	A4-3	Studiecabine	afsluitbare éénpersoons-studiecel, met pc-voorziening
3	A4-4	Afstudeerruimte	semi-open ruimte voor zelfstandig afstudeerwerk, uitgerust met pc-voorziening
2	A5	Bibliotheek	ruimte t.b.v. bibliotheekvoorzieningen
3	A5-1	Bibliotheek/leeszaal	ruimte t.b.v. lezen/studie en waar boeken, tijdschriften en catalogi uitgestald staan
3	A5-2	Depot/opslag	ruimte t.b.v. voor opslag van boeken, tijdschriften, prenten, etc.
2	A6	Ondersteunende onderwijsruimte	Ruimte ondersteunend aan een onderwijsruimte
3	A6-1	Opslag onderwijs	ruimte t.b.v. opslag onderwijsgerelateerde spullen
3	A6-2	Montageruimte	ruimte t.b.v. montage van online colleges
3	A6-3	Regie-regelkamer	ruimte t.b.v. ondersteuning tijdens colleges/ evenementen
3	A6-4	Geluidscabine	ruimte t.b.v. geluids-opnames
3	A6-5	Filmcabine	ruimte t.b.v. video-opnames, b.v. online colleges
3	A6-6	Technische ruimte onderwijs	technische ruimte behorend bij onderzoekruimte
3	A6-7	Vorbereidingsruimte onderwijs	ruimte t.b.v. voorbereiding van experimenten, reinigen en bewaren glaswerk en/ of opslag chemicalien
2	A7	Tentamineer-ruimte	ruimte ingericht voor het afnemen van tentamens
3	A7-1	Tentamineerruimte	ruimte ingericht voor het afnemen van tentamens

Staying on the level of "educational space" or "education" as a space function, all A-categories (as specified in Table 2) are summarized and divided by the total number of students. Figure 2.10 illustrates that in 2023 the average is 1,9 m2 educational space per student (Colliers 2024). In their publication, the Colliers authors state that this number has increased since the previous measurement (Colliers 2022), while they also acknowledge that this is the first year that UVIP (see Table 2.2) is applied for data collection and that the comparison with previous years can be hard. The same applies to the comparison with earlier Campus NL data, for instance, from the 2016 report, which mentioned average numbers like 1,9 m2 and 2,1 m2 per student for teaching space ("onderwijszalen") in respectively 2006 and 2015, which did not include library space at that time.

The increasing number of students in combination with the changing education categorisation (to UVIP in 2023) makes it harder to compare, but nevertheless both Colliers (in 2024) and Campus NL (2016) concluded that students gain territory on campus, but not necessarily demonstrated by these numbers. Colliers (2024) compares the 1,9 m2 average in 2023 to the 1,7 m2 in 2021.

Last but not least, the average does hide that the university with the lowest number (1,3 m² educational space per student) is only half of the 2,6 m² average for universities of technology. Note that UVT is referring to University van Tilburg (normally abbreviated as TiU, also by UNL) and not referring to Twente as a university of technology (Twente data are missing in the 2024 Colliers report).

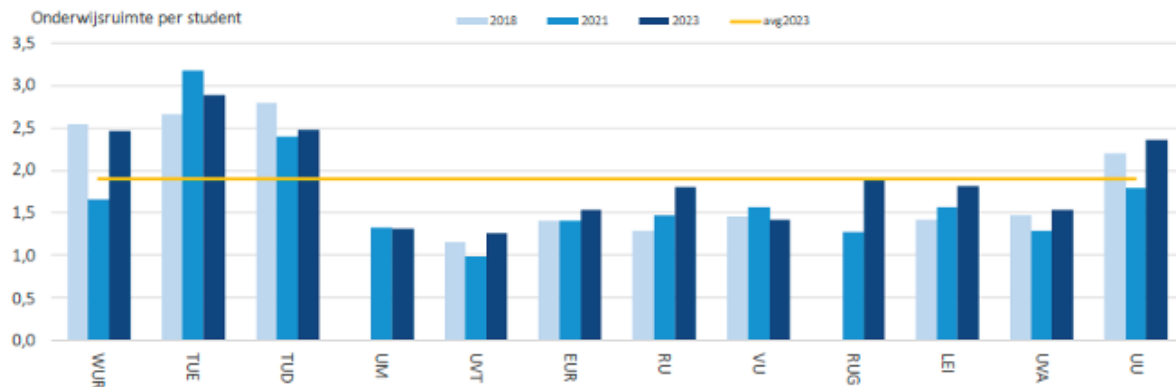


Figure 2.10: Educational space in m² per student from 2018 to 2023 (Colliers, 2024, based on the 2023 data, used with permission from Colliers) - the average of 1,9 m² per student (in 2023) is indicated with a yellow line.

In chapter A3, the Campus NL authors zoom in on the utilization of educational space, using the UVIP categories as a basis.

4. Conclusion

Summarizing the campus data findings so far, the Dutch universities have increasingly efficiently accommodated their students and staff in the past decade. Rapidly growing student communities and a range of frequently changing research teams are facilitated on a smaller footprint per user (double-size student community on roughly the same floor area). Why it still fits, can be explained by the hybridization of learning and working processes, on campus and off-campus, which has made users more flexible and able to adapt to scarcer supply.

Additionally, university culture has allowed space functions on campus to be more and more mixed. Students are often welcome in office space; restaurants serve as space for group work, corridors are used for many informal meetings. And there is still potential for more multifunctionality (which is the theme in 2025/2026), while there are also limits: it should not negatively affect the quality of education and other primary processes.

Nonetheless, the current trends in education, which raises both quality and cost of educational space and contemporary crises like resource-scarcity (energy, space, money, staff) force universities to make tough choices. "To share or not to be" (Den Heijer 2021), that is the question.

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Universiteiten van Nederland / UNL (2025).

A3 Utilisation of the learning environment

Sanjana John, Monique Arkesteijn, Jasmine Bacani, Daan Schlosser, Alexandra den Heijer (2025)

Key takeaways

- **Educational space utilisation is highly uneven across buildings and universities.**

Building level analysis reveals a 22 fold difference between lowest and highest realised frequency, with only 10 percent of buildings meeting the 70–75 percent target norm. Nevertheless, almost half of all buildings achieve frequencies above 50 percent, indicating substantial but uneven potential for optimisation.

- **Frequency, not occupancy, is the primary constraint in educational space planning.**

Across Campus NL, both scheduled and actual frequency outperform capacity occupancy, with average occupancy remaining structurally low, around 33 percent overall. This suggests that universities generally have sufficient seats, but challenges lie in temporal availability and distribution of spaces rather than room size.

- **Larger, scarcer lecture halls are used more efficiently than smaller, faculty owned rooms.**

Large amphitheatre style halls show the highest realised frequency, likely due to scarcity and central sharing. In contrast, smaller, territorially controlled rooms are more prone to underuse, highlighting the negative impact of exclusivity and fragmented ownership on utilisation.

- **Space standards and scheduling systems significantly influence utilisation outcomes.**

Regression analysis shows that higher square metres per student strongly reduce actual frequency, while decentralised or combined scheduling systems increase it. Measurements taken during peak periods also report higher utilisation, underscoring the need to distinguish between peak and average demand in planning norms.

- **Data driven campus management enables strategic reduction and adaptation of space.**

The findings support reconsideration of m² per student standards, cautious capacity overbooking, flexible and adaptable spaces, and potential reduction of teaching space in anticipation of declining student numbers. Effective implementation depends on coordinated governance involving boards, schedulers, property managers, and academic staff.

1. Introduction

This report forms part of Section A: Campus Data, which examines data about the learning environment, lecture halls and work group spaces on the one hand and educational spaces on the other hand. This report looks at the utilisation of the lecture halls.

Collecting campus data forms the basis of the Campus NL study. This second year (2024-2025) focused on exploring and analyzing the theme of educational spaces, identifying trends and differences between campus use before and after COVID. We examined data on educational spaces such as lecture halls, workgroup rooms, and lab spaces on university campuses, specifically their frequency and occupancy rates (respectively “*bezettingsgraad*” and “*benuttingsgraad*” in Dutch) in relation to the scheduling system.

We received reports from 2014 to 2025 but chose to process reports from 2018 onwards to ensure our analysis was relevant for current requirements. This resulted in a total of 38 space utilization studies, encompassing 133 unique buildings from 11 universities.

Definitions:

The resulting database was analyzed using four main parameters as defined by Valks (2021) in his dissertation thesis ‘Smart campus tools: Technologies to support campus users and campus managers’ and depicted in Figure 3.1.

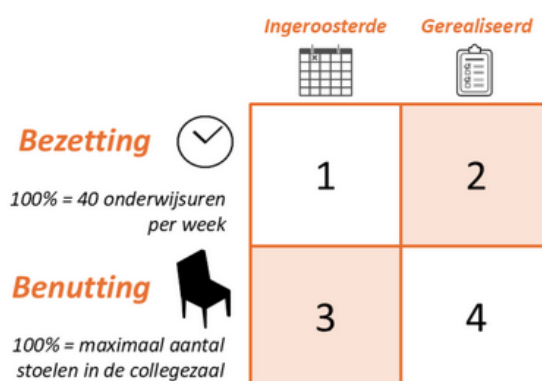


Figure 3.1: Definitions used in the A3 study as adopted from Valks et al (2021) (in Dutch)

1. **Scheduled frequency:** How many of the available classrooms/meeting rooms were booked before the measurement?
2. **Actual frequency:** Were the teaching/meeting rooms occupied during the measurement? The room is considered occupied, even if only one person is present.
3. **Scheduled occupancy:** How many of the available seats in the halls were reserved before the measurement?
4. **Actual occupancy:** How many of the available seats in the rooms studied were occupied during the measurement?

A baseline of 8 teaching hours per day or 40 teaching hours per week was adopted to ensure a certain degree of comparability between universities. The database was organized at a building level with further investigation based on the following few defining features:

- **Room types** as identified by UnivNL,
- **Room size** based on average room capacity or number of available seats per room
- **Scheduling system:** Centralized, decentralized or combination
- **Time cohort (or measurement period):** Busy period, less busy period or continuous measurements

While the database was analysed using descriptive statistics, multiple linear regression analysis was also conducted to investigate the relationship between building-level characteristics (time cohort, scheduling system, m2 per student, number of rooms, and average room capacity per building) as independent variables, and actual frequency as the dependent variable.

Note: The report is written in English, while the images in this section and the associated A3 posters in the appendix are in Dutch.

2. Key findings and dilemmas

Reporting at a building level

The campus contacts indicated that it is important to consider building-level occupancy. Looking at averages at the building level, there is a 22-fold difference between the lowest and highest achieved frequency. While only 10% of the buildings met the target standard of 70-75%, almost half of the dataset achieved frequency of more than 50%.

Depending on each university's educational vision and financial objectives, there is room for improvement. The extent of improvement varies per university and per building (see Figure 3.2).

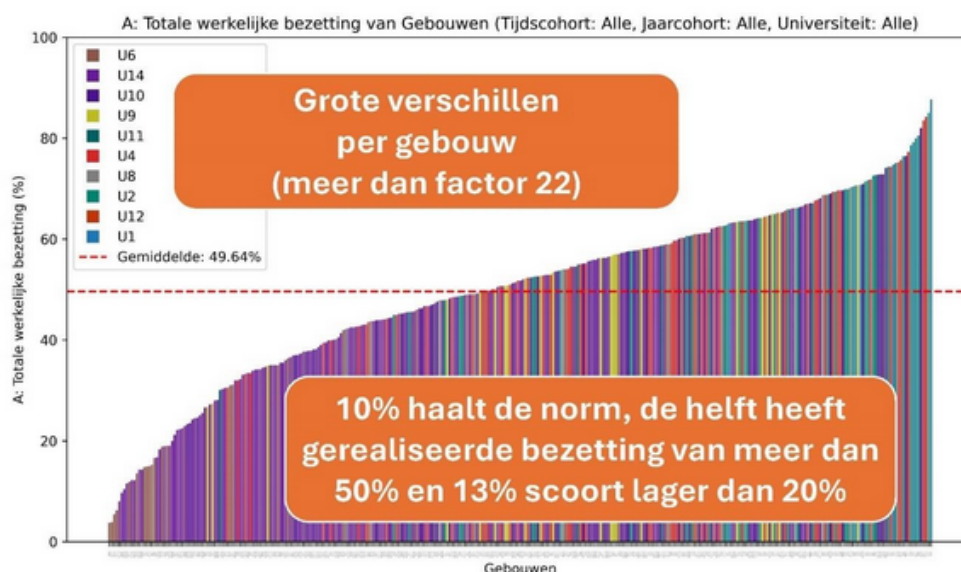


Figure 3.2: Actual frequency across Campus NL Buildings

Educational spaces distribution

The composition of educational space typically consists of a limited number of very large lecture halls and many medium or smaller rooms. Data from several universities indicate that the largest (amphitheater-style) lecture halls have relatively high frequency/ occupancy because they are also the scarcest. Do schedulers or space users adjust their needs due to scarcity, shifting more easily to days or time slots other than their preferred ones? This might be the case.

The largest halls are often shared facilities at the university level (located in generic buildings), whereas small halls are often abundantly present within faculty buildings. This territoriality (and exclusivity for certain user groups) can negatively affect frequency and occupancy.

Universities generally consider frequency (adequate availability over time) more important than capacity, especially since attendance is usually not mandatory for lectures. The trend to accommodate active & blended learning more effectively with specialized educational facilities also requires space sharing to share costs or derive more benefits.

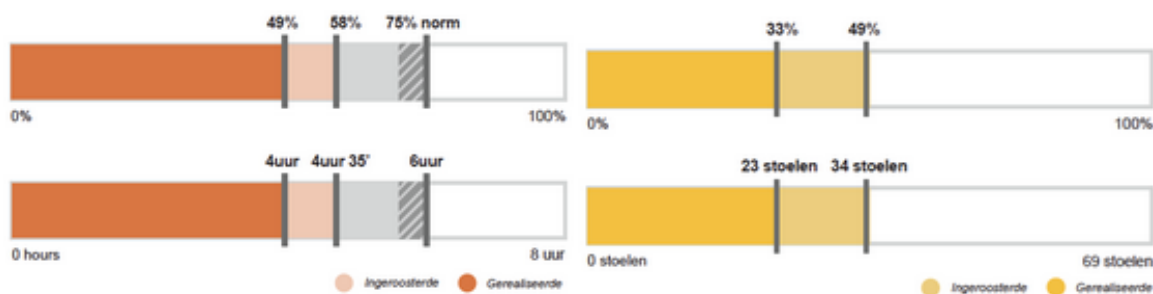


Figure 3.3: Average frequency of educational spaces at Campus NL relative to a 70-75% target norm: that is 6 hours out of 8 available hours per day; (right) average occupancy of space capacity.

Almost half of the universities included in the database have a frequency norm (target value for hours occupied relative to maximum availability) ranging from 70-75%. However, Campus NL achieves better scheduled and actual frequency with respectively 58% and 49% than (capacity) occupancy (see Figure 3.3).

This results in the following dilemma for Campus management:

- (a) Should scheduling be based on peak times or on average occupancy, and in the case of peaks, should space users be asked to adjust their demands?
- (b) Do these figures provide a reason to modify scheduling processes?
- (c) Or should different standards apply for peak periods compared to less busy periods?

Within the current space standards, education can be well scheduled with lecture halls still having overcapacity. Universities that explicitly apply space norms appear to use educational space more efficiently.

The next figure shows frequency and (capacity) occupancy percentages for different types of educational spaces, both scheduled (pre-booked) and actually measured.

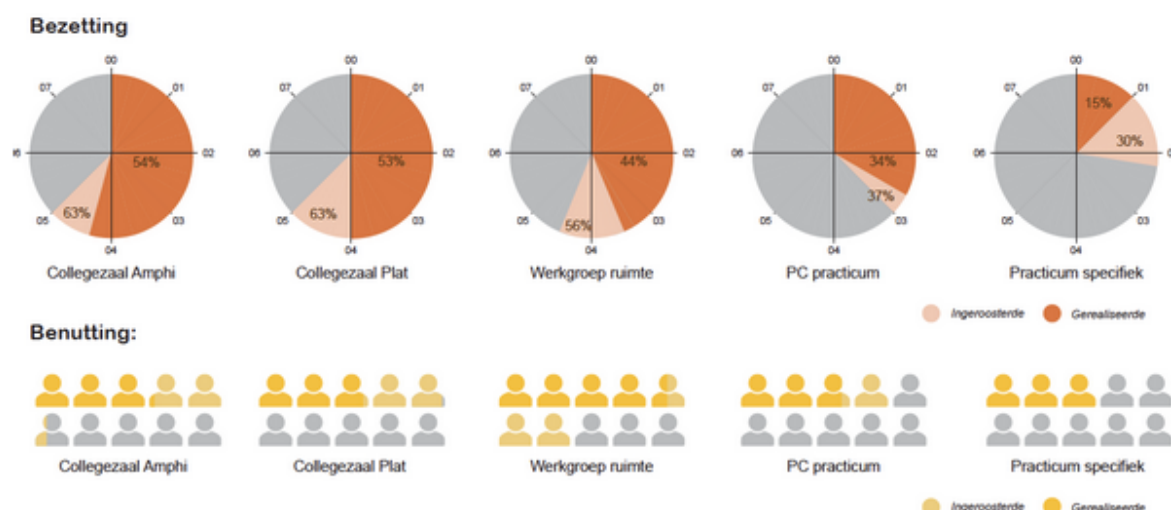


Figure 3.4: Frequency and (capacity) occupancy percentages for different types of educational spaces

The largest lecture halls appear to be the best used (highest realized frequency). In nearly all types of educational spaces, actual capacity is substantially underutilized; this also applies to scheduled capacity utilization (based on enrolled students per course).

- (a) Doubling group size—for example, as a cost-saving measure—should not be a problem given the average occupancy rate of 33% across all spaces at Campus NL, and 45% for tutorial rooms.
- (b) Universities could "overbook" rooms in terms of capacity, considering the "no-show" rate can reach several tens of percent. But do universities dare to risk overcrowded spaces, for example at course start? Is this reason to downscale space capacity during a course?

Frequency is more important than occupancy for teaching spaces. Occupancy indicates whether the room size is suitable for the group, while frequency indicates whether there are sufficient rooms. Additionally, occupancy is useful when universities plan to change their accommodation. It informs them about which types of rooms need to be added or removed.

Are occupancy rates a reason to review space standards (m² per student)?

Only a few universities apply space standards (expressed in m²/student): U2 and U10 (see Figure 3.5).

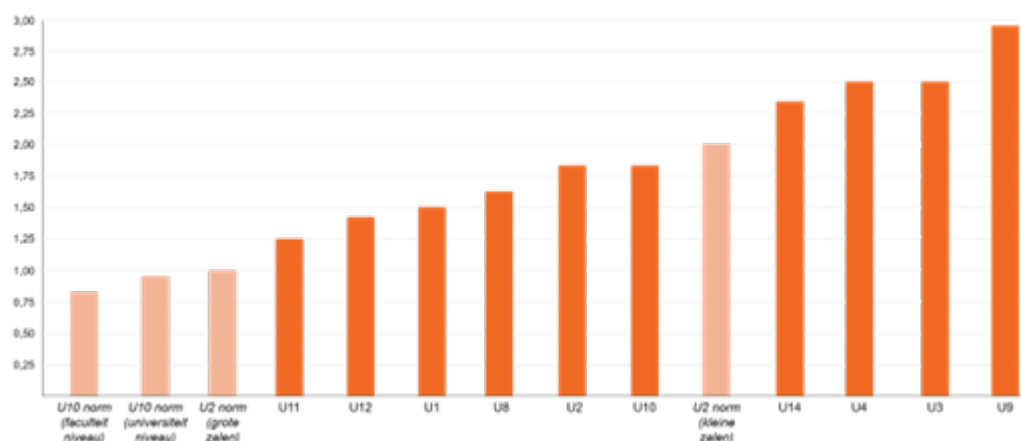


Figure 3.5: Actual educational space sq m per student (Colliers, 2024; Den Heijer et al., 2016; Campus NL, 2025) and Standards for educational space per m² per student from Campus NL

The amount of teaching space per student managed by universities has decreased in recent years, as shown in the Colliers report (2024). However, recent trends indicate that this could be reduced even further. In Figure 3.6 the average frequency is given per university combined with extra information.

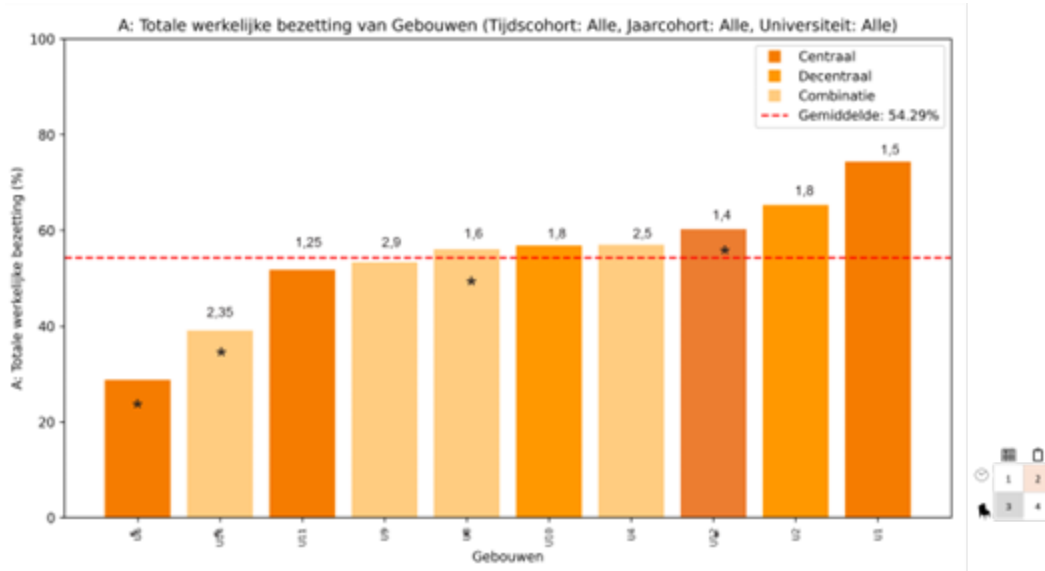


Figure 3.6: Average frequency rate across universities with the space standards (in square metres per student from the Colliers report) indicated above each column for each university. Asterisks indicate that measurements were taken during less busy periods.

A regression analysis on the dataset showed that actual frequency (bezetting) decreases as the number of square metres per student increases: frequency (bezetting) decreases by 26% for every 1 m² increase per student.

(a) Do these figures justify lowering the space standards? (i.e., square meters of educational space per student) at certain universities?

Campus NL on the HESMG 'utilization rate' tool

The below figure indicates Campus NL's performance on the HESMG assessment tool (HESEM, 2020), which is a 7-level system used for general learning spaces in higher education institutions in the United Kingdom to benchmark and evaluate their utilization rate. The utilization rate is a product of frequency (% of hours used compared to available hours) and occupancy (% of the number of people present compared to a room's stated capacity).

$$\text{gebruik (utilisation)} = \text{bezetting} \times \text{benutting}$$

$$\text{utilisation} = \text{frequency} \times \text{occupancy}$$

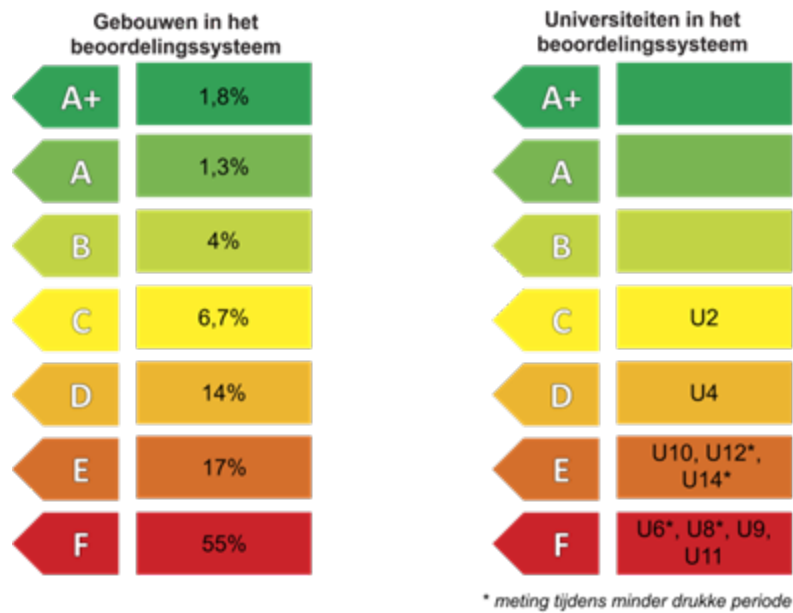


Figure 3.7: Campus NL Performance on the HESMG tool

Campus NL scores better on frequency than occupancy, likely due to the overcapacity in the rooms.

Statistical co-relations

In order to explain the differences between university results, statistical analysis of the database was conducted to identify the reasons for it. The key findings include:

- **Influence of m² / student:** The actual frequency decreases by a factor of 0.26 as the number of m²/student increases (i.e., with an increase of 1 m²/student, the actual frequency decreases by 0.26 or 26%).
- **Influence of the measurement period:** Universities that conduct their measurements during peak periods of the year show the highest actual frequency. Compared to peak periods, measurements during less peak periods decrease by a factor of 0.38.
- **Influence of the scheduling system:** Actual frequency appears to increase when a combined scheduling system or a decentralized scheduling system is used instead of a centralized scheduling system. Compared to the centralized scheduling system, the combined system increased realized frequency by a factor of 0.37, while the decentralized system increased frequency by a factor of 0.17.
- **Influence of room capacity:** The actual frequency increases by a factor of 0.00032 as the average room capacity per building increases (i.e., if the average room capacity increases by 1, the actual frequency increases by 0.00032 or 0.032%). If the average room capacity increases by 100 seats, the actual frequency increases by 3%. Therefore, larger rooms are better occupied than smaller rooms.

Data informs decision making



Figure 3.8: Data-driven decision-making (Illustration: Mark van Huystee)

The data can be used to influence decisions about property changes (demolition, rearrangement, and renovation) and can be useful in guiding more efficient capacity planning. Listed below are some of the solutions that were discussed within the Campus NL consortium:

- Flexibility of space:
 - Using temporary educational buildings
 - Adaptable space capacity (through movable partitions) allowing the size of rooms to be increased or reduced as needed, as a way to respond to trends that outpace real estate development.
- Switching to smaller spaces after the start of the semester per course, depending on actual student attendance (normally, a course receives the same space for the entire semester).
- Reducing teaching spaces: It may be worthwhile taking the risk of reducing the number of teaching spaces, as the number of students is expected to decline in the coming years. This can be done through demolition, renovation, or reconfiguration.
- Determine the capacity of teaching spaces on peak or average weeks and only rent extra space during peak weeks.
- Fewer practical classrooms: Since the trend is moving from practical training to simulation, fewer practical classrooms are needed.

It is important to note that **collaboration is key**. Effective solutions require collaboration and support from the Board of Education, schedulers, and property managers. Teachers should also be involved in both the process and the evaluation of improvements. Additionally, it is

helpful for users to understand the costs, distinctions between planning and implementing schedules, and the many variables that must be considered.

Attachments

Additional details regarding this portion of the study along with their corresponding results have been compiled in a set of posters which can be viewed in the appendix. Furthermore, a scientific paper is being prepared to explain in more detail the methodology adopted and the results.

References

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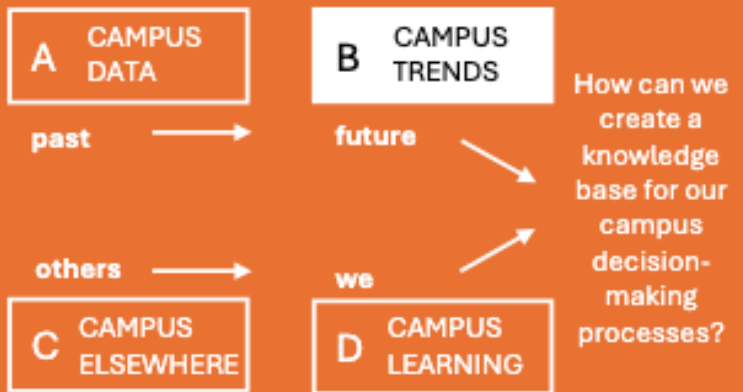
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Part II

CAMPUS NL 2024/2025 RESULTS



Part B – TRENDS

B1 Forecasting student numbers: insights from reference projections in 2025

Thomas Vogl and Alexandra den Heijer (2025), based on data provided by UNL

Key takeaways

- **Student numbers are structurally declining and forecasts have been revised sharply downward.**

Recent Reference Forecasts indicate a significant shift from earlier growth expectations. Whereas earlier projections anticipated around 400,000 higher education students, the 2025 Reference Forecast now predicts a plateau at approximately 300,000 students by 2040, signalling a long-term demographic contraction.

- **International student enrolment is already falling and acts as an early warning signal.**

Preliminary figures for the 2024–2025 academic year show a 6 percent decline in incoming international bachelor students, rising to 9 percent among EEA students. This follows an earlier downward trend and reflects the combined effects of policy uncertainty, budget cuts, and proposed internationalisation legislation.

- **Forecasts have immediate financial consequences for universities.**

Student number projections directly inform institutional funding allocations. Declining enrolment therefore translates into reduced income, increasing financial pressure and amplifying the risks of broad, non-targeted cost cutting measures if institutions do not respond strategically.

- **Campus and facilities planning is challenged by forecast volatility and long lead times.**

In just two years, projections for 2030 have been revised downward by nearly 60,000 students. Given the long planning and construction horizons of campus infrastructure, 2030 must be treated as an immediate decision point rather than a distant future scenario.

- **Universities must plan for flexibility under long-term demographic uncertainty.**

The findings underscore the need for adaptive campus strategies, including flexible space portfolios, scalable facilities, and scenario-based planning. Institutions must explicitly decide which reference student numbers to plan for, how much flexibility to embed, and how to balance financial resilience with sustainability objectives in an increasingly uncertain context.

1. Forecasting student numbers

At the beginning of 2023, the collective universities, represented by UNL (“Universiteiten van Nederland”, an association of universities in the Netherlands), commissioned a project to explore knowledge sharing about the past, present, and future of Campus NL. The focus is on campus management and supporting decisions about land, buildings, and other facilities of Dutch universities. This report is part of the Campus NL project, a four-year project from 2023 to 2027.

This report shows the development of the student numbers and the prediction for the future.

The findings aim to support higher education institutions in anticipating future trends and understanding their perceived effects on campus operations.

Budget cuts and the proposed internationalization law pose the risk of broad, non-targeted reductions. Preliminary enrollment figures for the 2024/2025 academic year indicate a 6% decline in the number of incoming international bachelor's students compared to the previous year. Among students from the European Economic Area (EEA), the decline is even greater, at 9%. A downward trend had already been observed in the preceding year (Universiteiten van Nederlands, 2024).

The Reference Forecast provides projections on the future development of student and graduate numbers in higher education. These forecasts play a crucial role in determining institutional budgets, as funding is closely tied to student enrolment figures. Consequently, a decrease in projected student numbers directly translates into reduced income for universities.

The most recent version, the 2025 Reference Forecast (“RR” refers to the Dutch word “referentieraming” for “reference projection”), anticipates a further decline in student enrolment over the coming years. As seen in the B1 Chapter of the previous Campus NL report 2023-2024 (Den Heijer, 2024), earlier projections had estimated that the number of students in higher education would reach approximately 400,000. However, RR2025 revises this estimate downward, forecasting that student numbers will instead plateau around 300,000 by 2040.

These updated forecasts highlight the need for universities to prepare for long-term demographic shifts and associated financial implications.

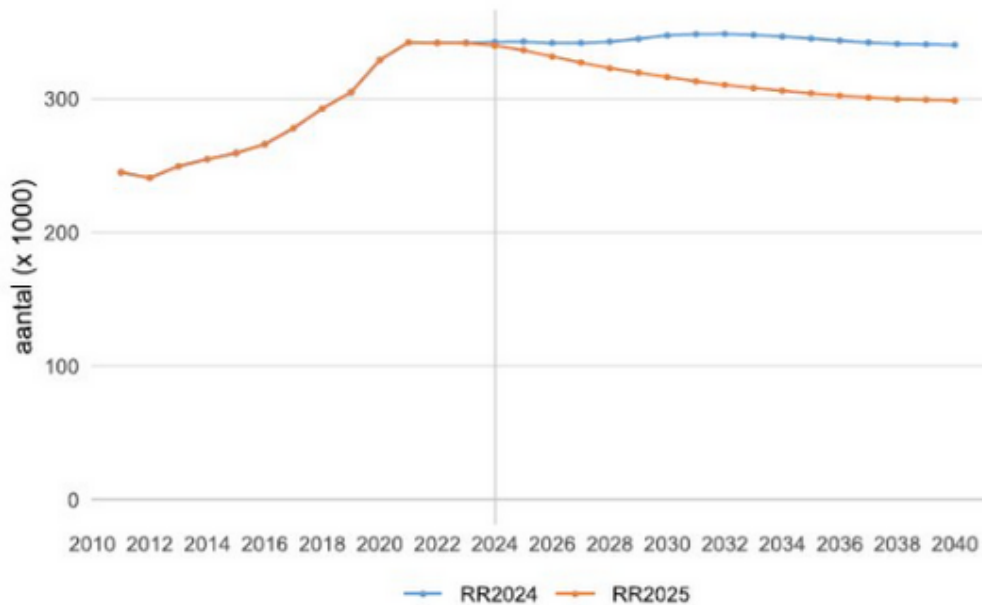


Figure 4.1: Number of university students: history and projections, based on respectively 2024 and 2025 data (source: reference projections “RR 2024” and “RR 2025”; UNL, 2025)

2. Planning of Campus Facilities

Frequent revisions in enrollment forecasts complicate campus and facilities planning. In just two years, the 2030 projection has been reduced by nearly 60,000 students, almost one-fifth of the current population. With long construction lead times, 2030 must be treated as an immediate planning horizon. Institutions must decide on reference student numbers, required flexibility, suitable facility and real estate portfolios, and the financial and sustainability implications—making long-term planning increasingly complex.

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B2 + B3 (Mega)trends and their implications for higher education – an international perspective

Thomas Vogl (2025), based on Flavia Curvelo Magdaniel, Alexandra den Heijer & Monique Arkesteijn (2019)

Key takeaways

- **Megatrends are reshaping higher education demands across all campus management dimensions.**
Global societal, technological, demographic, environmental, and geopolitical megatrends are fundamentally altering how universities operate, learn, and interact with society. These forces affect organisational structures, financial resilience, physical campus form, and functional use simultaneously, requiring integrated rather than siloed campus management responses.
- **Universities must plan under deep uncertainty, not stable growth assumptions.**
Volatile student numbers, shifting funding regimes, geopolitical instability, and rapid technological change undermine traditional long-term planning models. The evidence confirms that campuses must be designed and managed for adaptability, flexibility, and scenario-based decision-making rather than linear growth or fixed demand forecasts.
- **Digitalisation transforms campuses from primary learning sites to hybrid social and cultural hubs.**
Blended, hybrid, and online education reduce the campus's exclusive role in knowledge transfer while increasing its importance for social interaction, collaboration, well-being, and co-creation. This requires a rebalancing of space portfolios toward flexible, inclusive, and technology-enabled environments that support diverse learning modalities.
- **Resource pressure heightens the need for efficiency, data-driven management, and ethical governance.**
Underfunding, rising energy costs, housing shortages, and sustainability imperatives demand more efficient use of space, energy, and assets. Smart buildings, sensors, AI, and datafication offer optimisation potential but simultaneously raise concerns around cybersecurity, data ownership, public values, and institutional autonomy.
- **Campus competitiveness increasingly depends on collaboration, inclusivity, and societal relevance.**
Future-ready campuses are characterised by strong international and regional partnerships, interdisciplinary collaboration, lifelong learning provision, and attention to well-being, diversity, and inclusion. Campuses are evolving into living labs that integrate education, research, innovation, and societal engagement, positioning flexibility and resilience as core strategic assets.

Organizational drivers Trends: globalization and internationalization, change of knowledge culture as well as the demographic change leads to: - international partnerships (global campuses, joint degree programs, student/staff mobility) to improve their size and quality - increased demand for co-creation and transdisciplinary collaboration Dilemmas: - need for more education offers (e.g., micro-credentials) tailored to needs of companies but complex structures with lacking frameworks (format, design, funding and recognition) - need for more flexible schedules and virtual exchange - cultural diversity and equality while sustaining national values - chances attract talent and sustain student numbers	Physical drivers Trends: demographic changes and the rise of neo-ecology to deal with environmental challenges. - development of educational programs on environmental awareness and facilitate care of aging societies - adoption of energy-saving measures, green technologies, and circular design principles (incl. smart digital tools) - increased demand for flexibility and collaborative workspaces (living or field labs), personalization of education Dilemmas: - flexible, modular physical and virtual learning environment (accommodate diverse learning modalities, changing student numbers and individual needs) - adaption of the campus infrastructure with hard- and software (e.g., smart boards, VR tools, metaverse platforms).
Functional drivers Trends: demographic change, life and non-degree learning, urbanization, technical development, socialization and inclusivity - increased demand for educational programs to facilitate care of aging societies - increased need for capacity building in enrolment and recognition - managing classroom distractions through SMART teaching and policies - digital teaching and assessment enhanced expansion of distance learning, increased accessibility to education Dilemmas: - optimization through digital tools but cybersecurity and data storage - digital teaching but risk of infiltration, missing physical contact and social community => shift from campus as learning space to social hub	Financial drivers Trends: political turbulence, internationalization, technical development - operational costs (e.g., energy crisis) but also educational mobility - funding for universities (budget cuts for Dutch universities) - increasing demand for English courses and organization - provision of affordable accommodations for international students => challenging in overheated housing markets - automatization of administrative tasks - optimize space use, energy consumption and the facility management Dilemmas: - cost reduction by SMART tools but increased efforts for cybersecurity and data protection - Increased student numbers through international students but increased effort to provide English organization, housing and safeguard public values

1. Introduction

This report explores how global (mega)trends are influencing developments in higher education and their implications for campus management. By combining national and international perspectives, it offers practical insights into potential impacts across various dimensions of campus management - organizational, financial, physical, and functional.

This Chapter sets out to explore existing (mega)trends and derive potential implications for the campus management to predict future demands of universities and the campus. In order to achieve this, this study builds on the study of Curvelo Magdaniel et al. (2019) and uses the theoretical framework for assessing changing demands (Den Heijer, 2011) shown in Figure 5.1. The results will help stakeholders to anticipate trends, thus ensuring informed and resilient campus decisions.

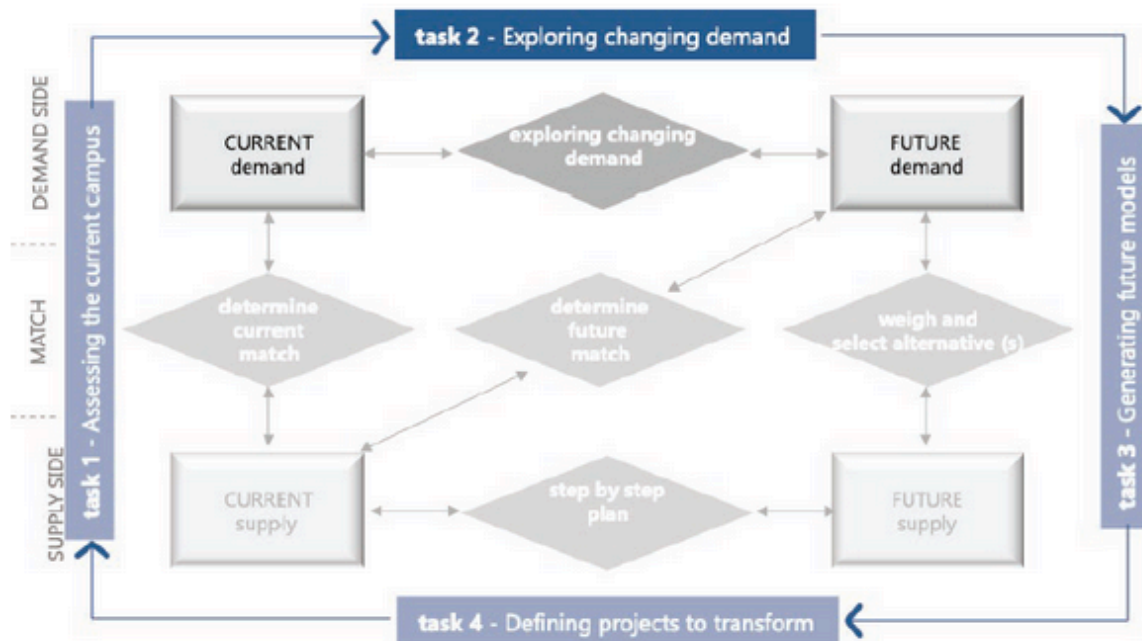


Figure 5.1: The second task in campus decision-making: Exploring the changing demand (Source: Curvelo Magdaniel et al., 2019, p. 59, based on De Jonge et al. 2009 and Den Heijer 2011).

Universities thrive in a dynamic environment driven by knowledge creation, diffusion, and application. Hence, the role of universities in driving innovation is well-documented; through the development and improvement of technologies, services and products, in collaboration with firms and governments at all levels, they ensure their continued competitiveness. However, the competitiveness is just one influencing driver for higher education worldwide (Curvelo Magdaniel et al., 2019) also social and technological (mega)trends influence the behaviour the way we interact with others, utilise technology, and engage with spatial learning environments. The development of some megatrends accelerated by the COVID-19 pandemic caused a paradigm shift in the way people work, live and learn. It is imperative that policymakers, public and private organisations, higher educational institutions be aware of the changing demands to ensure that they are adequately prepared to cope with the challenges and opportunities that the future will undoubtedly bring.

This section explores the evolving university landscape in three parts (trends, drivers and scenarios), based on Curvelo Magdaniel et al. (2019) as shown in the Figure below.

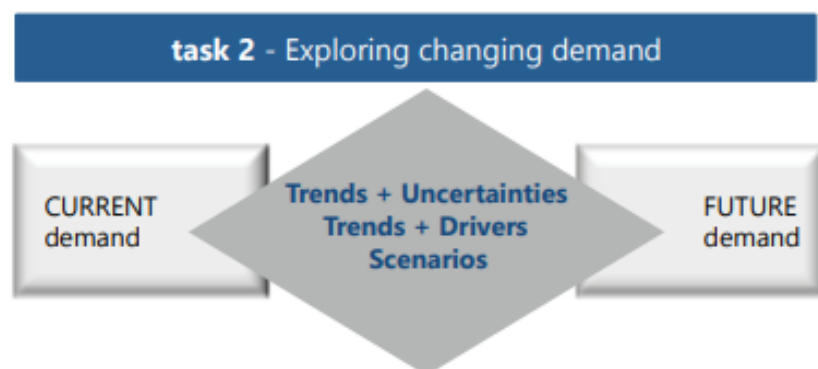


Figure 5.2: Approach to describe the changing landscape of UTs using trends, uncertainties, demand drivers and scenarios (Source: Curvelo Magdaniel et al., 2019, p. 59).

Based on the findings of the previous Campus NL report (2024), this Chapter contributes to the understanding of the development of megatrends by providing a narrative investigation on their perceived impact on higher education and displays potential future scenarios for educational spaces. To achieve this overarching goal, this section will, first, display a short summary of the trends and uncertainties in a Dutch context identified by Curvelo Magdaniel et al. (2019) to display the interrelations between changing demand in higher education and campus management research. Second, based on the SURF (2024) and the EUA trends report (2024) an overview of existing and emerging (mega)trends with potential effects on the four perspectives (organisational, financial, functional, physical) of the campus management are providing an international/European perspective. Finally, potential scenarios are derived, and the main conclusion of this section is drawn.

To systematically structure the field and enable a comprehensive analysis of (mega) trends and their impact on learning environments, this study adopts a "from rough to detailed" framework, which operates across multiple analytical levels. This ontological approach, rooted in project management, is a well-established method for both problem analysis and solution design (Kuster et al., 2019). Its primary advantage lies in its scalability: it allows for an initially broad perspective to be progressively refined through either a top-down or bottom-up analytical process.

In this study, a top-down approach is employed to assess the perceived effects and potential implications of (mega)trends at various levels of the learning environment. This involves first delineating the broader context of megatrends, which are then systematically narrowed to educational trends and their impact on the campus management as the analysis proceeds. Figure 5.3 illustrates the conceptual framework, highlighting the top-down structure.

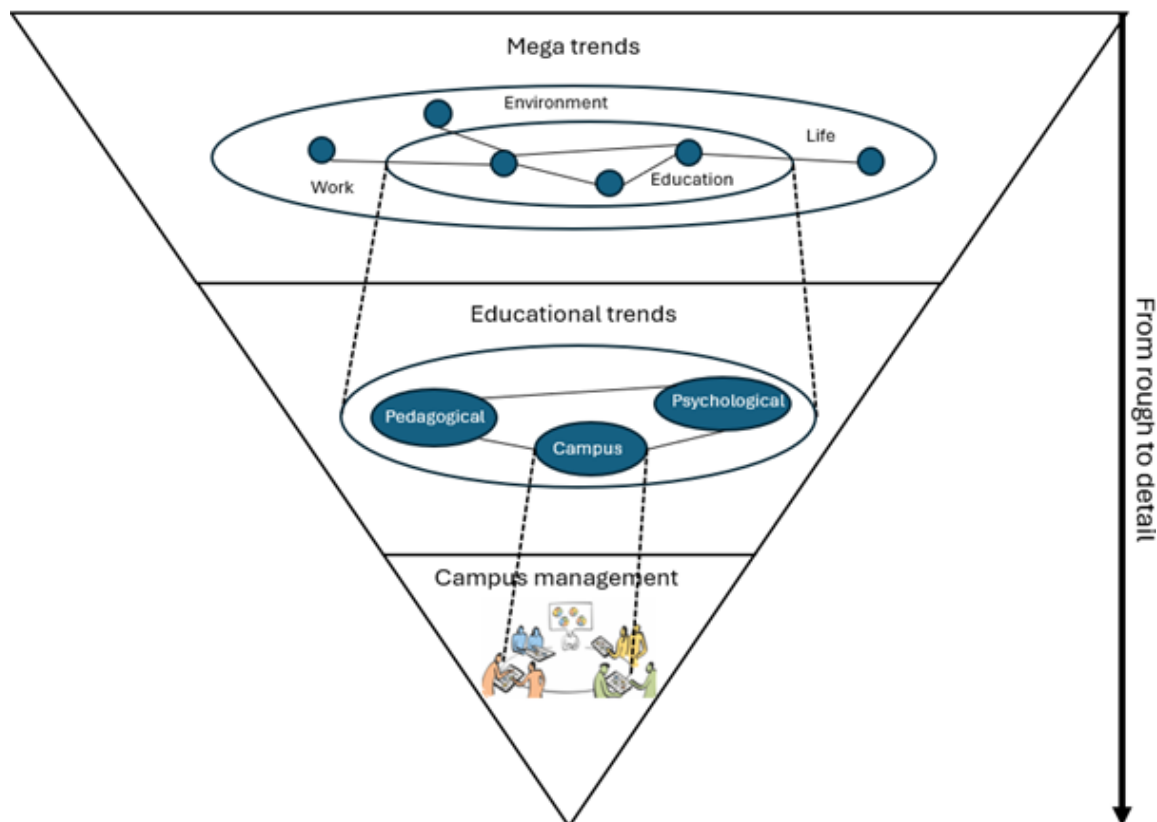


Figure 5.3: Conceptual framework "from rough to detailed" principle (own elaboration based on Vogl, 2024).

2. Evolving Campus Management – a national perspective

This section builds upon investigations from Curvelo Magdaniel et al. (2019), who identified eight trend-clusters that influencing the campus management of Dutch universities, and findings from the Campus NL (2024) which collected trend reports to describe implications for educational institutions in an international (European) and national context.

The eight trend-clusters identified by Curvelo Magdaniel et al. (2019) are: (1) globalization and internationalization, (2) diversity and demography, (3) the more rapidly changing context, (4) the cooperation outside the university, (5) the changing working environment, (6) digitalization, (7) shift in funding and (8) educational and research innovation. Accordingly, Curvelo Magdaniel et al. (2019) translated the trends into effects for each of the four perspectives on campus management, as shown in the Table below.

Perspective	Trends effects on...
Organisational	University goals and ambitions
Financial	University costs, income and value
Functional	University users and user's satisfaction
Physical	University's spatial condition (quantity/quality and location)

Table 5.1: Operationalization of trends according to their effects on campus perspectives (Source: Curvelo Magdaniel et al., 2019, based on Den Heijer 2011).

Based on the investigation, Curvelo Magdaniel et al. (2019) derived the following ten learning points with perceived impact on the future demands in Dutch universities.

1. universities must prepare for both growth and unexpected declines in student numbers.
2. students spending more time on campus, universities need to adjust teaching space usage and extend hours.
3. despite digital learning, students expect high-quality, accessible campus facilities.
4. long-term research planning is harder due to changing funding systems, making research space demand unpredictable.
5. stricter health, safety, and quality standards for research facilities increase costs per sqm.
6. growing dynamic workforce demands more flexible workspaces. More temporary staff, part-time and mobile staff.
7. underused academic office environment due to dynamic workforce. Traditional territorial workplaces are complex to manage towards temporary spaces demands of guest researchers.
8. students and academics are increasingly willing to share resources for sustainability.
9. flexibility is key to navigating future uncertainty.
10. planning for change allows universities to adapt to evolving circumstances.

Comparing these findings with the previous Campus NL report (2024) it can be said that today's campuses face increasing challenges in meeting dynamic space needs - driven by growth, hybrid working models and rapid innovation - with scarce resources such as energy, space, labor and finance. Further trends identified by the Campus NL team (2024) including energy transition, climate adaptation and university-city collaboration, with campuses often acting as living labs for academic innovation (Campus NL, 2024). The subsequent section will explore the trends and drivers that are shaping higher education and campus management, based on Curvelo Magdaniel et al. (2019).

3. Overview of (mega)trends and their perceived implications for the campus management: an international perspective

This section provides an overview of existing and emerging (mega)trends with potential effects on the four perspectives (organizational, financial, functional, physical) of the campus management.

The definition of megatrends is not clear, and many definitions and differentiation of megatrends exist in literature. However, in general, megatrends can be defined as macroeconomic and geostrategic forces which are exerting long-term changes in individual, social and technological structures that are expected to have a significant influence on the contemporary world (PwC, 2016; Deloitte, 2023). They differ from short-lived trends and disruptors, which are defined as singular events that drive radical global change. The Zukunftsinstitut (2024) defines them by the following criteria (1) duration, lasting for decades (> 10 years); (2) ubiquity, impact on all areas of society; (3) globality, impacting the world, albeit unevenly; (4) complexity, driving change through interconnected dynamics.

Megatrends are complex, cross-sectoral and interdependent phenomena. They are not acting isolated but influence each other and reinforce their impact. E.g. New Work is driven by technological development and connectivity as well as evolving gender roles (Gender Shift) (Zukunftsinstitut, 2024).

The table below provides a general narrative overview of relevant (mega)trends found in grey literature and derives potential implications for the campus management of educational institutions. These implications are color-coded based on the campus perspectives shown in Table 5.2 and are further tested in the next chapter using findings from campus-specific literature.

Table 5.2: (Mega)trends and potential implications for the campus management perspectives (Source: own elaboration).

Source	Societal (mega)trends	Description	Hypothesis: Assumed implications for LE (colors - perspectives)
Deloitte (2023), PwC (2016)	Technological innovation, hyperconnectivity 	The combination of the internet, mobile devices, data analytics, cloud computing, and AI will continue to transform industries, increasing automation and productivity. However, remote or underserved communities without adequate infrastructure may be negatively impacted.	Digital transformation, artificial intelligence, and online learning - Implications for teaching, learning, and administration. Digital tools for space planning and controlling (analyzing data in real time). Cyber security issues and infiltration. Lack of physical/social contact (isolation)

		Hyperconnectivity will also shape public discourse on various social issues.	
PwC (2016), Copenhagen institute for futures studies (2024)	Globalization Internationalization 	Emerging countries are shifting from labor and production hubs to consumption-driven economies, exporting capital, talent, and innovation. As a result, mature markets may lose influence, capital, and appeal for talent and business.	International collaborations Cross-border education War for talent Economic pressures on higher education funding and access (governmental subventions, tax, private investments).
PwC (2016), Deloitte (2023), Copenhagen institute for futures studies (2024)	Demographic Changes (Silver Society), general population growth, scarcity 	Global population growth is driving increased demand for resources like water, food, and energy. Aging populations in Western regions are facing a shrinking workforce, while younger, growing populations in other areas need to be fed, housed, educated, and employed.	General population growth Lower energy demand Aging populations: Negative impact on student enrolment. Attract talent from abroad (older workers, supplemented by migrant population). Educate young workforce with key skills. Retool aging workforce. Solutions to facilitate care of aging societies.
Deloitte (2023)	Environmental Challenges Neo-Ecology Climate Change 	Climate change is prompting countries to adopt laws to reduce CO2 emissions. Younger generations' growing interest in sustainable lifestyles is shifting consumer behaviors. Global leaders have committed to the Sustainable Development Goals (SDGs).	Address sustainability trends and the role of higher education in addressing climate change.
PwC (2016), Copenhagen institute for futures studies (2024)	Urbanization 	Half of the world's population now lives in cities, with 4.9 billion expected by 2030. This growth demands new infrastructure, trade support, and solutions for education, health,	Higher demand for lecturers and researchers. Less public funding. Pressure on the housing markets

		security, and employment. Urban growth may surpass governments' ability to provide essential services.	
Deloitte (2023)	Social and cultural changes Gender shift, diversity, inclusion 	Changing societal values, equity, diversity, and inclusion.	Diversity and inclusion within higher education
Deloitte (2023)	Knowledge culture 	Global education levels are rising, and our understanding of knowledge creation and dissemination continues to grow.	Education becomes more digital Cooperative and decentralized structures for knowledge generation are spreading
Deloitte (2023), Copenhagen institute for futures studies (2024)	Global political tensions, Concentration of wealth 	Government agencies aim to create competitive advantages, while network vulnerabilities expose national security risks, including threats to infrastructure and classified information. Propaganda and radical groups target disaffected populations.	Security issues

4. Overview of campus specific trends and demand drivers and their perceived implications for the campus management from a European perspective

This European trend overview builds upon findings of the previous earlier research (Campus NL, 2024; Curvelo Magdaniel et al., 2019) and the assumptions made in the previous chapter, establishing a link between trends and their impact on the four perspectives of the campus managements described in Chapter 1 (see Table 5.3). Insights from practice reports (SURF, 2024) and institutional sources, like the EUA report by Gaebel and Zhang (2024) who applied an online survey in 489 higher education institutions in Europe to assess the implication of trends, underscore the identification of trends and their interconnections with the campus perspectives.

Table 5.3: Trends and demand drivers for European universities and potential implications for the campus management perspectives (Source: own elaboration).

Source	Educational trend	Description	Implications for LE/ management perspectives (color coded)
SURF (2024) EUA (2024)	Rise of blended, hybrid, and online education 	Accelerated digitalization due to COVID-19, enabling advanced virtual interaction Hybrid integration of physical and digital learning environments Increased use of open educational resources Diversification of educational formats and teaching methods	Expansion of distance learning for greater reach and flexibility Increased accessibility to education Diverse teaching methods Digital assessment of students and space use Shift from campus as a learning space to a social and cultural hub
SURF (2024) EUA (2024)	Increasing focus on lifelong and non-degree learning 	Governments and institutions promote lifelong learning and personal development Growth of e-learning, micro-learning, and stackable micro-credentials 75% of HEIs see micro-credentials as a chance to innovate and expand but worry about unrealistic expectations	Education tailored to employer and employee needs through business and regional collaboration Micro-credential challenges include lacking frameworks for format, design, funding, and recognition Need for capacity building in enrolment, recognition processes, and prior learning
SURF (2024)	Extensive flexibility and personalization of education	Emphasis on personalized, flexible, and engaging learning experiences	Personalized and extracurricular learning Flexible, modular physical and virtual environments Diverse spaces for focus, collaboration, instruction, informal learning, meetings, and experimentation

			
SURF (2024) EUA (2024)	Growing importance of well-being, socialization, and inclusivity 	Rising student anxiety and depression shift campus focus from knowledge transfer to socialization and co-creation Greater emphasis on community building, inclusion, and mental health, with two-thirds of EUA institutions prioritizing student well-being	Strengthening student connections on physical and digital campuses WELL certification for health-focused facilities and well-being events Ensuring accessible education for all students
SURF (2024)	SMART buildings and improved infrastructure 	Technological advances drive smart campus applications Robotics, machine learning, and AI enable digital twins for simulations and predictions	Optimizing campus performance with digital tools, sensors, and robotics for space use, energy, and safety
SURF (2024) EUA (2024)	Growing importance of sustainability and green campus initiatives 	Growing awareness of buildings' environmental impact drives sustainability efforts 72% of institutions have strategies aligned with the United Nations Sustainable Development Goals (SDGs)	Education programs on sustainability and environmental awareness Adoption of energy-saving measures, green technologies, and circular design principles
SURF (2024) EUA (2024)	Extensive digitalization and datafication of education	The rise of generative AI and immersive tech (VR, MR, AR) enables data-driven education, bridging physical and virtual learning environments and enhancing social interaction, co-creation, and engagement	Adapting campus infrastructure with hardware and software (e.g., smart boards, VR tools, metaverse platforms) Telepresence learning environments (e.g., hybrid active learning classrooms)

			
SURF (2024) EUA (2024)	Growing importance of ethical awareness and safeguarding fundamental (public) values 	Big tech platforms and tools raise concerns about privacy, data ownership, and institutional autonomy Most institutions uphold Bologna process values, though some report diminished focus on academic freedom and autonomy Increased awareness of the need to enhance participatory institutional cultures beyond formal rights	Technology requires increased efforts to safeguard public values, data protection, and cybersecurity
SURF (2024)	Changing role of teacher and his skills 	Teachers must embrace innovations, adapting their role and encouraging interactive, participatory collaboration with students	AI automates administrative tasks, requiring digital and cultural skills, but leads to time and space constraints Emphasis on co-creation with students and companies
SURF (2024)	Low change readiness of educational organizations 	Campuses have low capacity to initiate and implement changes, including in governance and stakeholder involvement	Growing demand for change management, including control and experimentation
SURF (2024)	Increasing cross-sectional and/or interdisciplinary collaboration	Increasing demand for collaboration between students, teachers, educational institutions, businesses, and the region.	Collaboration between educational institutions (student mobility) Transdisciplinary collaboration among students, teachers, institutions, regions, and companies

			Establishment of collaborative hubs/workspaces (living or field labs)
SURF (2024) EUA (2024)	Intensification of internationalization and globalization 	Educational institutions transform into global knowledge networks with exchanges of teachers, students, and ideas to enhance multicultural competencies. Staff mobility remains less systematic (EUA, 2024) with Difficulty integrating mobility into degrees. Growth of international students in the Netherlands. Over 98% of HEIs value Erasmus+ and the Bologna Process highly (EUA, 2024). Challenges include lack of funding, fellowships, and affordable housing. COVID-19 accelerated blended mobility, with virtual exchanges rising from 12% to 54% (2020-2023).	Growing international partnerships, global campuses, and joint degrees Increased focus on virtual exchanges, staff development, and learning innovation Rising demand for English-taught programs and quality recognition Boost in "internationalization at home" via virtual exchanges Need for improved English-language services and housing for international students
SURF (2024) EUA (2024)	Flattening population growth, rising diversity (migration), housing shortages, and aging population 	The Netherlands' population is growing due to migration and longer life expectancies. Urbanization is driving young people and migrants to cities, creating housing challenges, while peripheral regions face aging populations. International students are declining in vocational and applied sciences but growing in academic education.	Flexible facilities are needed to accommodate changing student numbers, with a focus on inclusive and supportive learning environments
EUA (2024)	Economic development / underfinancing	Underfunding is one of the top three obstacles for improving learning and teaching.	
EUA (2024)	Political changes / geopolitical challenges	Decreased exchanges with Russia and Belarus. Increased collaboration with Ukraine.	

		Growing support and demand for academics and students at risk.	
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Previous research categorized trends based on the four campus management perspectives, with each trend then being linked to specific drivers (Campus NL, 2024; Curvelo Magdaniel et al., 2019) as shown in Figure 5.4. The utilisation of these perspectives serves not only to categorise the trends, but also to highlight their interconnections.



Figure 5.4: Drivers influencing the changing demand in universities categorised by campus management
(Source: Own elaboration based on Curvelo Magdaniel et al., 2019)

a. Organizational drivers

In order to navigate the demands of an organisation, a university must demonstrate competitiveness, governance, and a clearly defined identity. It is through these factors that a university can excel in education and research, structure itself according to effective policies, and shape its societal presence (Curvelo Magdaniel et al., 2019; Campus NL, 2016).

Universities are institutions that are characterised by their commitment to academic excellence, innovation, and the pursuit of distinction. They are pivotal drivers of knowledge creation, which is a vital asset for Europe.

As shown in Table 5.1 and 5.2, especially the mega trends globalization and internationalization, change of knowledge culture as well as the demographic change can be directly linked to organizational implications for the campus management. Hence, on the one hand, universities reported on the need for international partnerships (global campuses, joint degree programs, student/staff mobility) to improve their size and quality which is in line with findings of (Curvelo Magdaniel et al., 2019). On the other hand, universities see an

increased demand for co-creation and transdisciplinary collaboration between universities and businesses which goes along with education offers (including micro-credentials) tailored to the needs of local companies. However, this leads to more complex structures lacking frameworks for format, design, funding and recognition as well as the need for more flexible schedules and virtual exchange.

The growing internationalization brings chances for universities and local economy in order to attract talent and sustain student numbers. In turn, it also creates challenges in terms of cultural diversity and equality while sustaining national values.

b. Financial drivers

The financial demands of universities are driven by three key factors: growth, value and efficiency. These are, in turn, shaped by economic conditions, funding impact and resource management. While universities seek stability, societal contribution and sustainability, they face challenges amid political turbulence (Curvelo Magdaniel et al., 2019). For instance, the war in Ukraine has caused increased energy costs for European universities and has restricted funding, collaboration and student mobility for Russian and Belarusian universities but, in turn, support for Ukrainian universities has grown as well as the demand of academics and students at risk.

According to the EUA (2024), due to shifts of political focuses that go along with cost cuttings for educational institutions, several European universities experienced a reduction of public funding. Furthermore, as already mentioned in the previous section, internationalisation goes along with chances and challenges. Besides, the effects mentioned before, an increasing demand for English courses and organization is needed and the provision of affordable accommodations for international students could be challenging in overheated housing markets. The trend with the biggest chances to optimize the scarce resources (Curvelo Magdaniel et al., 2019) goes along with the technical development and the use of new technologies for optimizing processes. Hence, the implementation of digital tools, sensors or AI can contribute to the automatization of administrative tasks and optimize the campus performance with regards to space use, energy consumption and facility management. However, it would also require increased efforts to safeguard public values, cybersecurity and data protection.

c. Physical drivers

The quality of the place, its distinctiveness, and its circularity are the driving forces behind universities' physical demands, enhancing activities, reflecting identity, and ensuring sustainability (Curvelo Magdaniel et al., 2019).

According to Table 1 it can be assumed that the (mega) trends of demographic changes and the rise of neo-ecology to deal with environmental challenges are affecting physical drivers of the campus management. Universities embed sustainability in their campuses, thereby driving innovation and addressing key societal challenges. Hence, the role of higher education institutions is to develop educational programs on sustainability and environmental awareness and find solutions to facilitate care of aging societies, a finding that is in line with the conclusions of Curvelo Magdaniel, et al. (2019). Furthermore, this growing importance of sustainability and green campus initiatives requires the adoption of energy-saving measures, green technologies, and circular design principles. Here also smart digital tools can support

the optimization of the campus performance in terms of energy consumption and CO₂ emissions.

Besides the focus on sustainability and energy, European universities report on an increased demand for collaborative workspaces (living or field labs) and flexibility to increase the quality of the place. Whereas the former was already mentioned by Curvelo Magdaniel, et al. (2019), the latter seem to gain more relevance with the establishment of digital tools in education in the last years and is related to the call for more personalisation of education. Hence, this trend necessitates two things. Firstly, the adaptation of the campus infrastructure with hard- and software (e.g. smart boards, VR tools, metaverse platforms). Secondly, a flexible, modular physical and virtual environment to accommodate changing student numbers and their individual needs. Consequently, there is a necessity for a variety of spaces that cater to diverse learning modalities, including focus, collaboration, instruction, informal learning, meetings, and experimentation. These spaces should be designed to foster inclusive and supportive learning environments.

d. Functional drivers

The functional demands in universities are driven by demographic, productivity, users' well-being, and new ways of learning (NWOL) methods. These main drivers have a significant impact on student and staff populations, productivity within their core activities, users' well-being in terms of the ability to provide a safe and healthy learning and workspace, and education innovation (Curvelo Magdaniel, et al., 2019).

Universities seek to recruit students who are academically gifted and motivated to learn, and who will optimise their learning experience. However, universities face a number of uncertainties, particularly with regard to student numbers. If universities fail to take into account the possibility of a decline in student numbers, this may have implications for their funding, the stability of their payroll, and the utilisation of their facilities. Megatrends like the demographic change in aging societies could have negative impact on the enrolment of young students and increase the need to educate them with key skills of key industries with labour shortages. However, a focus on professionals and the need for retooling the aging workforce could also be a chance for universities in order to keep or even increase the number of enrolments. This goes along with the increasing focus on lifelong and non-degree learning in European universities, which is leading to an increased need for capacity building in enrolment and recognition processes (EUA, 2024). In turn, the megatrend urbanisation leads to a higher demand for lecturers and researchers in urban areas with high population densities.

Digitalization is reshaping learning, compelling universities to adopt advanced technology while managing classroom distractions through smart teaching and policies (Curvelo Magdaniel, et al., 2019). The ongoing digital transformation and hyperconnectivity gained traction with the establishment of digital tools during the Covid-19 pandemic and the ongoing technological developments in the field of IoT. These developments led to the rise of diverse teaching and assessment methods (blended learning, hybrid and online education, digital assessment of students) which enhanced the expansion of distance learning and increased the accessibility to education. The downsides of digital education are not only existing in terms of infiltration, cybersecurity and data storage of sensitive data as mentioned in previous sections, also the missing physical contact and social community can harm the

learning processes and the mental health of individuals. Hence, a shift from campus as a learning space to a social and cultural hub to strengthen student connections on the physical and digital campus is required. With the rising use of technology in education comes also a growing importance of well-being, socialisation and inclusivity as well as ethical awareness and safeguarding fundamental (public) values.

5. Conclusion

It is evident that universities are incapable of predicting the future; consequently, they must continuously anticipate and adapt (Curvelo Magdaniel et al., 2019). Megatrends influence university trends, so they should always be considered to ensure future preparedness.

Universities face challenges amid political turbulence (Curvelo Magdaniel et al., 2019). For instance, the war in Ukraine has caused increased energy costs for European universities and has restricted funding, collaboration and student mobility for Russian and Belarusian universities but, in turn, support for Ukrainian universities has grown as well as the demand of academics and students at risk.

In the next Chapter a systematic literature review on future scenarios for higher education is presented.

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B4 Innovations in learning spaces on Campus NL

Julia Kudła, Thomas Vogl, Alexandra den Heijer (2025)

Key takeaways

- **Universities face structurally competing strategic priorities.**
Diverse educational policies reflect different institutional values, such as societal impact and innovation versus accessibility, flexibility, and spatial efficiency. Managing these priorities simultaneously creates inherent tensions rather than resolvable trade-offs.
- **Limited resources force difficult and value-laden choices.**
Constraints in funding, infrastructure, and organisational capacity mean that prioritising one strategic objective often comes at the expense of another. Aligning long-term institutional visions with short-term operational pressures remains a persistent challenge.
- **Digitalisation is both an enabler and a risk factor.**
While digitalisation expands access to learning and enables global collaboration, it also risks deepening digital inequality and reducing face-to-face interaction, with potential negative consequences for student well-being, belonging, and peer learning.
- **Flexibility conflicts with long-term investment logics.**
Changing learning models require adaptable and multi-functional spaces, yet campus infrastructure investments are capital-intensive, long-lived, and often poorly suited to rapid reconfiguration. This tension is particularly acute for specialised facilities such as laboratories and workshops.
- **Design decisions reflect deeper institutional priorities.**
Choices between open, communal spaces versus quiet, structured environments are not neutral design questions but strategic statements about inclusivity, pedagogical philosophy, and the intended role of the campus in academic and societal life.

Findings - Educational policies across the universities diverse strategic goals, though managing them simultaneously can create tensions - Differences reflect strategic dilemmas a. some institutions emphasize societal impact, engagement, and innovation b. others focus on accessibility, flexible learning, and optimizing physical space	Dilemmas - Limited resources (funding, infrastructure, and institutional capacity) => difficult trade-offs - Prioritizing one set of goals may come at the expense of another - Challenges in aligning long-term visions with immediate operational needs, stakeholder expectations, and policy frameworks - Balancing these competing priorities demands careful strategic planning and often reveals deeper institutional values and constraints. - Digitalization i. enhances access to learning opportunities and fosters global collaboration ii. risks widening the digital divide if all students do not have equal access to technology iii. reduction in face-to-face interaction and peer collaboration can negatively affect students' well-being, sense of belonging - Flexibility with long-term planning i. changing learning models demand adaptable spaces ii. infrastructure investments are costly and designed for the long term iii. flexible, multi-functional spaces often conflict with the need for specialized, discipline-specific facilities, such as labs or workshops, which require dedicated environments and cannot be easily reconfigured
Design - Implications a. Universities aiming to enhance societal impact and engagement i. open, communal spaces b. Focusing on accessibility and inclusivity i. emphasize quiet, structured environments that fulfil diverse learning needs	

1. Introduction

This chapter summarises the findings of a desk research on the design and use of diverse learning environments within university campuses, along with an analysis of each institution's strategic vision for future development on this matter. The aim is to explore innovations in educational spaces, such as classrooms, lecture halls, informal learning hubs, across all 14 universities in the Netherlands.

This research investigates trends in management strategies across 14 Dutch universities, focusing on the planning, design and development of educational spaces within their campuses. By analysing changes in the use and development of learning environments, the study evaluates organizational models and their responsiveness to evolving institutional needs and shifting educational paradigms.

The research identifies challenges faced in current management practices and highlights key factors and sectors influencing the contemporary educational environment. The research examines case studies to address dilemmas surrounding strategic business decisions and governance processes, particularly those that impact the performance and adaptability of campus spaces dedicated to learning.

By questioning management models, the study fosters the dialogue and knowledge exchange among the network of participating universities. This shared expertise can serve as a reference for addressing challenges and guide effective prospective planning. Conducted analysis juxtaposes past, present, and future scenarios in educational space management, providing a perspective on how these strategies can adapt to meet future demands. Ultimately, the findings aim to contribute to the development of sustainable and effective management approaches for campus environments.

In order to gain a deeper understanding of the development and changes in educational environments on university campuses, this study emphasizes the importance of analysing both current and prospective models of management. The study is guided by the following primary research question:

What are the innovations in educational spaces on university campuses?

This overarching question is supported by a set of sub-questions aimed at deepening the investigation:

What are the common challenges associated with the management of learning environments that universities face?

How do universities approach and resolve these challenges?

What factors influence the design, use, and functionality of learning spaces?

These questions explore obstacles, constraints, evolving educational requirements, and technological advancements that influence decision-making processes. By addressing them, this research seeks to present the management practices, policy frameworks, and strategic solutions that academic institutions adopt to improve and future-proof their campus environments. Considering the significant impact of diverse external and internal factors, such as institutional goals, stakeholder needs, technological integration, economic pressures and sustainability issues, highlight broader context of campus organisation. The findings aim to present the challenges and opportunities in campus planning and identify best practices that can guide future strategies. Following this approach provides a potential to make educational environments remain adaptive, functional, and aligned with the needs of a modern university system.

2. Methodology

a. Data collection

The research methodology involves collecting comprehensive information on the types of study spaces available at universities in the Netherlands, their accessibility to students, and their overall availability. In addition, the study aims to gain insights into how these spaces are developed and managed by the institutions. Focus points of the study are to examine institutional strategies related to the utilization and management of study spaces, including policies for development of campuses in this context, as well as investigate how universities are incorporating online and hybrid learning platforms into their strategies and how this impacts physical space planning. The research is conducted through a desk research of university websites, reports, and strategic documents. The following steps outline the methodological framework:

1. Website Review of the Universities of the Netherlands

University websites are reviewed to collect detailed information about educational spaces, study rooms, libraries, learning centers, and other facilities, including informal educational spaces. For each participating university, the following sections are examined (if applicable): Education, Study Programs, Facilities, Students, Library, and Digital Learning Platforms.

This allows to extract information on the types, availability, and accessibility of these spaces and simultaneously provides data about the physical and digital infrastructure provided by each institution.

2. Review of University Reports and Strategic Documents (available publicly online)

Publicly accessible documents and posts are examined to explore how factors such as technological advancements and sustainability influence campus planning strategies. Reports discussing Campus Development Plans, Virtual Learning Platforms, and Sustainability Initiatives are sought to gain insights into institutional priorities and positions to development of educational spaces.

3. Review of University Reports and Strategic Documents (internal documents)

Internal documents, provided by a representative responsible (our "campus contacts"), where available, are reviewed to validate and expand on the information obtained from public sources. This step allows for a more nuanced understanding of university strategies and visions that may not be reflected in public-facing materials.

b. Response rate and data availability

The data collection was started in October 2024 and was finished in February 2025. Data collection of internal documents was gathered with 'campus contacts' assistance. They were requested to validate the summary of information obtained from publicly available data, which was shared in posts on Microsoft Teams platform. With these messages they were also asked to provide other documents that might be relevant to continue the research. As a result of this method, 5 (36%) out of all 14 universities provided the documents relevant to learning spaces policies.



Figure 6.1: Data collection methodology (Source: own elaboration).

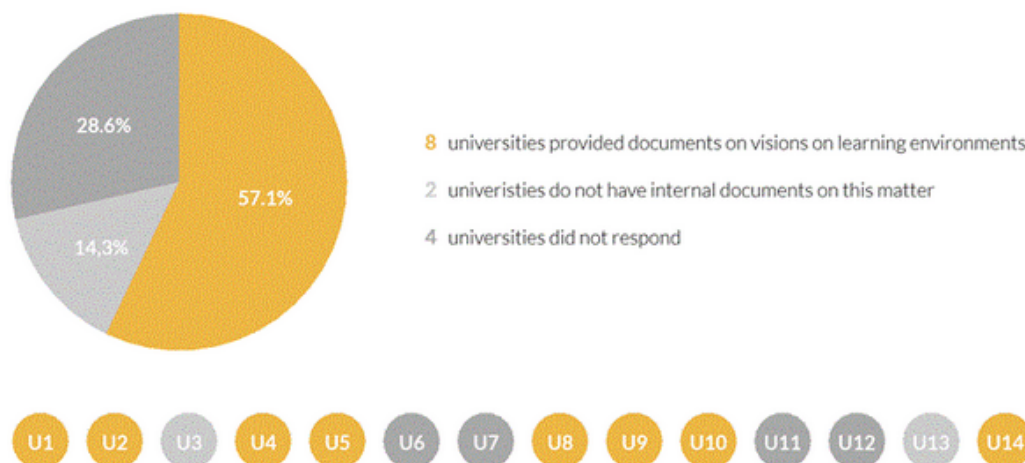


Figure 6.2: Institutional internal documents' response rate (Source: own elaboration)

3. Results

This study examined the policies of educational spaces across fourteen universities. Analysis of documents provided by 8 institutions revealed diverse approaches to educational space management. Institutional documents indicate varying priorities in shaping campuses to support educational and pedagogical goals. The table provides an overview of document titles, including summaries of their contents and page counts.

The analysis reflects the diverse frameworks that universities use to support learning, drawing attention to significant differences in strategic focus, infrastructure planning, and pedagogical orientation. While some documents outline a general vision for improving education quality and learning methods, others take a broader perspective, examining the impact of academic-industry networks and the institution's mutual impact on city or region. Additionally, some documents provide detailed requirements for equipment and spatial dimensions in rooms designed for specific purposes.

Table 6.1: Overview of policies on education provided by Campus Contacts (source: own elaboration)

Institution Code	Document Title	Number of Pages	Content Summary
U8	<i>"Educational Vision U8"</i>	3	General position of the university towards aims in education.
U8	<i>"ENGAGEMENT. An U8's perspective on our third mission and how it contributes to our impact ambition"</i>	15	1. Introduction 2. Our definition of engagement 3. The relation between engagement and impact 4. Why is engagement important? 5. Our audiences or types of engagement – with whom are we engaged with? 6. Engagement as a quality

			7. The prerequisites of impactful engagement 8. Our rules of engagement 9. Engaged scholarship – engaged academics 10. U8 as a civic university – taking our societal responsibility seriously 11. Towards a common engagement strategy: challenges and questions
U8	<i>“Impact-driven education at U8”</i>	18	1. Introduction 2. The Learning Landscape for Impact-driven education 3. The concept of impact capacity 4. Changing roles and interactions in the impact learning environment 5. Appropriate ways to assess impact-driven education 6. Impact-driven education as a reflexive and academic process 7. A final note – about space for faculties to contextualise and differentiate 8. Appendix - References
U4	<i>“Cookbook Education Spaces. Requirements for Education Spaces U4”</i>	54	1. Classification of teaching practices 2. Education space typologies 3. Education space requirements 4. Study places
U9	<i>“U9 VISION ON EDUCATION”</i>	23	1. Introduction: Future U9 education 2. Drivers of change 3. U9 learners and graduates 4. U9 education – Developing from teaching to learning 5. Learning in the innovation hub: our faculty university and ecosystem 6. Developing towards future U9 - U9 education: a learning organization
U10	<i>“Onderwijsvisie: Learning@ U10”</i>	20	1. Introduction 2. Why educational innovation? 3. Elaboration of the new educational vision

			4. Ambitions for a renewal agenda
U10	<i>“U10_230626 inventarisatie zelfstudieplekken_concept Campus NL”</i>	6	Overview on dedicated study places and spaces of shared functions used for learning purposes.
U2	<i>“CONCEPT_Innovatie trends”</i>	2	Campus contact response with verification by trends indicated on Teams.

Societal Impact and Engagement

Institutions U8 and U9 highlight the importance of positive societal impact at the center of its strategic objectives. The institutions aim to foster dialogue within its community and beyond, including local and international partnerships. For instance, U8 emphasises the role of learning environments in real-world application, encouraging students to use their knowledge in practical settings, thereby enriching their educational experience. Following this principle, various stakeholders are involved to facilitate entrepreneurship and research through enabling supportive infrastructures beyond campus. Similarly, U9 promotes challenge-based learning, allowing students to tackle real problems in multidisciplinary environments.

Translating these strategic objectives, collaboration between academia, industry, and the wider community indicates that some of the learning spaces are moved beyond rigid setup of campus facilities. Enhancing experiential or practical learning and entrepreneurial activity may result in development of cross-sector partnerships in creation of shared spaces between different institutions. This model allows for efficient use of space not only within campuses but on a wider scale of, for instance, city networks.

Another key point that supports engagement is inclusivity and participation. This is promoted in various institutions by providing diverse classroom settings and student-centered learning methods. It means that diverse users' needs along with particular teaching models need to be taken into account to provide efficient layout for the space. According to study, learning spaces blend traditional academic environments with innovative spaces designed for collaboration and experimentation. This can be observed in devoting facilities for student initiatives where they can develop their interests and skills apart from their main study path.

Well-Being

The physical learning environment is evolving to accommodate a diverse student body with varying learning needs. Institutions focus on inclusivity by considering neurodiversity, different study habits and levels of social interaction. This is supported by, for instance, incorporating study spaces for diverse needs, including silent zones, touchdown areas, and informal meeting spaces. This is reflected in the design of study spaces that address these diverse requirements, for example, through the provision of silent zones for focused work, touchdown areas for brief use, and informal meeting spaces that encourage collaboration. Flexibility is expressed in layout that enables to change a given room with mobile furniture pieces and reconfiguring individual work stations into combined collaborative setup or even divide the space with movable temporary partitions if needed. Creating such adaptable

environments requires a thoughtful analysis of spatial typologies and the development of potential rearrangement scenarios, whether for everyday use, such as adjusting layouts between morning and afternoon sessions, or for long-term future planning, like adapting spaces for new pedagogical approaches or institutional growth.

Apart from that, regular classrooms or lecture halls can be used for different purposes outside scheduled classes. This allows for more efficient use of space, however, requires appropriate organisation. It can be also applied to non-educational function areas, such as cafe, canteen or corridors, if the basic equipment and sockets is provided. For instance, U10 claims that their institution provides 2400 regular study spots and in addition 1100 are available in the restaurants.

U2 has launched a pilot project “Colaboratory” to enhance collaboration within its community. U4 defines spatial typologies, ensuring classrooms are equipped with furniture, lighting, and technological tools, appropriate for specific learning mode, to foster effective learning. Meanwhile, U9 is shifting toward multipurpose labs and workspaces, emphasizing active, student-driven learning experiences. This is indicative of the current trend away from single-activity spaces, instead suggesting a more fluid use of available space resources, that accommodate different functions. Worth mentioning is also that the demand for study facilities changes throughout the year. During busy exam periods students tend to spend more time at the campus. Simultaneously, during that period, the number of scheduled classes is reduced, which gives an opportunity to dedicate teaching rooms for self-study or group work.

Physical and Digital Learning Environment

The digital transformation of higher education plays a crucial role in expanding access, flexibility, and efficiency in learning environments. Institutions emphasize the integration of hybrid and online learning models, providing students with greater flexibility in how they engage with their studies. High-quality digital tools play a crucial role in ensuring a seamless connection between physical and virtual learning environments, enhancing accessibility and efficiency. Therefore, rooms should be equipped with audio-visual systems, such as cameras, speakers and boards to enable sufficient transmissions. Additionally, universities are prioritizing engaged and interactive online experiences that complement traditional classroom instruction, fostering deeper student participation. Furthermore, there is a growing focus on supporting lifelong learners and professional development, creating alternative learning pathways that cater to diverse educational needs.

U10 emphasizes the efficient use of classrooms by incorporating digital tools to enhance active learning. U9, on the other hand, has developed a comprehensive hybrid learning infrastructure designed to support seamless interaction both in-person on campus and through accessible digital platforms, ensuring flexibility and inclusivity in the learning experience.

As a result of aforementioned mentioned practices, physical space can be reduced not only in terms of classrooms but also archival space to store students' work which can be preserved on virtual platforms or online drives. Conversely, it requires additional resources so equip them and maintain their technical performance.

Identified trends

Trends in educational space management reflect a dynamic interplay of organizational, financial, social, and spatial considerations to meet a diverse needs of stakeholders such as students, staff, and administrators. Drawing from Alexandra den Heijer's publication "Campus of the Future: Managing a Matter of Solid, Liquid and Gas", the application of these trends considered how well educational spaces support institutional identity (organizational), remain cost-effective and accountable (financial), enable user satisfaction and well-being (functional), and ensure quality and sustainability of the built environment (physical). These criteria helped assess whether spatial strategies align with broader university goals and stakeholder needs.

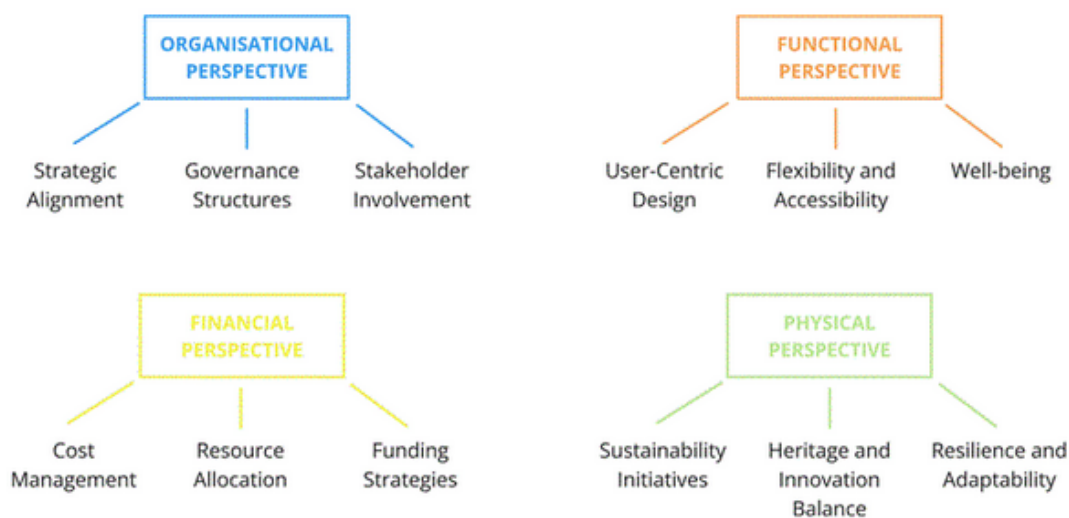


Figure 6.3: Core criteria across financial, functional, physical, and organisational dimensions in university management. (Source: own elaboration based on den Heijer, 2021).

A significant insight is the shift away from one-size-fits-all solutions to diversifying learning spaces to accommodate varied educational methods, ensuring accessibility and adaptability. Identified trends show that universities are adopting smart tools, such as reservation apps, to optimize the use of resources, which touches upon balancing cost-efficiency and implementing sustainable solutions addressing, among others, energy transitions or climate change. Traditional learning facilities, such as libraries, are organised in a layout that allows for both individual and collaborative study. Accommodating a large student population results in organisational and financial conflicts.



Figure 6.4: Diagram depicting identified trends through website review along with frequency of mentions (out of 14) (Source: own elaboration).

On one hand, increasing demands are prompting universities to expand their campuses by developing new infrastructure tailored to evolving academic and operational needs. On the other hand, these pressures also necessitate a more efficient use of existing facilities. This includes rethinking how space is utilised, often by partially shifting certain aspects of learning to digital formats. Data collected indicates that universities are actively investing in innovative technologies and digital tools to diversify and improve teaching and learning practices. Such investments support the development of hybrid learning platforms, which blend in-person and online educational experiences. Accelerated by the pandemic, this shift enables greater efficiency, flexibility, and accessibility. For instance, lectures designed for large student cohorts can now be delivered virtually or made available as recordings for asynchronous learning.

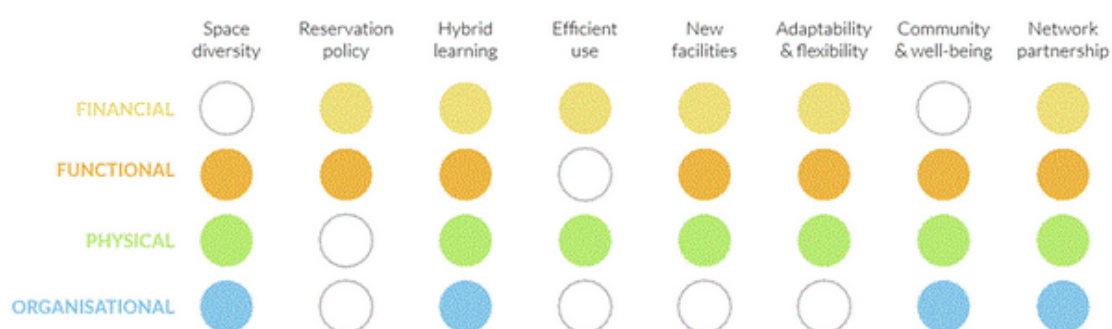


Figure 6.5: Financial, functional, physical and organisational added values in trends considered by universities. Trends identified through website review and internal documents analysis (Source: own elaboration)

4. Conclusion

Educational policies across the universities studied reflect diverse strategic goals, though managing them simultaneously can create tensions. These differences reflect strategic dilemmas, as some institutions emphasize societal impact, engagement, and innovation, while others focus on accessibility, flexible learning, and optimizing physical space. The tension arises because resources, such as funding, infrastructure, and institutional capacity, are limited, requiring universities to make difficult trade-offs. Prioritizing one set of goals may come at the expense of another, leading to challenges in aligning long-term visions with immediate operational needs, stakeholder expectations, and policy frameworks. Balancing these competing priorities demands careful strategic planning and often reveals deeper institutional values and constraints.

Digitalization in education also presents a set of complex dilemmas. On one hand, it enhances access to learning opportunities and fosters global collaboration; on the other, it risks widening the digital divide if all students do not have equal access to technology. Additionally, the reduction in face-to-face interaction and peer collaboration can negatively affect students' well-being and diminish their sense of belonging within the academic community. Universities aiming to enhance societal impact and engagement seem to prioritize open, communal spaces, whereas those focusing on accessibility and inclusivity might emphasize quiet, structured environments that fulfil diverse learning needs.

Another key challenge lies in balancing flexibility with long-term planning. Rapidly changing learning models demand adaptable spaces, yet infrastructure investments are costly and designed for the long term. For instance, while 'innovative' interiors may support current educational trends, they risk becoming outdated quickly, leading to short-term functionality. Additionally, flexible, multi-functional spaces often conflict with the need for specialized, discipline-specific facilities, such as labs or workshops, which require dedicated environments and cannot be easily reconfigured.

These dilemmas highlight the complexity of designing effective learning environments. Policymakers should ensure that strategies applied remain adaptable, inclusive, and responsive to emerging needs. A balanced approach that

considers the mutual effect of digital and physical spaces, or both organised and flexible learning environments, is crucial to fostering genuinely innovative and inclusive learning environments that enable individual and collective development.



Figure 6.6: Dilemmas in learning space management (Source: own elaboration).

References

Den Heijer, A. C. (2021). Campus of the future: Managing a matter of solid, liquid, and gas (5th ed.). TU Delft Open Publishing.

B5 Trends in learning environments and their implications

– a systematic literature review

Thomas Vogl, Jet Bierman, Monique Arkesteijn, Alexandra den Heijer (2025)

Key takeaways

- **Learning space design is shifting toward flexibility, personalization, and activity-based use.**

Innovative educational environments increasingly prioritise task-oriented zones, flexible layouts, and varied seating arrangements that support active, blended, and informal learning. Concepts such as open learning spaces, flexible furniture, and “sticky campus” environments reflect a move beyond traditional classroom typologies.

- **There is no universal spatial solution for learning environments.**

Building morphology and organisational context strongly influence design outcomes. The evidence confirms that one-size-fits-all approaches are ineffective, as each institution has distinct pedagogical goals, spatial constraints, and user needs that must be assessed locally and iteratively.

- **Academic users play a critical role in shaping effective campus design.**

Successful learning environments depend on meaningful involvement of academics and users as stakeholders in the planning and design process. Strong leadership and alignment between teaching objectives, institutional strategy, and project management are decisive factors in campus project success.

- **Scientific literature concentrates on functional and organisational perspectives, leaving critical gaps.**

Existing research predominantly focuses on flexibilisation, digitalisation, and campus-based learning environments, with limited attention to physical, financial, ethical, and demographic dimensions. Notable gaps include exam and event spaces, laboratories, blended lecture halls, housing pressures, and institutional readiness for change.

- **Persistent dilemmas stem from misalignment between educational needs and estate management.**

Communication gaps between academics and estate managers remain a major barrier to effective learning space development. User-centred, participatory planning approaches are increasingly recognised as essential, yet require a shared language and governance framework to reconcile pedagogical ambitions with spatial, financial, and operational realities.

Implications - Design of innovative spaces with a focus on different activities, featuring task-orientated zones and the classroom layout and seating arrangements - o Active learning space: Round tables, flexible layout - o Blended learning: Round tables with chairs, semicircular seating - o New learning spaces: Open space, task-orientated zones, flexible furniture, mobile digital devices - o Sticky campus: Spaces for relaxation, eating, socializing, study - Morphology of the building (size, enclosures, floors, ceilings and internal division of the classrooms) influence design and needs to be considered. - o No one-size-fits-all solution - o Every organization has unique needs - o People who use and work in the space play a crucial role in assessing those needs and shaping the campus design - o Academics can act as clients and stakeholders in the project management - o Successful campus projects require strong leadership and alignment between teaching objectives and institutional strategies	Focus of scientific literature - Focus on flexibilization and personalization of education (n=32), general educational (n=27), digitalization of education (n=25) - Most educational trends focus on learning environments on campus locations (n=17), regular classrooms (n=16), and libraries (n=12) - Focus on the functional and organizational PREM perspectives. Gaps in scientific literature - Lack of research on population growth, diversity, aging and housing shortage (n=2), the increased importance of ethical awareness and public values (n=3) as well as the readiness of the campus to implement changes (n=5) - Lack of investigation on exam rooms and event rooms/aulas (n=1), laboratory (n=2), lecture hall and blended classrooms (n=3). - Lack of investigation on physical and financial perspectives in the context of campus management - Scarce data on design features of learning environments Dilemmas - Communication gaps between academics (focus on teaching and learning needs) and estate managers - User-centered participatory planning and design approach with a common language at its core are highly relevant
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1. Introduction

This report, Trends in Learning Environments and Their Implications: A Systematic Literature Review, offers a comprehensive synthesis of global trends shaping learning environments in higher education. Using the PRISMA method, it addresses three key questions: What trends are emerging in scientific literature? How do they impact the campus management — financial, organizational, functional, and physical perspectives? And what are their broader implications for universities and their learning environments?

The review serves a dual purpose. Theoretically, it identifies patterns, highlights gaps in the literature, and suggests directions for future research. Practically, it provides insights for campus managers to be aware of future trends and their implications for the campus management.

Higher educational institutions must evolve to adapt to technical and societal developments and the new circumstances they engender. However, these institutions are often unable to adapt at the same pace as societal developments. Specifically concerning built pedagogy; most campus buildings vary in age, design and quality, and stand for decades, while in the meantime views on education and pedagogy develop (Lam et al., 2019). This discrepancy can lead to potential tensions in how these buildings facilitate educational developments (Sandström & Nevgi, 2020). In this light, it becomes imperative to reconsider how learning environments must evolve in order to provide effective learning experiences. One way to approach this reconsideration is by foreseeing which trends and innovations could potentially affect learning environments, including physical and virtual learning spaces (Ellis & Goodyear, 2016).

Multiple developments and trends, and their impact on learning environments have been the subject of numerous studies from various disciplines worldwide during the past decade. Since 2018, EDUCAUSE published Horizon reports that identify emerging technologies and trends that influence the future of higher education, which can have an impact on the learning environment (Shehata, et al., 2024). In multiple editions these reports recognise redesigning learning spaces as a short-term trend. There is an emphasis on adapting physical learning spaces in order to promote new ways of learning and also take virtual spaces into account (EDUCAUSE, 2019). With the help of these reports universities are able to make strategic choices.

Further, the European University Association (EUA) envisioned, in the published futuring report 'Universities without walls - A vision for 2030' (2021), that European universities would be accessible and actively involved in society, while they offer open, transformative spaces for collaborative knowledge creation through education and innovation. The EUA's yearly trend report (2024) delves into issues distilled from their futuring report and concludes that this report is on the one hand helpful, yet on the other hand raises more questions. Taking this into account, the prediction of future trends and their subsequent impact on the university must be approached with a balanced consideration of the opportunities and risks inherent in such predictions. This is essential in order to ensure the continued competitiveness of the university in future marketplaces.

The contribution of this study lies in the methodological approach selected: the Preferred Reporting Item for Systematic Reviews and Meta-Analyses, also known as PRISMA (Liberati et al., 2009). Following the PRISMA checklist items, this paper aims to enhance our understanding of trends in learning environments by systematising the current scientific literature. Hence, this study will present different aspects and identify indicators from various cross-studies published post 2000. In particular, this review attempts to answer the following research questions:

RQ1: What are the different kinds of trends in the learning environment?

RQ2: What are the effects of these trends on the financial, organizational, functional and physical campus perspectives?

RQ3: So far, what do we know about the specific implications of these trends for the higher educational institutions and the learning environment?

From the theoretical perspective, on the one hand, the PRISMA approach can integrate various globally significant studies and shed light on the implications of trends for higher educational institutions; also to underline the existing gaps in the literature and propose future research lines. On the other hand, the findings of the study can be transferred to campus managers, policymakers and didactic specialists to be considered in designing tailored space concepts, policies or curriculums to facilitate trends.

This research is organised in four main sections. The introduction is followed by the methodological approach section, where details are provided on data collection and the different phases of analysis. The third section discusses the findings to address the research questions outlined above. The final section summarizes the primary outcomes and introduces future lines of research.

2. Analytical framework

a. Learning environments

A learning environment can be described as the overall environment wherein students experience learning (Valtonen et al., 2021). Students not only learn during scheduled lectures or seminars in formal learning spaces, but also across various informal spaces throughout the campus (Boni & Calabuig, 2017; Hunter & Cox, 2014). Formal spaces are designated for structured activities, while informal spaces, such as open areas, campus cafes, corridors, and hallways with seating arrangements, provide additional learning opportunities (Beckers et al., 2016). Dugdale (2009) refers to this range of informal spaces as the 'space between', indicating areas that lie between formal learning environments like lecture halls, laboratories, and classrooms.

Besides these physical spaces of the campus, the learning environment also includes virtual aspects (Ellis & Goodyear, 2016). Most classrooms are equipped with technology, such as computers and LCD-screens, which are used by the teacher for instruction. Moreover, in more recent years, campuses have developed all sorts of innovative technology-rich learning spaces featuring interactive whiteboards, advanced cameras, and augmented and virtual reality tools (Donkin & Kynn, 2021). With digital devices and learning management systems students can easily connect with others, communicate, collaborate and learn together. Additionally, with the help of wireless internet and educational software students can potentially learn anywhere, both on campus and off campus.

In the course of this work, the categorization provided by De Heijer (2018) served as the basis for the classification of available spaces for a wide range of learning purposes. They include: (1) laboratories, (2) libraries, (3) lecture halls, (4) (regular) classrooms, (5) study places, (6) meeting rooms, (7) exam space, (8) ceremonial rooms, (9) cafes and restaurants. This classification was enriched with more innovative learning space typologies which were presented in "Types of teaching rooms" (SURF, 2024) and include (10) active learning classrooms, (11) hybrid virtual classroom, (12) blended classroom, (13) virtual classroom. As it is also essential to consider quantitative characteristics of certain kinds of space, such as (13) number of seats provided or its (14) area in square meters, we inductively added these codes. Another factor that was inductively added was the location of the facilities, namely (15) off campus or (16) on campus as well as visual description, photos or layout plans.

b. Trends in learning environments

Multiple reports such as the EUA Trends 2024 and the Future Campus Trend Report by SURF (2023) provide critical insights into changes and evolution of learning environments. These documents provided data and outlined a profile of trends noted in the evolving learning environments in university education. Building on this foundation, a coding scheme was drawn up to explore the changes, priorities and tendencies occurring in the shaping of learning spaces in higher education.

We applied deductively the following thirteen trends identified by SURF (2023): (1) Changing role of teachers and their skills, (2) increased digitalisation and datafication of education, (3) flexibilisation and personalisation of education, (4) population growth, increasing diversity, housing shortage and aging, (5) general educational trends, (6) impotence of sustainability

and green campus initiatives, (7) increasing importance cross-sectional and interdisciplinary collaborations, (8) importance of ethical awareness and safeguarding public values, (9) increased importance of well-being, socialisation and inclusivity, (10) globalisation and internationalisation, (11) low change readiness of educational organisations, (12) rise of blended, hybrid and online education, (13) smart buildings and improved infrastructure. Furthermore, (14) general pedagogical and educational trends were inductively added.

c. Campus management perspectives

An efficient management of campuses requires a multilayered approach that integrates organisational, financial, functional, and physical perspectives, that were presented in den Heijer et al., (2016). Integrated approach allows for efficient navigating numerous challenges in learning environments in higher education. In the course of this work, we deductively applied those four perspectives and interpret them as shown in the illustration below.



Figure 7.1: Operationalisation of trends according to their effects on campus perspectives (Source: Curvelo Magdaniel et al., 2019, p.60).

3. Methods

a. Data collection

This paper presents a systematic literature review and follows the protocols developed by PRISMA. Subsequently, different electronic databases were screened to classify relevant records for further analysis. The first phase of the search process concentrated on identifying synonyms and terms related to higher education institutes and trends in the English language. As a result, the authors chose the following search terms and connected them with the “OR” and “AND” operators:

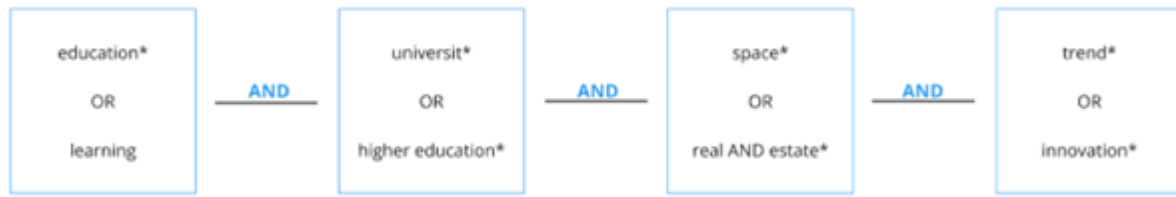


Figure 7.2: The search string applied (Source: Own elaboration).

This search string was applied within a scientific database on November 29, 2024 and several criteria were defined: (1) to show the recent status of publications the timeframe was restricted to 2000–2024; (2) the term had to appear in the title or abstract or in the keywords; (3) the search was limited to research or review articles.

Hence, the initial list consists of 2,557 articles. After removing duplicates, the number of potential articles selected for the screening process was reduced to 2,156. These articles were screened in three screening phases (started with the title, abstract and finally the full text screening) by two independent individuals based on defined inclusion and exclusion criteria. Articles were included if they (1) report on one or more trends in higher education, (2) report on future developments in higher education, (3) report on implications of trends on different perspectives of higher education institutions, (4) report on effects of trends on different perspectives of higher education institutions. Articles were excluded if they (5) no relation to higher education institutions were clearly stated, (6) no relation to trends, developments or innovations in relation to higher education institutions were clearly stated, (7) investigated trends in primary or secondary education.

Following the initial screening of titles, 347 papers were identified for further investigation. Subsequent to abstract screening, 269 papers were excluded on the basis that they did not meet the eligible criteria. Consequently, 78 papers remained for the full-text screening. Following the application of the exclusion criteria, 32 articles were ultimately deemed to be unfit for inclusion. The primary reasons for exclusion were a lack of thematic fit or accessibility of the full-text documents, utilisation of languages other than English. Consequently, 46 papers were selected for content analysis, which were then executed with the assistance of the software programme Atlas.ti.

b. Coding framework

A deductive approach was initially employed to establish categories for trends, perspectives and learning environments, with reference to the framework delineated in Chapter 2. This formed the foundation for subsequent qualitative analysis. The coding process was inductive and iterative, with categories undergoing refinement in accordance with the emergence of findings. Descriptive statistics were employed to analyze the frequencies of codes within the database, with a view to identifying the way each trend exerts an influence on higher education institutions. For the analysis of the identified articles a computer-assisted qualitative data analysis software Atlas.ti was used. The preliminary coding phase concentrated on the identification of trends, learning environments and effects on the campus perspectives. The content of the articles was evaluated for references to trends, developments, and potential implications for the campus management. During the coding process, three primary categories - namely, "trends," "learning environments," and "perspectives" - along with several subordinate codes as well as the main category "evaluation methods", were introduced when necessary through an inductive approach.

4. Results

a. General overview of frequencies

When looking at the frequency, overall the most investigated trend in literature is the increased *flexibilisation and personalisation* of educational space, which was mentioned by 32 articles. Besides general *educational* (28) and *pedagogical* (23) trends, more than 50% of the identified articles are dealing with the trend towards the extensive *digitalisation and datafication* of education (25). The latter is also reflected in the *rise of blended, hybrid and online education* (21). Surprisingly, fewer studies address the trends of the growing importance of *sustainability and green campus* initiatives, *internationalisation and globalisation* (6) as well as the *flattering population growth, increasing diversity, aging and housing shortage* (3), which are representing global megatrends that can be expected to go along with changes for the learning environment and, the sustainability in particular, are characteristics of modern campus buildings.

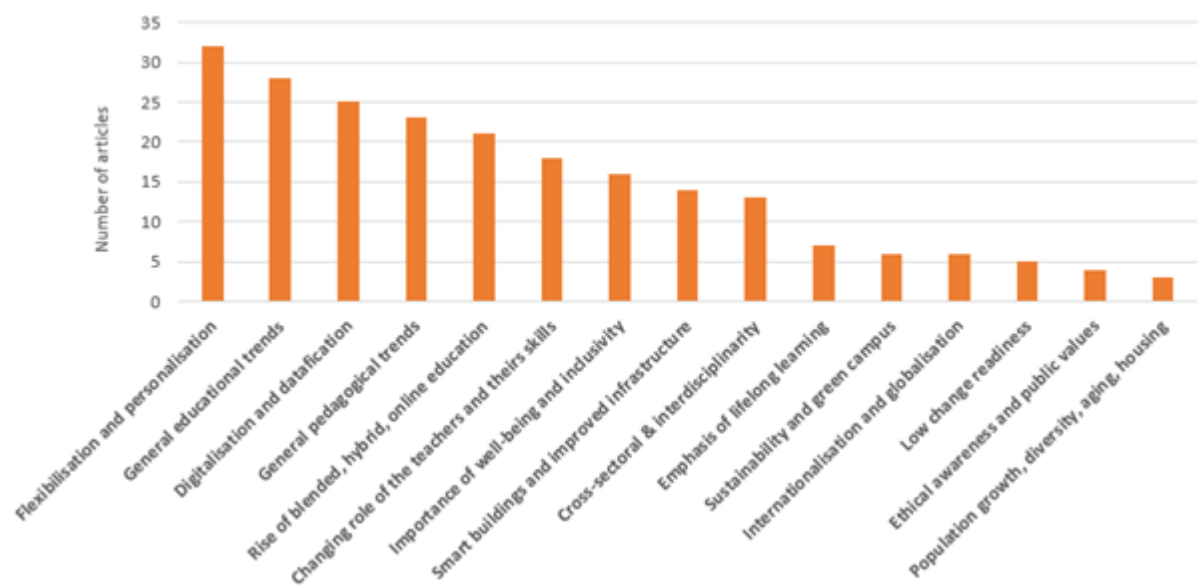


Figure 7.3: Frequencies of trends in learning environments mentioned in literature (n=46) (own elaboration).

The learning environments have been assigned to the following four main groups: (1) type of learning space, (2) location off or on campus, (3) quantitative characteristics of the spaces in numbers, (4) available visualisations of the learning spaces investigated, as shown in the Figure below.

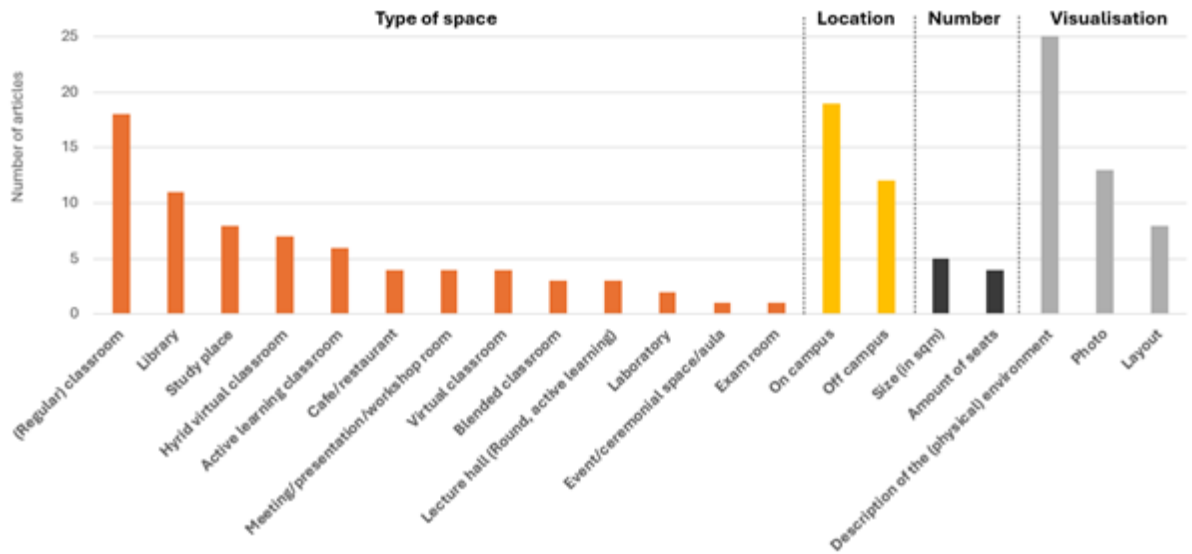


Figure 7.4: Frequencies of learning environments mentioned in literature (n=46) (own elaboration).

The frequencies of learning environments show that against the background of trends in the learning environment the most investigated type of space is the (regular) classrooms (18), followed by libraries (11) and regular study places for students (8). However, just a few articles investigated lecture halls or blended classrooms (3) and laboratories (2). Exam rooms and the ceremonial spaces, such as aulas are investigated against the background of trends by just one article. This implicates great research potential.

Looking at the group location, it is evident that the literature is focusing more on learning environments on campus (19) than off campus (12). Just five articles providing quantitative numbers about the size (5) or the amount of seats (4) of the learning environments investigated, which could indicate a lack of practical implementation. However, 25 articles provide descriptions, photos (13) and even information about the spatial layout (8) of the learning environments investigated.

b. General overview of frequencies

The implications of the trends for the Public Real Estate Management (PREM) perspectives (see Chapter 2 and Part I) are defined in the following section.

Financial perspective

For university managers financial sustainability is a key matter, especially in relation to the increasing pressure to optimise public funding. The financial perspective in this study encompasses cost management, resources allocation and funding strategies. It examines how institutions supervise ownership costs, among others, maintenance, energy consumption and operational expenses, as well as, decisions regarding budget and investments in physical or digital infrastructure.

According to the analysis, the economic resource-efficiency is influenced by the trend of (1) digitalisation and datafication, (2) general educational trends and (3) internationalisation (population growth).

1. Erickson (2012) found that advanced information technology in math, science, and language courses improves student learning and retention while reducing costs by an

average of 33%. Universities unable to invest in IT - often requiring tens of millions annually - will struggle to compete in the evolving higher education landscape.

Swiatek (2019) stated that over the past decade, European research has evolved rapidly, with electronic documentation playing a key role in enhancing performance and innovation. Thereby, staffing and material expenditures per student, teacher, and researcher serve as moderately comparable indicators. Notably, most material spending goes toward electronic resources, primarily used by teacher-researchers.

Leonard (2003) refers to the growing digital repository of universities that supports real-time, multimedia teaching. Universities plan to use multi-point video for interactive discussions and data collaboration in order to reduce response time, costs, and travel.

Peng (2013) highlighted key areas for organizational learning in designing future learning spaces in higher education, including transparent alignment of learning and spatial strategies, balancing participatory planning with financial and time constraints, building a knowledge base for evolving needs, and maintaining cost-effective, up-to-date real estate records.

2. Erickson (2012) found that, among other things, the nature of education as a service industry and the weakening social contract between higher education and public causes financial challenges for universities in the USA, affecting both operational decisions and student access to higher education.

Neary (2011) stated that higher education is becoming more commercialized and driven by quasi-market principles. Design and development discussions focus on responding to these external pressures and limited funding. While funding is crucial, the research found that iconic building projects often begin without a fixed budget.

This is confirmed by Parker (2013) who found that the government put pressure to increase student intake and produce employment-ready graduates for the global knowledge economy. Operational efficiency has become a main strategy with the goal of minimizing the expenses to maximize the profit. The shift to mass student intakes and teaching reflects universities' efforts to develop new teaching concepts and practices tailored to large student cohorts and corresponding delivery systems.

3. Erickson (2012) highlights the growing global competition in higher education, driving U.S. universities to revise curricula, expand study abroad programs and universities increasingly establish overseas campuses. International students contribute over \$18 billion to the economy and many US universities are increasingly reliant on international students and their tuition revenues. As reliance on international tuition grows, effective internationalization strategies will shape the future of higher education.

This is confirmed by Parker (2013) who highlights universities' growing reliance on international student fees, because governments reduce direct investment in higher education while positioning universities as agents of education export, shifting costs to alternative revenue sources, including local and international tuition.

general educational trends



globalization and internationalization



Functional perspective

The functional perspective addresses the needs of all campus users. Universities are supposed to provide spaces that accommodate various demands. Key points taken into account are user-centric strategies that can be reflected in, for instance, the design of the learning environment. It covers issues related to different teaching and learning styles and possibilities to adapt infrastructure to space usage by a certain number of students. Apart from that this viewpoint considers how institutions promote mental and physical well-being.

The (a) users satisfaction and their (b) engagement as well as their (c) activities seems to be influenced by the trend of (1) digitalisation and datafication, (2) extensive flexibilisation and personification of learning space, (3) general educational trends and (4) internationalisation, as shown in Table 1.

1. Erickson (2012) stated that due to the development of information technology higher education needs to use technology (in terms of fiber, wireless networks permeating campus spaces permitting in near ubiquity of mobile devices) to meet the demands of the new generation of students that grow up in an online world.

Seal (2015) confirms these statements and found that users expect and desire to have the latest technology (e.g. 3-D printers, tablets, video walls, mobile docking stations) to enhance the learning, knowledge creation and collaborative work. Therefore, interdisciplinary collaborations with e.g. IT departments are becoming more important. As a case study, the author investigated a university library in Chicago that places significant emphasis on computer technology for information access, demonstrating notable success in terms of attendance, technological utilisation and user satisfaction.

Appleton (2011) stated that with technological developments the user expectations changed and introduced the idea of implementing “third places” (into libraries) that serve as an inspirational learning space with a variety of seating styles and good information technology (IT) support to encourage debate, discussion and conversation. These spaces were located on the ground floor but the design of the building, particularly on the higher floors, provides the flexibility to be able to create a number of micro-environments that can be adapted for either quiet or group study at different times of the academic year.

Neary (2011) mentioned that the development of new technologies have led to the design of diverse learning spaces - specialized, flexible, formal, and informal- while integrating information technology to network these spaces. At the core of these designs are student-centered pedagogies, increased collaboration and engagement between staff and students, and stronger connections with communities beyond the campus. Therefore, they propose an open-space intellectual event involving the university community (academics, real estate professionals, students, staff) to reimagine its core philosophy and define key features for future teaching and learning spaces.

Khamitova (2023) stated that the growing digitalization of teaching and learning leads to technologically enhanced classrooms. They found that these spaces provide flexibility regarding installing various technologies like learning analytics or an extended reality technologically and showing positive feedback both from the teachers and learners.



2. Kohls (2021) found that with hybrid pedagogy, which blends traditionally separate educational concepts (e.g. physical-digital, academic-non-academic, online-offline) the diversity of students and teachers can be considered. Hybrid learning spaces support this by offering flexible environments that enable students to work, interact, and learn in ways that fit their needs, both online and offline, on campus and off.

This is in line with Logan (2020) who states that round tables and flexible layout of Active Learning Classrooms (ALCs), designed for more flexible pedagogy, significantly enhance student-to-student and student-instructor interactions compared to traditional classrooms.

This is confirmed by Chen (2024) who found that active learning spaces strengthen teacher-student and student-student relationships, fostering informal communication, collaboration, and engagement more effectively than traditional classrooms.

Khamitova (2023) found that the need to enhance learning experiences has driven a shift towards more student-centered spaces. This evolution has shifted classrooms from static, teacher-centered spaces to dynamic environments that influence pedagogy. Therefore, the author introduces innovative learning spaces as flexible environments that integrate ICT, support diverse learning approaches, and promote active student engagement. These spaces are designed to motivate learners, encourage collaboration, provide personalized and inclusive experiences, and adapt to a variety of activities.

Borris (2021) Learning spaces must adapt to evolving needs, featuring flexible zones, diverse tools, and mobile, internet-connected devices. This shift challenges the traditional static classroom model towards a flexible learning space, enabling more dynamic and innovative environments.

Frelin (2021) found that in the design process of learning environments more attention has been paid to the user needs and, therefore, the design of classrooms and corridors are replaced by more flexible, complex, and multi-use learning spaces.

Berman (2024) mentioned that with the trend of ‘third places’ and commercial spheres that see students as consumers and creators rather than passive learners. This development has led to the introduction of the “Sticky Campus”, which aims to integrate study and recreation by providing spaces for relaxation, eating, socialising and study that, importantly, prioritise flexibility and variety.

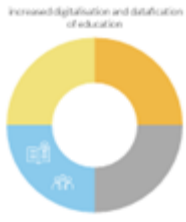
Organisational perspective

The organisational perspective focuses on aligning campus infrastructure with the strategic goals of the institution. This standpoint analyses how institutional visions are supported by stakeholders, including administrators, staff, students, and external partners. Their involvement reflects pedagogical and educational needs. In addition, this viewpoint evaluates decision-making frameworks in terms of operational efficiency of governance structures.

The (a) stimulation of collaboration and community, (b) facilitating network partnerships (c) and the support of innovation in education and research seems to be influenced by the trend of (1) digitalisation and datafication, (2) the increasing importance of cross-sectoral and interdisciplinary collaboration, (3) increased flexibilisation and personification of education, (4) increased importance of well-being, socialisation and inclusivity and (5) general pedagogical and educational trends, as shown in Table 1.



1. a/b) Sotiriou (2016) introduced a pan-European multilingual e-learning and community-orientated platform to foster the collaboration between teachers and improve the way educational content is produced, accessed and used.



Black (2006) found that due to technological development and social learning students can create learning environments anywhere at any time and sees especially libraries as a social and collaborative learning space.

This is in line with Peng (2013) who points to an example of new learning landscapes emerging in the UK due to the rapid growth of digital technologies and a corresponding paradigm shift in terms of libraries, that among other things, need to enhance the interpersonal interactions (social networking and group working). Thereby, an open participatory system approach has been identified as an appropriate approach to deal with the tensions arising from rising expectations of pervasive smart ICT provision in terms of innovative learning spaces in higher education.

As already mentioned in terms of the functional perspective, new technologies have led to the design of diverse learning spaces with the core of student-centered pedagogies, increased collaboration (Seal, 2015) and engagement between staff and students, and stronger connections with communities beyond the campus (Neary, 2011).

Sanchez (2022) found that learning labs can be seen as hybrid spaces that encompass different rooms designed to accommodate the activities and the community they aim to host as well as a digital space in the form of a digital platform allowing communication (webinars, meetings) and storing and dissemination of pedagogical resources. The digital space also encompasses social networks that enable the building of the community and foster the interaction between academic bodies from different departments to enable knowledge sharing and co-designing of educational resources

c) Leonard (2003) stated that collaborative tools that combine video with other internet technology can support teaching, research, and administration tasks.

Kohl (2021) stated that the internet has expanded learning spaces through virtual rooms, while augmented reality blends real and virtual environments, enhancing education. Digital media has transformed learning, with students collaborating via smartphones and social media, while teachers integrate interactive tools, like voting systems, videos and screencasts into flipped classrooms. Universities are increasingly designing spaces for self-directed learning, informal learning, and innovative teaching methods.

Khamitova (2023) confirms the findings that the digitalization of education is advancing technology-enhanced classrooms equipped with specialized software and hardware for enhancing teaching and learning. Technology-enhanced learning spaces vary by institution, each shaping its vision with extended reality, the metaverse, learning analytics and emerging innovations.

2. Björklund (2019) found that innovation now emerges through collaborative networks and interdisciplinary approaches. Universities, as innovation hubs, are uniquely positioned to generate and disseminate valuable knowledge beyond teaching and research.

Verhoef (2017) describes a successful implementation of a cross- and multi-disciplinary, faculty-overarching programmatic themes to realize a Green Village within the campus. Thereby, the process of co-creation (between scientist, real estate department, project architects, and external stakeholders) has been challenging but important in order to develop innovative campus projects.

Migliore (2024) highlights the trend of co-creation, noting that some universities are opening on-campus to external users by hosting coworking spaces for staff and outsiders and opening off-campus hubs in e.g. external coworking spaces. These spaces host different user groups (corporate employees, artists, entrepreneurs) and foster innovations, entrepreneurship among students and researchers while offering non-silent areas for teamwork. These off-campus hubs can create relationships with a territory where the university is not present.

Elia (2010) found that the creation of new areas of study developed by the collaboration of universities with corporations and other third parties. This will lead to a greater number of interdisciplinary offerings, an increase in partnerships between universities and corporations and Inter-university collaborations.

Neary (2011) found that the transformation of learning spaces is driven by student demands for collaborative, immersive experiences and academic staff needs for interdisciplinary research. This has led to the creation of flexible, interconnected spaces that support student-centered learning, collaboration, and connections with external communities.

Schmidt (2013) found that to meet political targets, educational institutions must emphasise three key aspects: equipping students with employable skills, fostering innovation, and promoting entrepreneurship. Achieving this requires stronger links between educational levels, interprofessional collaboration, and university-society connections. Hence, universities are strategically planning facilities that foster interaction across disciplines and transforming from mono-functional spaces into academic city areas which can be utilized by both public and private sectors to influence regional development. By creating new meeting spaces, such as learning landscapes and knowledge-hubs, they aim to overcome the physical separation of departments and professions.

Schmidt (2013) found that universities are transforming campuses from mono-functional spaces into academic city areas, promoting interaction, knowledge, and diverse learning experiences. This shift reflects a redefinition of their societal roles and physical presence in the community they serve, with strategic planning shaping their identity and purpose.

3. Gonzalez-Zamar (2020) found that design professionals prioritize flexibility and functionality to create open spaces that foster collaboration and personal connections. Classroom design—including building morphology, size, enclosures, and internal divisions—should ensure visual continuity and support active, participatory learning. Students perceive stronger group cohesion, task commitment, and cooperation when



seating is arranged in small groups with clear visibility of peers, enhancing interaction and group activities.

King (2015) found that flexible learning spaces were more likely to be used for collaboration. Thereby, egalitarian groups with an informal style favored "soft" areas, while formal groups used desks, and "soft" spaces encouraged creativity and balanced tasks.

Goodnight (2016) noted that libraries are evolving into collaborative spaces, but the need for quiet study areas remains. While students value flexible, service-integrated workspaces, the demand for quiet spaces continues to grow.

4. Kohl (2021) emphasized that learning media's potential for creative and collaborative learning remains underutilized. Student-centered learning environments should foster active participation in a "Community of Inquiry," where students critically engage, collaborate, and take ownership of their own learning. By contributing content, designing services, and enhancing digital platforms, students can shape an inclusive learning community without digital divide between different population groups.

As mentioned in the section before, Berman (2024) found that informal learning spaces foster social networks, provide support, and offer students a place to socialize, strengthening their connection to the broader academic community and therefore, suggest the sticky-campus concept.

5. As mentioned above, new learning spaces are related to the trend of active pedagogy Borris (2021) or student-centered pedagogies (Neary, 2011) which are focusing on the educational process on student needs and may lead to a new curriculum. Active, experience-based learning environments foster problem-solving, lifelong learning, and learning-to-learn skills, along with cooperative or collaborative activities between staff and students.

This can be confirmed by Seal (2015) who noted that pedagogical shifts have influenced the design of learning commons. While traditional lecture-based teaching persists, collaborative learning has grown significantly. Library commons now feature group study rooms, presentation practice spaces, and collaborative software, all designed to enhance group work and learning.

Physical Perspective

Sustainable and efficient use of physical space is a priority nowadays, therefore physical perspective considers the environmental and architectural elements of campus design. With this viewpoint, analysis focuses on sustainable initiatives integrated in campus planning, such as reduction of carbon footprint. It encompasses how available structures are preserved and how it is balanced with incorporating new infrastructure and innovative technologies.

The trends are rarely mentioned in relation to the physical perspective which shows a research gap and great potential for further studies.

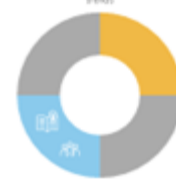
flexibilisation and personalisation
of education



Increased importance of well-being,
socialisation and inclusivity



general educational and pedagogical
trends



c. Trends and the learning environment

Applying a cross-sectional analysis to identify the trends and their implications for specific learning environments shows that libraries and regular classrooms were investigated in relation to the trends of increased digitalisation and datafication as well as the personalisation and flexibilisation of education, apart from general educational and pedagogical trends. Furthermore, hybrid virtual classrooms and active learning spaces were investigated in relation to the increased digitalisation and flexibilisation as well as the rise of online education. Looking at the location, it can be seen that the on campus location was more investigated than the off campus location. On campus locations were mostly investigated in terms of the growing importance of well-being, socialisation and inclusivity, followed by the increased digitalisation and flexibilisation as well as the rise of blended learning. In contrast, off-campus locations seem to be particularly important in the course of increasing importance of cross-sectional and interdisciplinary collaboration.

5. Conclusion

Most discussed trends in literature are dealing with the flexibilization and personalization of education (n=32), general educational (n=27), digitalisation of education (n=25) and pedagogical trends (n=23), which is in line with findings of Chapter B.2. Last frequently mentioned trends are population growth, diversity, aging and housing shortage (n=2), the increased importance of ethnical awareness and public values (n=3) as well as the readiness of the campus to implement changes (n=5). In this context of educational trends, the majority of the papers investigated learning environments on campus locations (n=17), regular classrooms (n=16), and libraries (n=12). Less investigated are exam rooms and event rooms/aulas (n=1), followed by laboratory (n=2), lecture hall and blended classrooms (n=3). Hence, this study shows further research potential, as these learning environments are either not affected by educational trends or seem to be overlooked by campus research

The frequency of mentioned campus perspectives shows that the focus of literature is on the functional and organisational perspectives. Within these perspectives, 15 articles see the trends in relation to user engagement, increased user satisfaction and stimulation of collaboration (n=18), support of innovations (n=17) and user activities (n=16). Contrary, barely investigated are the physical and financial perspectives, which is confirmed by the cross-section analysis (see Table 1) and therefore shows promises for further research towards campus management.

Furthermore, it is important to keep in mind that campus perspectives could be intertwined concerning some trends. For example, regarding the digitalisation of education, Kohl (2021) mentioned, from a functional perspective, the importance of hybrid learning spaces that serve a wide range of students and teachers on and off campus. From an organisational perspective Kohl (2021) states that digital learning can bridge the gap across diverse population groups, ensuring equitable access and participation in a unified learning community (see Chapter B. 2).

This study aims to investigate potential implications of learning environment' trends. Literature shows that it is important for universities to adapt their designs and construct innovative spaces with a focus on the activities and the classroom layout, and seating

arrangements reflected in the selected furniture (Khamitova, 2023). Since the activities are diversified and can change, the learning space should be designed for a range of different activities, featuring task-oriented zones fitted with flexible furniture and a variety of educational materials and tools (Borris, 2021). The Table below shows a list of potential approaches in relation to the trends found in literature.

Table 7.1: Summary of relevant learning environment approaches and their effects in relation to the trends (own elaboration).

Goal/trend	Implication/approach	Effect/perspective	Design	Source
Digitalisation Interdisciplinarity	Open Discovery Space (learning platform)	Stimulate, incubate uptake of e-learning practices		Sotiriou, 2016
Diversity Flexibility	Hybrid learning spaces	Support student activities, interaction		Kohl, 2021
Digitalisation Community	Technology-enhanced spaces	Create metaverse, support networking and interaction	Software and hardware	Khamitova, 2023
Community Productivity Satisfaction Flexible pedagogy	Active learning space	Support social interaction, group work, activities	Round tables Flexible layout	Khamitova, 2023 Logan, 2020
Community Productivity Satisfaction	Blended learning	Support social interaction, group work, activities	Round tables with chairs Semicircular seating	Khamitova, 2023
Productivity Satisfaction	New learning spaces	Support activities	Open space, task-oriented zones, flexible furniture, mobile digital devices	Borris, 2021
Flexibility Satisfaction	Non-traditional learning environments multi-use learning spaces	Support activities	Stakeholder involvement	Frelin, 2021
Societal impact Community Interdisciplinarity	Academic city areas	Social interaction, informal knowledge exchange		Schmidt, 2013
Well-being Community Flexibility	Sticky campus	Social informal interaction	Spaces for relaxation, eating, socialising, study)	Berman, 2024
Innovation	Learning labs	Support learning and teaching, innovation		Sanchez, 2022

6. Discussion

Over the past decade, there has been a substantial increase in research focused on physical learning spaces, encompassing a broad array of perspectives and themes (Leijon, 2024). This review study acknowledges the heterogeneity within this body of research, which extends beyond thematic diversity to include a variety of learning environments themselves. Table 1 illustrates the variety of new learning environments in the literature. This aligns with the systematic review of learning spaces conducted by Papaioannou et al. (2023), which highlights the development from traditional learning spaces to innovative learning spaces

within higher education. They emphasized the importance of the design of new learning spaces. Finkelstein et al. (2016) developed five principles for designing learning spaces in higher education. In summary, they claim that learning spaces must support students' engagement with content and incorporate technologies that facilitate a diverse range of teaching and learning that enable both individual and collaborative work. Learning spaces should also promote interaction between students and faculty within and beyond the classroom. Finally, learning spaces should align with the university's culture and priorities as delineated in the campus master plan and be adaptable for future needs (Finkelstein et al., 2016). However, thinking about the implementation, there is no one-size-fits-all solution that exists, as each organization has unique needs.

Therefore, it is recommended that higher education institutions should perform their own research. For example, the University of Utrecht conducted a review study (Fuchs et al., 2024) aimed at the design and layout of Active Learning Spaces (ALS') to optimize existing ALS' and inform the development of new ones. This study found three pivotal aspects that contribute to well-designed ALS': visibility, mobility and learning tools. For visibility, the arrangement of furniture and seating positions of students play a crucial role. Enhanced visibility of the teacher correlates with higher student engagement. Moreover, the freedom created by movable and flexible furniture is important to promote collaboration. Furthermore, learning tools such as whiteboards facilitate effective communication.

Although research is conducted to optimize learning spaces, the morphology of campus buildings, including their size, enclosures, floors and ceilings, as well as the internal division of the classrooms, needs to be taken into account. And these concrete aspects of a learning environment are hardly researched and should get more attention in future research. It is important that campus projects require strong leadership and alignment between teaching objectives and institutional strategies in order to be successful, typically facilitated through university committees and effective communication (Neary, 2011; den Heijer, 2011).

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B6 Real world implications – examples from universities and workshop

Thomas Vogl, Monique Arkesteijn, Julia Kudła, Alexandra den Heijer (2025)

Key takeaways

- **Learning spaces increasingly integrate multiple themes simultaneously.**
Most educational environments combine several approaches at once, with active learning, hybridity, and the “sticky campus” concept most prominent. Smart building approaches remain comparatively underdeveloped, suggesting a gap between technological potential and practical implementation.
- **Flexibility and skill development dominate current design goals.**
Across institutions, flexibility is the most consistently pursued objective, followed by skills development and student well-being. In contrast, organisational development, neighbourhood integration, and community creation receive limited attention, indicating uneven translation of broader institutional ambitions into spatial design.
- **Teaching and study spaces remain the primary focus of spatial interventions.**
The majority of initiatives concentrate on teaching spaces and study areas, with common spaces playing a secondary role. This reflects a continued prioritisation of core educational functions over informal, social, or civic-oriented campus spaces.
- **Design implications emphasise adaptability and digital support rather than fixed form.**
Movable furniture, open and wide layouts, and audiovisual resources are the most frequently cited design responses. These elements support rapid reconfiguration and hybrid use, reinforcing adaptability as a central spatial value.
- **Future campus strategies converge on flexibility under financial constraint.**
There is broad consensus that flexibility and student well-being will define future learning environments, alongside selective emphasis on interdisciplinarity, active learning, and sustainability. Financial pressures are accelerating the push toward more efficient space use, reduced spatial footprints, and the deployment of smart tools to optimise occupancy, maintenance, and affordability.

Themes: - Most learning spaces address different themes simultaneously. overall focus of the spaces lies in: - o Approaches: active learning (n = 15), hybridity (n = 9) and sticky campus (n = 9) approach. The least implemented approach is smart building (n = 4) - o Goal/trends: flexibility (n = 17), development of skills (n = 11) and increased student well-being (n = 10). The least implemented goals are development of the organization (n = 1), connection with neighborhood & surrounding area (n = 3) and the creation of community (n = 4) - o Type of space: Teaching (n = 20), study space (n = 18) and common space (n = 10) approach. - Most mentioned design implications: - o Movable furniture (n = 6) - o open and/wide space layout (n = 5) and - o AV resources (n = 4)	Future: - Main themes for the future: - o Consensus between all groups: ▪ flexibility (all groups) ▪ student well-being (two groups) ▪ interdisciplinarity (one group) ▪ active learning (one group) ▪ sustainability (one group) Financial constraints: • Financial constraints lead to the need for: - o more efficient use of space - o (or generally lower space requirements/space reduction) ▪ by e.g., implementing SMART tools to optimize space occupancy, supply and maintenance. - o Focus is increasingly on affordable projects dealing with flexibility of space/ functions and the student well-being
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1. Introduction

This chapter presents the outcomes of a workshop conducted with representatives from Dutch universities in Utrecht, focusing on trends in learning environments and the campus management. The purpose of the chapter is to identify best practices and share real-world examples that can inform decision-making and strategic planning in these domains. Drawing on the diverse perspectives and expertise of the participants, the findings highlight practical approaches, lessons learned, and innovative solutions relevant to the management and development of university campuses.

The former Chapter investigated the trends in learning environments by systematising the current scientific literature and showed relevant implications along the four campus management perspectives.

On the one hand, the study found significant research gaps regarding the physical perspective and underlined a great research potential towards it. On the other hand, the study identified various trends, particularly flexibilization, general educational trends and the digitalisation, that are impacting the functional, organizational and financial campus management perspectives.

However, the systematic literature analysis also revealed that practical implications remain scares. Therefore, the purpose of this Chapter is to identify best practices and real world examples through a workshop with representatives of Dutch universities focussing on campus management and development, real estate, facility management.

This Chapter is organised in four main sections. The introduction is followed by a summary of the identified trends (SURF, 2025; Chapter B.5) and the defined learning environments

and its characteristics (Chapter B.2). In the methodological approach section the organisation of the workshop and the data analysis is explained in detail. The third section discusses the findings and the final section summarizes the outcomes.

2. Analytical framework

a. Themes: trends, goals and approaches

As mentioned in Chapter B.5, several reports provide critical insights into changes and trends in learning environments (SURF, 2025; CampusNL, 2019 – 2023; EUA, 2024). Building on the foundation of the 17 themes of the SURF report (2025), which we categorized in further in three sub-groups, namely, approaches, goals and trends: (1) active learning, (2) community building, (3) digitalisation (technology), (4) diversity, (5) sustainability, (6) flexibility, (7) hybridity, (8) interdisciplinary collaboration, (9) development of skills, (10) development of the organisation, (11) SMART buildings, (12) Sticky campus, (13) student well-being, (14) development of talent, (15) connection/ network neighbourhood and local community, (16) connection/ network practise-theory, (17) connection/ network bedrijfsleven.

b. Learning environments: types of learning spaces and characteristics

As can be seen from Chapter B.5, the learning environment is defined as the broader context in which students engage with learning. This encompasses formal settings such as lectures and study places, as well as informal common spaces across the campus where learning continues beyond the classroom, which can be physical or virtual. In order to extract further information about the physical learning environment, we added the two sub-groups type of room, which includes (1) study place, (2) teaching, (3) common space, as well as room characteristics, including (4) descriptive characteristics (e.g. furniture, layout, colours) and (5) quantitative characteristics (SQM, amount of students).

3. The workshop

a. Objectives and attendance

As part of the Campus NL project, a workshop was held to discuss the findings of the literature review regarding the new learning environments and how they are implemented in the “real world”. The objectives of the workshop were to:

- Identify existing projects (since 2016) or project (buildings or renovations) that are planned to identify more concrete examples of new learning environments.
- Discuss most important theme to evaluate their applicability to university campus environments and identify concrete examples of how these are implemented
- Establish a consensus among participating Dutch universities regarding the prioritization of themes related to new learning environments. Utilizing three focus groups designed to group consensus.
- Discuss the future viability of the mentioned projects against the background of to the financial constraints. Establish a consensus among participating Dutch universities

On March 25th, a meeting was convened at the Utrecht University, extending invitation to all 14 Dutch universities. Notably, 18 real estate and a few other representatives from 11 out of 14 Dutch universities participated in the workshop, as depicted in Table 8.1.

Table 8.1: University workshop participants (source TUD for CampusNL 2025) (Source: own elaboration).

VU (2 persons)	UT (1 person)
UVA (1 person)	TUD (2 persons)
UU (2 persons)	RUG (1 person)
TiU (1 person)	WUR (1 person)
EUR (3 persons)	TUE (1 person)
RU (2 persons)	
Absent:	LEI LU MU Replaced by UM (1 person), OU (1 persons)

b. Workshop summary

All participants were present in person, congregated in a single lecture room, with no remote participation. The workshop was meticulously structured to address the delineated objectives. The preliminary phase entailed the moderation of the workshop along the guidelines to fulfil multiple pivotal objectives. These encompassed the introduction of the workshop with the objectives and purpose, rules, guiding questions and a review of the Campus NL project, with an emphasis on part B.

After welcoming the participants, Thomas Vogl, postdoctoral researcher at TU Delft, provided an summary overview of the context, objectives and the procedure of the workshop. Than the participants were distributed equally into three different groups with three moderators (Alexandra den Heijer, Professor Public Real Estate; Monique Arkesteijn, Associate Professor Corporate Real Estate; Thomas Vogl). Participants were then provided with a paper copy of the main questions with explanations, a list of projects which were already listed in the referred SURF report (2025), and the template of the table with themes to use as an aid for the remainder of the workshop. Further, each group was equipped with a flipchart, markers, sticky-notes and an A-2 poster of the table with all themes to support an interactive participation and to have an constant overview of the results.

The three groups delved into the questions, with teams randomly assigned to foster diverse discussions. The groups were guided by a template encouraging them to consider the “real world” campus projects of their universities with regard to the given themes, which are the most important themes and how are they going to be addressed in the future in the face of the financial constraints. The template covered the following four considerations:

- **“Real world” projects of each university linked to the defined themes:** As practical implications of emerging themes (see analytical framework, section B.6.2) and approaches in the learning environment remain scarce in literature, this workshop aimed to identify more real cases within the campus context besides the projects from the SURF report (2025). This data collection involved a thorough examination of which themes are addressed by which project and how they are addressed by these learning environments. Participants were encouraged to implement existing (post-2016) or

planned projects of their universities to the template, link them to the relevant themes and explain how they are addressing them. This process aimed to distil existing practices implemented by universities to tackle unique themes.

- **Relevance of unique themes for the future Campus management:** This evaluation involved a thorough examination of how each theme manifests in the different campus projects, considering future trends and unique needs of the universities. In their discussion, participants were encouraged to not only think about the most important themes for their campus management but also to consider which of all the learning environments identified addressing them best. On the one hand, this part of the discussion aimed to uncover the priorities of the universities and if they are in line or differ from one institution to another. On the other hand, the discussion should uncover the relationship between unique themes and practical implications, suggesting “best practices” of universities. Understanding these connections and identifying “real world” examples is crucial for deriving comprehensive practical advices and developing specific, realistic strategies for the future campus management.
- **Campus management and trends in the light of financial constraints:** In addressing the financial constraints, participants were tasked to discuss the challenges that goes along with the budget cuts, how they are going to deal with it and which of the themes will be prioritized.

Each question was allotted between 30 and 45 minutes for discussion, after which the moderators summarized their findings. Feedback and a short discussion within the wider group was permitted after each presentation. Participants were provided with a handout to facilitate the discussion and standardize the data collection. A contributing author served as facilitator in each group, aiding participants in articulating their ideas in written form, ensuring the progression of discussions, and addressing inquiries to promote comprehension. Generally, the facilitators not actively engaged in debates; however, they did employ literature-based insights when the situation demanded. Two of three workshops were conducted in Dutch, centered around three main open ended questions: identification of specific projects, most important themes and their design implications for future learning environments in the light of the Dutch government’s financial resource constraints and their impact on the campus management. After transcription, with adjustments for readability (Fuß and Karbach, 2014), moderators verified the transcripts for accuracy. An inductive thematic content analysis was then conducted to explore subjective experiences within objective contexts (Percy et al., 2015). Based on the workshop guidelines a coding scheme was developed comprising categories and subthemes related to the main questions (Braun and Clarke, 2006). A list of subthemes was created and cross-referenced for accuracy and simplicity. The research team eventually reached a consensus on these categorizations.

4. Workshop findings

a. General overview of the projects identified

A total of 22 new learning environments from 11 different universities, ranging in size from 30 to 1,000 square meters, were identified, as can be seen in Figure 8.1.



Figure 8.1: Overview of different Campus projects and their location in the Netherlands (source: own elaboration).

As can be seen in Table 8.2, most of the spaces identified address different themes simultaneously. In conclusion, the overall focusing of the spaces lies on the following themes:

- Approaches: active learning (n = 15), hybridity (n = 8) and sticky campus (n = 9) approach. The least implemented approach is smart building (n = 5)
- Goal/trends: flexibility (n = 19), development of skills (n = 13) and increased student well-being (n = 13). The least implemented goals are: development of the organization (n = 1), connection with neighbourhood & surrounding area (n = 3) and the creation of community (n = 3)
- Further, the participants were asked to pick and assign the most influential/important theme to their individual projects. Here, for a total of 11 projects the majority show a focus on: active learning (n = 4), flexibility, creation of community, development of talent (n = 2), student well-being, hybridity, smart building, connection and network/bedrijfsleven (n = 1)
- It needs to be mentioned that goals and effects were used interchangeable by the respondents. Hence, some respondents stated effects even if the reason for building the learning environment was not originally related to that goal. The crosses in brackets (x) show when it was more like an effect or is not yet put in place.

Table 8.2: Overview of projects identified and their addressed themes (source: own elaboration).

Themes	EUR		Uva	RUG		WUR	TilU		RU			TUE		TUD			UU			UT	VU	SUM
	Langeveld building	Makerspace	Anda Kerkhoven Centre (Onderwijs-gebouw)	UCG	Aurora	Marga Klompe	Deprez	Virtual classroom E. Ostrom	Flexible K.I. chair	RU sensoren	Innovative space matrix	Area 19	ECHO	Pulse	Teaching Lab	Anna Maria van Schurman	Uniek!	Diergeneeskunde	Carre 3	Cubicus (2026)	Creative technology	
Flexibility	x	x	x		x	x	x	x	x	x		x	x	x	x	x	x	x	x	x	x	19
Active learning		x	x	x		x	x		x		x	x	x	x	x	x		x			x	14
Student well-being	x	x			x			x					x	x	x	x	x	x	x	x	x	13
Development of skills		x	x	x	x						x		x	x	x		x	x		x	x	12
Sustainability	x	(x)			(x)	x		x		x			x	x	x	x	x	x				11
Diversity					x			x					x	x	x	x	x	x	x			9
Hybrid			x		x			x				x	x	x	x				x			8
Sticky campus	x		x	x	(x)								x	x	x				x	x		8
Development of talent		x		x	x						x		x	x	x						x	8
Digitalisation			x		(x)	x		x		x			x	x	x							8
Creation of community		x					x									x	x	x	x	x		7
Connection/ network practise-theorie		x	x	x		x					x				x						x	6
Connection/ network bedrijven	x	x	x	x			x				x				x							6
Interdisciplinarity		x	x	x				x	x				x	x								6
Smart buildings					(x)					x			x	x			x					5
Connection/ network neighborhood			x										x	x					x	x		3
Development of the organisation	x																					1

In comparison, the 14 learning environments investigated in the SURF report (2025) shows a focus on:

- Approaches: active learning (n = 5), hybridity and sticky campus (n = 3) and smart building as least mentioned (n = 1).
- Goals/trends: development of skills (n = 9), interdisciplinarity (n = 8) and the connection between practise-theory (n = 7). Sustainability (n = 2) and diversity (n = 3) are the least mentioned goals.

If the 14 campus projects of the SURF report (2025) are added to the results of the workshop, the overall focusing of the spaces is as follows:

- Approaches: active learning (n = 20), hybridity (n = 12) and sticky campus (n = 12) approach. The least implemented approach is smart building (n = 5)
- Goal/trends: flexibility (n = 21), development of skills (n = 20) and increased student well-being (n = 16). The least implemented goals are: development of the organization (n = 5), connection with neighbourhood & surrounding area (n = 7) and diversity (n = 9)

Looking at the characteristics of the identified learning environments (see Table 8.3), most of the spaces identified address different room types simultaneously. In conclusion, the overall focusing of the spaces lies on the following themes:

- Type of space: Teaching (n = 20), study space (n = 18) and common space (n = 11) approach.
- Design: Movable furniture (n = 10), AV resources (n = 8) and open and\wide space layout (n = 6).
- The mentioned spaces can host on average up to 157 persons and have an average area of 3002 sqm

Table 8.3: Overview of projects identified and their design features (source: own elaboration).

	EUR	UvA	RUG		WUR	TIU		RU			TUE		TUO			UU		UT	VU	SUM	
Characteristics	Langeveld building	Maker-space	Anda Kerkhofen Centre (Onderwijsgebouw)	UCG	Aurora	Marga Klumpe	Deprez	Virtual classroom E. Oostrom	Flexible K.L. chair	RU sensoren	Innovative space matrix	Area 19	ECHO	Pulse	Teaching lab	Anna Maria van Schuurman	Uniek!	Designstudio-kunde	Care 3	Calculus (2026)	Creative technology
Teaching	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x			x
Study place	x		x	x	x		x		x		x	x	x	x	x	x		x	x	x	x
Common space	x	x	x		x		x						x	x	x				x	x	x
Movable furniture	x				(x)	x	x		x				x			x		x		x	x
AV resources					x	x		x		x						x		x			x
Layout			Open space		Ample room	Wide less depth	Lounge area, study area												x		
Green (flora)	x				x											x		x			
Gender neutral bathrooms					x											x		x			x
Movable walls	x	x			x																
Machines, robotics, workbenches		x																x			Elsewhere
Color							x												x		
3-D printer		x																			Elsewhere
Detachable screens & cheat screens						x															
Persons	40	n.a.	2000	n.a.	2500	n.a.	n.a.	12	n.a.	60	n.a.	600	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	200	150	40
SQM	7700	100	12000	4800	17500	n.a.	n.a.	30	42	n.a.	n.a.	n.a.	10150	4800	n.a.	n.a.	n.a.	n.a.	950	750	100

b. Workshop discussion and findings

After the identification of specific projects, participants of all three groups were asked to discuss the future campus management in the light of the Dutch government's financial resource constraints. In this context, one participant of Group three stated the following statement;

"I think the projects that we've listed are not specifically an example of something that you do if you have financial limitations" (Group 3)

Therefore, follow-up questions were designed to figure out the most important themes in the light of the financial constraints, what are their design characteristics and what will be the effect on the campus management.

Rising themes in the light of the financial challenges

During the workshop, participants were asked to discuss which themes are the most important in the future in the light of the financial resource constraints. It was evident that all groups experienced difficulty in selecting a single aspect, with many citing the necessity of a multifaceted educational space that incorporates the interaction of a physical environment, the individuals involved, and the activities undertaken.

However, as a result, there is a consensus between all groups that flexibility will continue define the campus of the future. Apart from that, the trends/themes influencing the new learning environments of the future vary among the groups:

- (1) Group: student well-being and active learning/interdisciplinarity
- (2) Group: hybridity and active learning
- (3) Group: sustainability and student well-being/ creation of community

Important themes and potential design implications

As the availability of information regarding concrete designs are scarce (see Chapter B.5), the participants were asked about the most important trends and corresponding design features.

Flexibility can be created through all kinds of ways to customize the space and use it in different ways for different functions. In this context the participants mentioned, movable walls and furniture, monitors in the corridors to see the availability of space and make them usable for students.

Regarding *student well-being*, participants stated that for this purpose they create interactive living room like atmospheres with a lot of greenery and wood which can be equipped with coffee machines that are free for students and employees.

"(...) to just make it a beautiful place where people want to be at the turn." (Group 1)

Furthermore, they emphasise the importance of daylight and a pleasant view to the outside. Hence, this influences the choice of location of e.g. lecture halls and make them positioned on the façade and not closed in the inside of the building as in the past. Regarding the furniture, lecture halls should be equipped with office chairs that are not just flexible but also comfortable and fulfil ergonomic standards.

Sticky campus approach goes hand in hand with an increased student well-being and should increase the duration of stay of students on campus. In this context, participants mentioned

an open public space with some restrictive areas but also integrated commercial entities such as cafeterias which are mainly run by external parties and have extended opening hours.

Regarding *active learning*, the participations mentioned that the design should facilitate cooperation by the creation of multiple spots. This can be supported by flexible (rotatable) furniture, u-shape settings, attention wall (wall with a screen in a central location).

As mentioned by a participant of Group one, blended learning - where the lecturer is positioned in the centre and not in the front of the audience- shows similar features as active learning.

“What we see in active learning are a few of the ingredients that we also see in blended learning.” (Group 1)

Besides flexible furniture, that allow the students to split up in groups, the participants mentioned in this context an open space layout and emphasized the importance of flexible screens and the latest AV technology to facilitate the link between rooms and to be able to record things easily by default. Unlike active learning facilities, blended learning classrooms should have screens on all sides of the room and, consequently, no attention wall.

Similar to blended learning and active learning, also hybridity shows similar design characteristics than flexibility. Hybrid classrooms are also defined by multifunctionality which can be created by flexible furniture and easily movable walls to make the spaces splittable or linkable to adjust their size in correspondence to the group size. In contrast to active and blended learning settings, one group stated that hybrid classrooms have screens in the back of the room. This allows the teacher to observe the students. As hybrid classrooms are also located in large lecture halls, they can be visually separated via plateaus to support group work.

With regard to sustainability, beside the use of greenery and wood, the participants also mentioned natural ventilation and trees around which the lecture halls will be organised.

Nevertheless, the participants asserted that, in addition to the campus management's complexity due to financial limitations, a comprehensive transformation is imperative. This assertion is further substantiated by the following quotation.

“(...) It's not just about flexibility. We need to change things so that it remains affordable, sustainable and attractive for students.” (Group 2)

Affects and opportunities to address the financial challenges

Furthermore, participants emphasized that financial constraints lead to the need for a more efficient use of space. Hereby, the workshop discussions yielded several key strategies and considerations for addressing those changes. Participants stated the following aspects:

(1) Group: General reduction of (unused) space

The participants reported that they have already started to close buildings and reduce the area for educational spaces. However, it is evident that the campus managers are committed to two primary objectives. Firstly, they are dedicated to identifying opportunities for optimising spatial efficiency. Secondly, they are committed to enhancing the variety and quality of the existing facilities, as it has been determined that the most beneficial and economical measure to take would be to alter the design.

“We have kind of less but better as an unofficial slogan. So fewer square meters for more quality. (...) we will continue to carry out projects (...) but we will reduce our real estate area in the meantime.”

However, it was also emphasized that behavioural and cultural changes are crucial for the successful implementation of measures. Furthermore, alternative funding possibilities of projects via third-party cooperations, additional income through disposer or subleasing of spaces were also mentioned.

- (2) Group: Implementation of (more efficient) space assessments (e.g. SMART tools) to optimise space occupancy, supply and maintenance

The participants of the second group confirmed the findings of the first group by reaching the same consensus that the reduction of space (before cutting staff) and the enhancement of space and management efficiency are imperative. In this context, they identified digitalisation in education but also in terms of the campus management as a particularly promising avenue for advancement. Furthermore, it was posited by the participants that enhancing cost transparency, in the sense of presenting real-time costs of a place of work or study, could constitute an effective measure to raise users' awareness of the costs incurred.

“I think you also have to confront people with how much something costs and then let them choose...”

Major points of resistance include to give up fixed offices, adopt desk sharing and flexible space arrangements. The implementation of mini libraries in the communal hallway was identified as a specific measure to be employed in order to reduce the amount of books and create space in offices for more people. Further, the participants were discussing the feasibility of the quality criteria for scheduling (for education and exams) and potential economy measures that goes along with the student centricity. Here, it was determined that young full-time students have a surplus of options, which may result in e.g. delays of standard study period and programme changes and, therefore, cause logistical implications. Conversely, working students or employees who study were observed to lack sufficient flexibility, which may be a contributing factor to attrition and result in financial implications for the university. As a result, restriction but improvement of choices in the curriculum (e.g. avoid double scheduling of electives) are expected to result in a corresponding lower logistical effort, increase of capacities, greater planning reliability and, ultimately, a reduction in the demand for space. Hence, the group stated that the focus should shift from a more student-centric demand driven perspective to a supply-driven management approach. It was also emphasised by the group that a common understanding and shared goals across all faculties (and their directors in particular) are crucial for the successful implementation of these measures.

- (3) Group: Increased flexibility of spaces to enhance the hybridity between different functions (e.g. between teaching, study and office spaces)

It was also posited by the participants of the third group that the space should be utilised in a more efficient manner. It was perceived by the participants that the flexibility between offices and education, as well as the hybridity of functions, were solutions for increasing space efficiency.

“Because flexibility implies sort of efficiency. If you can use a space for multiple purposes, you can use it in a more efficient way.”

Besides, it was posited by participants that, whilst the efficacy of university marketing in the short term may be questionable, its long-term value is significant in ensuring a growing demand from students, thereby generating increased financial resources. In terms of cost efficiency, participants are in line with findings from group two by proposing a reduction in available options for students as a cost-saving measure. This would serve two purposes: firstly, it would reduce (space, labour and time) capacities; and secondly, it would encourage students to graduate within the standard period of study. Furthermore, the group reached consensus regarding the necessity of an integrated approach that makes the integration of measures possible and balances between the affordability, student well-being and feasibility. Group three corroborates the necessity for a shared comprehension and underscores the significance of aligning all perspectives for the effective execution of the measures.

To conclude, with regard to the financial constraints, the focus of future learning environments will be on affordable projects dealing with flexibility of space, hybridity of functions and the student well-being. Further, the participants mentioned potential for improvement with regard to student options for electives and the associated scheduling and occupancy rates. A common understanding and awareness about the changes seem to be also essential for implementing measures successfully. In addressing the challenges that go along with the financial constraints, some participants also highlighted that the budget cuts can also be seen as a chance to optimize their portfolio, the space utilisation and internal processes and to increase the awareness for costs.

5. Conclusion

This Chapter aims to identify real case projects and fill the research gap regarding practical implications of the trends discussed in the previous chapters. Further objectives was to discuss potential implications of the financial constraints of the Dutch governments for the campus management.

Most addressed approaches of the identified real case projects are: active learning (n = 15), hybridity (n = 8) and sticky campus (n = 9) approach and the most addressed goals are flexibility (n = 19), development of skills (n = 13) and increased student well-being (n = 13). These findings are in line with those reported in the international literature study (see Chapter 5), which identifies flexibilization as the most discussed trend besides the personalisation of education.

Similar to the findings in literature (see Chapter B.5), the practical design implications and their links to the themes remain unclear and are predominantly related to movable furniture and walls. This pattern became particularly evident when organizing the findings from Tables 1 and 2 according to the identified approaches and categorizing the projects as either (1) single-approach or (2) multiple-approach. Comparing the frequencies with which individual goals, trends, or design features were mentioned within projects of the same approach revealed that groups with more projects exhibited greater diversity in results. Consequently, there appears to be no clear differentiation between the approaches - neither in the themes they address nor in their layout factors, as shown in Table 8.4

Table 8.4: Overview of identified projects based on their goals/trends, breakdown in approaches (source: own elaboration).

Learning environments	Single Approaches					Multi Approaches				
	Active Learning	Hybrid Learning Environment	Sticky Campus	SMART Building		Active Learning & Hybrid Learning Environment	Active Learning & Sticky Campus	Hybrid Learning Environment & Sticky Campus	Active Learning & Hybrid Learning Environment & Sticky Campus	Active Learning & Hybrid Learning Environment & Smart Building
Goals/Trends	- Marga Hompes (TUU) - Depaze (TUU) - Innovative Matrix Space (TUE) - Diegenes-kunde (UU) - Anna Maria van Schuren (UU) - Creative technology (VU) - Flooble CL Chair (Ru) - Makerspace (bwn)	- Aurora (WUR) - Virtual classroom E. Côté (Ru)	- Langeveld building (EUR) - Cubus (UT)	- RU Kennen (RU) - Onleif (UU)		- Anas 7 (TUE) - Teaching Lab (TUO)	- UCC (RUG)	- Carre 3 (UT)	- Ada Karthoven Centre (RUG)	- ECHO (TUO) - Puke (TUO)
	Flexibility	Development of skills	Student well-being	Development of talent	Digitalization	Sustainability	Connection/network practice-theory	Connection/network practice-theory	Interdisciplinarity	Diversity
	Creation of community	Connection/network neighborhood	Development of the organization							
	Layout	Teaching, Study & Common Space	Teaching, Study & Common Space	Teaching, Study & Common Space	Teaching, Study & Common Space	Teaching & Study Space	Study & Common Space	Teaching, Study & Common Space	Teaching, Study & Common Space	Teaching, Study & Common Space
	Maximum occupancy (average of projects)	40	1256	95	60	n.a.	200	2000	n.a.	n.a.
	Size in sqm (average of projects)	71	8745	4225	n.a.	4800	950	12000	7525	7525
	Degree of alignment	highest								lowest
	Layout	Movable furniture Movable walls Visible depth Lounge area Study area	Movable furniture Movable room Movable walls Movable walls Gender neutral bathrooms	Movable furniture Movable walls Movable walls Floor Gender neutral bathrooms	Movable furniture AV resources Floor Gender neutral bathrooms	Teaching, Study & Common Space Movable furniture AV resources Floor Gender neutral bathrooms	Teaching & Study Space Movable furniture AV resources Floor Gender neutral bathrooms	Study & Common Space Lounge Colour Lounge	Teaching, Study & Common Space Open space	Teaching, Study & Common Space Movable furniture AV resources Floor Gender neutral bathrooms

Note: color coding alignment (x) between projects: green ($x > 66\%$); yellow ($65\% < x < 33\%$); red ($x < 33\%$); n.d. (not determined, no comparable project data)

However, the workshop found that this could be due to the interrelations between those themes and that they are addressed not only by the physical space design but also by the people and the teaching function. Hence, a holistic integrated design approach is required.

The future of the Dutch universities are in line with findings from literature and confirm that universities need to adapt their designs and construct innovative spaces with a focus on flexibility. Since the activities are diversified and can change, the learning space should be designed for a range of different activities.

The Figure below shows a selection of different Campus projects on a timeline.

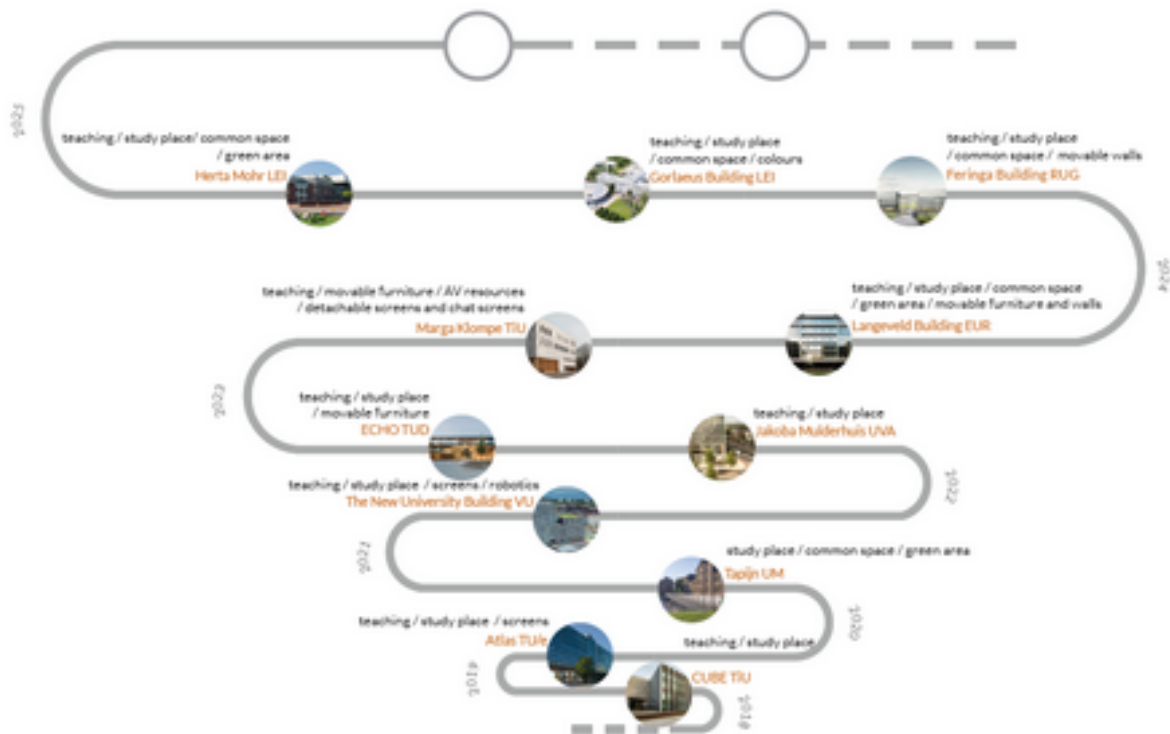


Figure 8.2: Overview of Campus projects on a timeline (source: own elaboration).

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- SURF report (2025), <https://www.surf.nl/files/2025-09/futurecampus-report-14-dutch-campus-innovations-1.pdf>

Picture credits

Project / Building	Credit / URL
Herta Mohr Building	https://www.archdaily.com/1022489/herta-mohr-building-leiden-university-renovation-de-zwarte-hond
Feringa Building	https://www.archdaily.com/project/feringa-building-university-groningen
Langeveld Building	https://pauwertier.nl/en/projects/langeveld-erasmus-university-rotterdam
Maas Kloeppel Building	https://www.powerhouse-company.com/maas-kloeppel-building
ECHO Building	https://www.unstudio.com/projects/echo
Jakob Mulderhuis	https://marcohele.com/project/campus-hva/
New University Building	https://www.livabout.com/about/new-university-building
Tapijn Campus	https://www.liag.nl/project/tapijn-maastricht
Atlas Building	https://www.vanvoorst.nl/project/maas-building-tue/
Gorlaeus Building	https://www.sweco.nl/portfolio/het-gorlaeus-gebouw/
CUBE Building	https://www.tilburguniversity.edu/contact/campus-map-and-buildings/history-cube
Pulse Building	https://www.tudelftcampus.nl/project/pulse/
Makerspace	https://www.linkedin.com/posts/u-makerspace-u-makerspace-technasium-week-agroactivity-7271865515541729281
Unmanned Desktop	https://www.coasart.com/blog/ACoADA%20VR%20Q&A%20unmanned%20desktop
Ernie Schurman Organisation	https://www.erwinunkel.com/project/ernie-schurman
Anna Maria van Schurman Building	https://www.uu.nl/huisvesting/het-anna-maria-van-schurmangebouw-rijke-vorm
Diergeneeskunde	https://duba.nl/onderwijs/nieuwe-diergeneeskunde-stormverzekering
Innovation Space Matrix	https://educationguide.tue.nl/programs/innovation-space
AKC	https://www.gsm.nl/en/architects/projects/erasmus-mc-324
CARE	https://www.utoday.nl/news/88589/nieuwe-thuishaven-in-carré
Cubicus	https://intranet.com/cubicus-universiteit-twente

B7 Effectieve “Active Blended” Leeromgevingen – lessen uit de literatuur

This chapter is only available in Dutch

Tazelaar, J. M. (2025). *Creating Effective Learning Environments: The Power of Stakeholder Involvement*, TU Delft Repository.

<https://resolver.tudelft.nl/uuid:226624b7-2839-450b-aec7-53bd442fb8e5>

Supervised by Monique Arkesteijn & Vitalija Danivska

Key takeaways

ENGLISH:

- **Effective learning environments are multidimensional systems, not just physical spaces.**
Learning environments are shaped by the interaction of physical, social, and psychological factors. Their effectiveness depends on how well they support personal development, social interaction, and organisational adaptability rather than on spatial form alone.
- **Active blended learning environments best align with contemporary educational trends.**
Among physical learning environments, active blended learning spaces most effectively respond to the rise of hybrid education, flexibilisation, and digitalisation. They integrate face-to-face interaction with digital tools while maintaining a strong physical learning setting.
- **Flexibility and adaptability are central to learning space effectiveness.**
Effective environments support variation in teaching methods, learning pace, group size, and spatial configuration. Modular layouts, lightweight and movable furniture, and reconfigurable seating arrangements enable rapid adjustment to diverse educational needs.
- **Connectedness is a core design principle for effective learning.**
Literature identifies visibility, mobility, and access to learning tools as the three key drivers of connectedness. Together, they enhance interaction, engagement, collaboration, and student-centred learning outcomes within active blended environments.
- **Technology must be spatially integrated, not merely added.**
Digitalisation and datafication require physical learning environments to be intentionally designed to support digital tools. Effective spaces seamlessly integrate analogue and digital resources, enabling hybrid functionality without undermining inclusion, well-being, or social interaction.

NEDERLANDS:

- **Effectieve leeromgevingen zijn meerlagige systemen en geen louter fysieke ruimtes.**

Leeromgevingen worden gevormd door de wisselwerking tussen fysieke, sociale en psychologische factoren. Hun effectiviteit hangt af van de mate waarin zij persoonlijke ontwikkeling, sociale interactie en organisatorische aanpasbaarheid ondersteunen.

- **Actieve blended leeromgevingen sluiten het best aan bij hedendaagse onderwijsontwikkelingen.**

Binnen fysieke leeromgevingen bieden actieve blended leeromgevingen de meest robuuste respons op hybride onderwijs, flexibilisering en digitalisering. Zij combineren face-to-face interactie met digitale middelen binnen een betekenisvolle fysieke context.

- **Flexibiliteit en aanpasbaarheid zijn kernvoorwaarden voor effectiviteit.**

Effectieve leeromgevingen maken variatie mogelijk in didactiek, leertempo, groepsgrootte en ruimtelijke configuratie. Modulaire indelingen, licht en verplaatsbaar meubilair en flexibele zitopstellingen maken deze aanpasbaarheid mogelijk.

- **Verbondenheid vormt het centrale ontwerpprincipe van effectieve leeromgevingen.**

Zichtbaarheid, mobiliteit en de beschikbaarheid van leermiddelen zijn de drie belangrijkste bouwstenen van verbondenheid. Samen bevorderen zij interactie, betrokkenheid, samenwerking en studentgericht leren.

- **Digitalisering vraagt om geïntegreerd ruimtelijk ontwerp, niet om add-ons.**

De toenemende digitalisering en dataficering vereisen leeromgevingen die vanaf de ontwerpfase digitale en analoge middelen combineren. Effectieve ruimtes ondersteunen hybride onderwijs zonder inclusie, welzijn of sociale interactie te ondermijnen.

Effectieve Leeromgevingen

Om een beter begrip te krijgen van wat leeromgevingen zijn en wat ze effectief maakt, zal het concept eerst worden gedefinieerd. Vervolgens wordt bestaande literatuur onderzocht om belangrijke trends binnen het kader van effectieve leeromgevingen te identificeren. Deze aanpak biedt een uitgebreid overzicht van essentiële kenmerken en opkomende ontwikkelingen die bijdragen aan het creëren van effectieve leeromgevingen.

Definitie van leeromgevingen

Een leeromgeving kan worden gedefinieerd als de fysieke, sociale en psychologische setting waarin leren plaatsvindt, en waarin ervaringen en verwachtingen gezamenlijk worden gecreëerd door de deelnemers (Rusticus et al., 2023). Leeromgevingen kunnen veel verschillende vormen aannemen en zijn niet beperkt tot scholen of universiteiten; elke context waarin leren plaatsvindt kwalificeert als leeromgeving (Moos, 1984; Rusticus et al., 2023). Deze omgevingen zijn niet gebonden aan één enkel format. Waar traditionele leeromgevingen bestaan uit fysieke ruimtes waar interactie tussen studenten en docenten plaatsvindt, is er een duidelijke verschuiving zichtbaar richting online leeromgevingen. Daarnaast zijn er hybride modellen ontstaan die fysieke en digitale componenten combineren, waarbij technologie een steeds centralere rol speelt in het faciliteren van leerervaringen (den Heijer et al., 2016; Lo & Hew, 2020). Een van de eerste onderzoekers die leeromgevingen bestudeerde – en tot op de dag van vandaag vaak wordt geciteerd – is Moos (1984). Ongeacht de specifieke vorm van de leeromgeving, karakteriseert hij deze aan de hand van drie kernaspecten: 1.) Persoonlijke ontwikkeling of doelgerichtheid, 2.) Relaties en 3.) Systeemonderhoud en verandering.

De eerste dimensie, persoonlijke ontwikkeling of doelgerichtheid, weerspiegelt het potentieel van de omgeving om persoonlijke groei te stimuleren, emotioneel welzijn te ondersteunen en bij te dragen aan de ontwikkeling van zelfvertrouwen. Dit omvat het motiveren van lerenden door middel van duidelijke doelen, het aanmoedigen van persoonlijke prestaties en het creëren van een emotioneel ondersteunende sfeer.

De tweede dimensie betreft relaties en benadrukt de aard en kwaliteit van sociale interacties binnen de omgeving. Deze dimensie richt zich op de mate waarin individuen met elkaar in contact komen, ondersteunende banden vormen en samenwerken aan gemeenschappelijke doelen. Leeromgevingen spelen een cruciale rol in het faciliteren van deze interacties door mogelijkheden te creëren voor samenwerking, dialoog en wederzijdse ondersteuning, wat uiteindelijk de algehele leerervaring versterkt.

De derde dimensie is systeemonderhoud en verandering, wat verwijst naar hoe goed de leeromgeving is georganiseerd, duidelijk is en openstaat voor verbetering. Dit omvat zowel organisatorische als fysieke aspecten en zorgt ervoor dat de leeromgeving gestructureerd is, maar ook aanpasbaar blijft aan nieuwe ontwikkelingen of uitdagingen (Moos, 1984).

Dit onderzoek richt zich op leeromgevingen binnen universiteiten, met specifieke aandacht voor omgevingen met een fysieke component. Voor dit onderzoek wordt een leeromgeving gedefinieerd als een fysieke setting binnen een universiteit waarin leren plaatsvindt, en waarin ervaringen en verwachtingen gezamenlijk worden gecreëerd door de deelnemers. Deze definitie en scope worden consistent gehanteerd in de rest van dit onderzoek.

Trends in Leeromgevingen binnen het Nederlands Universtair Vastgoed

Om inzicht te krijgen in de verschillende typen leeromgevingen en de vraag naar bepaalde soorten, is het belangrijk om de trends te begrijpen die universiteiten in de komende jaren zullen beïnvloeden. Een organisatie die hier veel onderzoek naar heeft gedaan is SURF, de ICT-coöperatie voor onderwijs en onderzoek in Nederland, bestaande uit meer dan 100 onderwijs- en onderzoeksinstituten. SURF heeft een rapport gepubliceerd, gebaseerd op onderzoek door experts vanuit diverse perspectieven, waarin dertien trends worden beschreven die in 2040 invloed zullen hebben op het hoger onderwijs, zowel fysiek als virtueel (SURF, 2023). Deze trends worden weergegeven in Figuur 9.1.D

- 
- 1 Rise of blended, hybrid, and online education
 - 2 Growing emphasis on lifelong learning
 - 3 Extensive flexibilisation and personalisation of education
 - 4 Increasing importance of well-being, socialisation, and inclusivity
 - 5 Smarter buildings and improved infrastructure
 - 6 Growing importance and focus on sustainability and green campus initiatives
 - 7 Extensive digitisation and datafication of education and the learning/work environment
 - 8 Increasing importance of ethical awareness and safeguarding public values regarding technology use in education
 - 9 Changing role of the teacher and his skills
 - 10 Low change readiness of educational organisations
 - 11 Increasing cross-sectoral and/or interdisciplinary collaboration
 - 12 Stronger internationalisation and globalisation
 - 13 Flattening population growth, increasing diversity, and aging

Figuur 9.1: Dertien trends die impact gaan hebben op de campus van de toekomst (SURF, 2023)

Al deze dertien trends zullen invloed hebben op hoe campussen er in de toekomst uitzien. Van deze dertien trends hebben er echter drie een directe invloed op de inrichting van leeromgevingen, namelijk trend 1: de opkomst van blended, hybride en online onderwijs; trend 3: verregaande flexibilisering en personalisering van onderwijs; en trend 7: verregaande digitalisering en dataficatie van de leer-/werkomgeving.

De reden dat specifiek deze drie trends worden uitgelicht en niet de overige tien, is omdat de andere trends geen directe invloed hebben op het fysieke ontwerp van leeromgevingen. Zij richten zich voornamelijk op de organisatie van de universiteit, zoals structuur, gemeenschap en ethiek. Hoewel deze trends indirect invloed kunnen hebben op het ontwerp van leeromgevingen, zijn het deze drie trends die rechtstreeks verband houden met de veranderende inrichting van het onderwijssysteem en daarmee met de werking van leeromgevingen. Daarom is het essentieel om ons op deze drie trends te richten en dieper in te gaan op hun implicaties voor de ontwikkeling van toekomstige leeromgevingen.

Trend 1: De opkomst van blended, hybride en online onderwijs

Door significante vooruitgang in digitalisering worden nieuwe vormen van onderwijs steeds beter mogelijk. Deze zijn niet langer beperkt tot fysieke klaslokalen, maar worden ondersteund door digitale methoden. De COVID-19-pandemie heeft hierin een grote katalyserende rol gespeeld, door de massale overstap naar online onderwijs in die periode (SURF, 2023). Leeromgevingen zijn daardoor niet langer beperkt tot fysieke ruimtes (Wong & Looi, 2011). Deze nieuwe vormen van onderwijs vereisen passende, innovatieve leeromgevingen. Er worden vier hoofdtypen leeromgevingen onderscheiden: Fysieke leeromgevingen, Blended leeromgevingen, Hybride leeromgevingen en Online leeromgevingen.

Fysieke leeromgeving

Fysieke leeromgevingen verwijzen vaak naar traditionele klaslokalen of leerplekken die zijn ontworpen voor face-to-face interactie. Deze ruimtes zijn meestal ingericht met vaste zitplaatsen en een gecentraliseerde, docentgerichte indeling, waarbij kennisoverdracht van docent naar student centraal staat (Khamitova, 2023).

Fysieke leeromgevingen richten zich op formele interacties tussen docenten en studenten, wat vaak de mogelijkheden voor actieve, samenwerkende of studentgerichte leerprocessen beperkt (Bozkurt, 2022; Khamitova, 2023). Door de toename van digitalisering en de vraag naar flexibeler onderwijs worden deze traditionele omgevingen steeds vaker als minder effectief beschouwd. Ze missen de flexibiliteit om zich aan te passen aan diverse leerbehoeften en opkomende onderwijsvormen zoals blended of actief leren. Daardoor is er een groeiende verschuiving naar leeromgevingen die beter aansluiten bij moderne onderwijspraktijken (Bozkurt, 2022; Khamitova, 2023; SURF, 2023).

(Actieve) Blended leeromgeving

Blended learning is een onderwijsvorm die traditionele klassikale sessies combineert met online leermaterialen (Gil et al., 2022). Het brengt face-to-face en online activiteiten samen, waarbij beide leerwijzen elkaar versterken. Deze aanpak maakt synchroon en asynchroon leren mogelijk over fysieke en digitale platforms heen (SURF, 2023).

Een belangrijk voordeel van blended learning is de flexibiliteit: studenten kunnen leren waar en wanneer ze willen, en de beperkingen van zowel fysiek als online onderwijs worden verminderd (Krismadinata et al., 2020). Deze flexibiliteit komt tot uiting in variaties in tijd, plaats, leerpad en tempo, wat zorgt voor een gebalanceerde en effectieve leerervaring (Bozkurt, 2022). Blended learning sluit ook goed aan bij studentgerichte, actieve leermethoden, wat leidt tot betere leeruitkomsten en een efficiënte inzet van docenten (Krismadinata et al., 2020). Daarom wordt vaak gesproken over *actieve blended leeromgevingen*, om niet alleen de integratie van digitale tools te benadrukken, maar ook de actieve betrokkenheid en personalisering van het leerproces (Talbert & Mor-Aviv, 2019).

Actieve blended leeromgevingen combineren digitale technologieën met traditionele leerruimtes om een flexibele en interactieve leeromgeving te creëren. Zulke ruimtes bevatten meestal aanpasbaar meubilair, snel internet en toegang tot digitale leerplatforms (SURF, 2023). Het primaire doel is om een soepele overgang tussen online en offline leren mogelijk te maken, waarbij de voordelen van beide vormen maximaal worden benut. Flexibiliteit staat hierbij centraal, zodat zowel studenten als docenten het meeste kunnen halen uit blended learning (Khamitova, 2023).

Hybride leeromgeving

Hybride onderwijs heeft sinds de COVID-19-pandemie een enorme groei doorgemaakt (SURF, 2023). Bij hybride onderwijs volgen sommige studenten de lessen online, terwijl anderen tegelijkertijd fysiek aanwezig zijn. Het is dus een combinatie van synchroon online en fysiek onderwijs. Hybride onderwijs maakt het mogelijk om onderwijs toegankelijker en flexibeler te maken, omdat het vanaf elke locatie gevolgd kan worden (Gil et al., 2022; SURF, 2023).

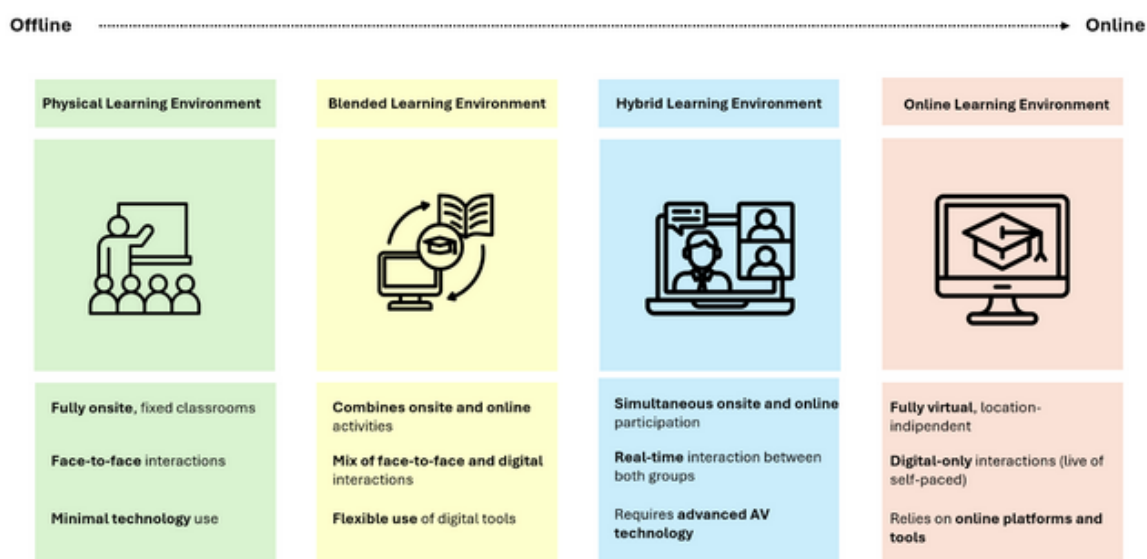
Hybride onderwijs vraagt om hybride leeromgevingen. Deze omgevingen integreren digitale elementen in niet-digitale leeromgevingen (Gil et al., 2022). Een gangbare inrichting van

zulke ruimtes bestaat uit klaslokalen met goede akoestiek, video- en audioapparatuur, interactieve whiteboards en vergelijkbare technologieën (Khamitova, 2023).

Online leeromgeving

Een online leeromgeving is een samenhangend systeem van diensten en applicaties die docenten en studenten ondersteunen in het leer- en onderwijsproces (SURF, 2023; Khamitova, 2023). De inrichting ervan is gebaseerd op ontwerpprincipes zoals flexibiliteit, connectiviteit, personalisering, veiligheid, comfort en structuur, ondersteund door technologie die het leren bevordert (Khamitova, 2023).

Digitale leeromgevingen en hun inrichting worden steeds belangrijker en spelen een toenemende rol in het onderwijs. Deze studie richt zich echter op stakeholderbetrokkenheid bij de totstandkoming van fysieke leeromgevingen. Om die reden worden online leeromgevingen buiten beschouwing gelaten in dit onderzoek.



Figuur 9.2. Vier types Leeromgevingen (Tazelaar, 2025, p. 38, visualisatie gebaseerd op SURF, 2023)

Trend 3: Extensieve flexibilisering en personalisering van het onderwijs

De toenemende flexibilisering in het onderwijs is een transformerende ontwikkeling die een aanzienlijke impact heeft op de toekomst van campussen en leeromgevingen. Flexibel leren, zoals beschreven door Moran en Myringer (1999), is een studentgerichte benadering die studenten autonomie geeft over hoe, wat, wanneer en waar zij leren. Deze aanpak speelt in op diverse behoeften van studenten door fysieke ruimtes, roosters en onderwijsmethoden af te stemmen op individuele voorkeuren en leerstijlen (Demetriadis & Pombortsis, 2007). Voorbeelden hiervan zijn online platforms voor zelfstandig leren en hybride modellen die klassikaal onderwijs combineren met digitale tools.

Loon (2021) voerde een uitgebreide literatuurstudie uit naar flexibel leren in de periode 2016 tot 2021. In zijn analyse benadrukt hij dat de opkomst van flexibel onderwijs sterk is beïnvloed door de opkomst van het internet, waardoor online onderwijs een gangbare vorm van leren is geworden. Daarnaast heeft de COVID-19-pandemie begin 2020 de noodzaak van flexibel onderwijs verder benadrukt, doordat universiteiten zich genooddaakt zagen snel aan te passen om continuïteit in het onderwijs te garanderen. Hierdoor is de academische discussie verschoven van de vraag óf flexibel leren nodig is naar de vraag hóe het effectief

geïmplementeerd kan worden. Deze verschuiving onderstreept de belangrijke rol die flexibel onderwijs tegenwoordig speelt in moderne onderwijssystemen (Loon, 2021).

Deze beweging richting flexibel onderwijs vraagt om een transformatie van leeromgevingen, waarbij ruimtes flexibel moeten kunnen worden aangepast aan uiteenlopende behoeften van studenten. Zowel virtuele als fysieke leeromgevingen moeten worden ontworpen om een breed scala aan onderwijsmethoden te ondersteunen, zodat studenten in hun eigen tempo, op een locatie naar keuze, en op een passend moment kunnen leren. Meer flexibiliteit in leeromgevingen bevordert een rijkere variatie aan didactische strategieën, wat de leerervaring versterkt (Khamitova, 2023).

Om flexibel onderwijs te ondersteunen, moeten leeromgevingen ontworpen worden met aanpasbaarheid en multifunctionaliteit in gedachten, zodat ze eenvoudig kunnen inspelen op veranderende behoeften. Hoge ruimtelijke kwaliteit en efficiëntie zijn essentieel, met ruimtes die zijn afgestemd op specifieke doeleinden zoals geconcentreerd werken, groepssamenwerking, informeel leren en experimenteren. Open ontwerpen – gekenmerkt door grote ruimtes, doorlaatbare grenzen en divers meubilair – stimuleren flexibiliteit in zowel onderwijs als leren (Chapman et al., 2014). Deze ontwerpen geven prioriteit aan comfort, gezondheid en aanpassingsvermogen van studenten, wat bijdraagt aan een omgeving die geschikt is voor uiteenlopende leeractiviteiten (Benade, 2019; Chapman et al., 2014).

In de praktijk betekent deze trend dat klaslokalen modulaire en aanpasbare indelingen moeten hebben, met lichtgewicht, slim en duurzaam meubilair (Brink et al., 2023). Met dit soort flexibel meubilair kan de opstelling eenvoudig worden aangepast aan verschillende leeractiviteiten. Zitopstellingen spelen hierbij een belangrijke rol, omdat ze het leerproces en de betrokkenheid van studenten aanzienlijk kunnen beïnvloeden. De inrichting moet afgestemd zijn op de leerdoelen: bij individuele taken zijn rijen tafels het meest geschikt, terwijl bij groepswork clusters van tafels interactie bevorderen (Wannarka & Ruhl, 2008). Onderzoek toont aan dat zitopstellingen een aanzienlijke impact hebben op leerprestaties, bijvoorbeeld in blended learning-omgevingen, waar ronde tafels of halfronde opstellingen effectief zijn in het bevorderen van betrokkenheid en interactie (Asino & Pulay, 2018; Yang et al., 2022). Deze flexibele indelingen, gecombineerd met passende onderwijsmethoden, versterken de "student-student communicatie en samenwerking" (Xu et al., 2019), en dragen zo bij aan een dynamische en interactieve leeromgeving.

Trend 7: Extensieve digitalisering en dataficering van de leer-/werkomgeving

Technologische ontwikkelingen transformeren het onderwijs in rap tempo en creëren nieuwe mogelijkheden voor leren en onderwijzen. Drie belangrijke ontwikkelingen sturen deze trend aan: de snelle opkomst van kunstmatige intelligentie (AI), het toenemende gebruik van immersieve technologieën, en de groeiende dataficering van het onderwijs – gecombineerd met verbeterde technologieën die fysieke en virtuele leeromgevingen met elkaar integreren (SURF, 2023).

Om het potentieel van deze ontwikkelingen te benutten, is het essentieel dat universiteiten hun campusinfrastructuur aanpassen aan de digitale behoeften en mogelijkheden. Om deze digitale innovaties effectief te integreren, moeten fysieke leeromgevingen zorgvuldig worden ontworpen om digitale tools optimaal te ondersteunen (Khamitova, 2023). Dit betekent onder meer dat digitale middelen worden geïntegreerd in het fysieke onderwijs, zoals interactieve

whiteboards, tablets, laptops en digitale leerplatforms. De hierboven geschetste technologische ontwikkelingen zullen de toekomst van campussen en leeromgevingen ingrijpend beïnvloeden, omdat ze bepalend zijn voor zowel de virtuele als de fysieke inrichting van onderwijsruimtes.

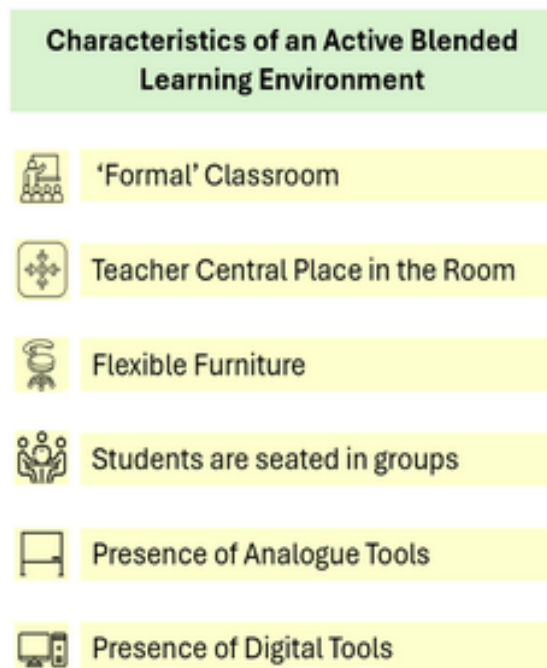
Effectieve Actieve Blended Leeromgevingen

Op basis van de trends en typologieën van leeromgevingen zoals beschreven in sectie B6, richt deze studie zich op actieve blended leeromgevingen. Deze omgevingen bieden een optimale combinatie van flexibiliteit, digitalisering en fysieke ruimte, waarbij de sterke punten van elk component worden benut.

Fuchs et al. (2024), in opdracht van het Centre for Academic Teaching and Learning van de Universiteit Utrecht, voerden een literatuurstudie uit naar de effectiviteit van actieve blended leeromgevingen en identificeerden concrete elementen waarmee de effectiviteit beoordeeld kan worden. Hun review is voornamelijk gebaseerd op peer-reviewed literatuur, waarbij Talbert en Mor-Aviv (2019) als een belangrijke bron worden genoemd.

In deze literatuurstudie stellen Fuchs et al. (2024) dat de primaire doelstellingen van actieve blended leeromgevingen zijn: het bevorderen van interactie, het ondersteunen van diverse leeractiviteiten, het behouden van een studentgerichte aanpak, en het bieden van hybride functionaliteit. Talbert en Mor-Aviv (2019, geciteerd in Fuchs et al., 2024) identificeren zes kernkenmerken waar een actieve blended leeromgeving aan moet voldoen.

Ten eerste bevindt een actieve blended leeromgeving zich in een formele onderwijsruimte, wat betekent dat het een aangewezen ruimte is waar leren als onderwijsactiviteit plaatsvindt. Dit sluit informelere ruimtes uit, zoals zelfstudieplekken in gangen of foyers. Daarnaast bevat een actieve blended leeromgeving specifieke ontwerpelementen die actieve leerprocessen stimuleren. Dit komt tot uiting in drie belangrijke kenmerken: flexibel meubilair dat eenvoudig te herschikken is om verschillende leeractiviteiten te ondersteunen, een groepsgerichte zitopstelling die samenwerking bevordert, en een polycentrisch of excentrisch ontwerp, wat betekent dat er geen duidelijk gedefinieerde voorkant van het lokaal is. Hierdoor kan de docent zich vrij bewegen en dynamisch interacteren met studenten. Tot slot betreffen de laatste twee kenmerken de aanwezigheid en het gemakkelijke gebruik van analoge en digitale leermiddelen, waaronder meerdere digitale projectoren, tablets, laptops, wand- en persoonlijke whiteboards, en schermen bij iedere tafel. Figuur 9.3 biedt een visueel overzicht van deze kenmerken.



Figuur 9.3. Zes karakteristieken van een Actieve Blended Leeromgeving (Tazelaar, 2025, p. 40, visualisatie gebaseerd op Talbert en Mor-Aviv (2019), zoals geciteerd in Fuchs et al., (2024))

Na het vaststellen van de doelstellingen en kenmerken van een actieve blended leeromgeving is de volgende stap om te onderzoeken welke specifieke ontwerpelementen bijdragen aan de effectiviteit van zo'n leeromgeving en hoe deze principes succesvol kunnen worden toegepast. Talbert en Mor-Aviv (2019, geciteerd in Fuchs et al., 2024) deden onderzoek naar hoe deze omgevingen bijdragen aan leerresultaten van studenten, lespraktijken van docenten en betrokkenheid. Hun studie benadrukte het belang van 'verbondenheid' als een fundamenteel ontwerpconcept dat leidt tot de meest effectieve leeromgevingen. Zij identificeerden drie belangrijke aspecten die bijdragen aan het realiseren van deze verbondenheid: mobiliteit, zichtbaarheid en leermiddelen.

Om verbondenheid te creëren via mobiliteit werden twee belangrijke elementen benadrukt: de bewegingsvrijheid van stoelen en de flexibiliteit om leeromgevingen te transformeren. Het eerste element richt zich op het waarborgen van bewegingsvrijheid voor studenten, met aandacht voor hun individuele behoeften. Aangezien elke student uniek is, met verschillende fysieke vereisten en voorkeuren, zorgt het ontwerpen van leeromgevingen die hierop inspelen voor een inclusievere en comfortabelere omgeving. Verstelbaar meubilair, zoals stoelen met wieltjes en een draaibaar ontwerp, maakt flexibele indelingen mogelijk die toegankelijkheid verbeteren en een breed scala aan studenten ondersteunen. Harvey en Kenyon (2013) benadrukten het belang van zitopstellingen door te stellen dat, hoewel zitplaatsen slechts één van de vele ontwerpvariabelen zijn, het een van de gemakkelijkst aanpasbare is en een grotere impact heeft dan vaak wordt aangenomen. Het tweede element betreft de flexibiliteit om de leeromgeving aan te passen. Traditionele klaslokalen met vaste tafels en onbeweeglijke stoelen kunnen interactie belemmeren. Deze beperking kan worden overwonnen door gebruik te maken van verrijdbaar meubilair en flexibele zitopstellingen, waardoor docenten dynamische leeromgevingen kunnen creëren die communicatie, groepswork en betrokkenheid bevorderen. Uit studies blijkt dat docenten die zich vrij kunnen bewegen in het lokaal vaker gesprekken aangaan met studenten, wat het belang van flexibele leeromgevingen onderstreept (Fuchs et al., 2024).

Een tweede belangrijk aspect van verbondenheid is zichtbaarheid, wat een cruciale rol speelt in actieve blended leeromgevingen. Zichtbaarheid wordt beïnvloed door de inrichting van onderwijsruimtes, met name zitopstellingen, evenals de vorm van tafels, die gezamenlijk het leerklimaat bepalen. Volgens Park en Choi (2014) weerspiegelen leeromgevingen de pedagogische filosofie. De manier waarop studenten zitten beïnvloedt hun gedrag, betrokkenheid en communicatie. Zo stimuleert een opstelling in rijen luisteren en aandacht voor de docent, terwijl een polycentrische opstelling actieve communicatie en samenwerking tussen studenten bevordert. Onderzoek toont aan dat goed ontworpen leeromgevingen betrokkenheid vergroten, coöperatief leren stimuleren en sociale interactie bevorderen (Fuchs et al., 2024).

De keuze van meubilair, in het bijzonder tafels, speelt hierin ook een belangrijke rol. Talbert en Mor-Aviv (2019, geciteerd in Fuchs et al., 2024) toonden aan dat studenten die in groepjes zitten meer geneigd zijn tot interactie en samenwerking. Ze stellen ronde tafels voor als middel om samenwerking te bevorderen, terwijl Brooks (2012) vond dat de vorm van tafels invloed heeft op de manier waarop studenten deelnemen aan activiteiten. Daarnaast laat onderzoek naar groepssamenstelling zien dat er verschillen zijn in interacties, productiviteit en leeruitkomsten tussen duo's en kleine groepen, wat het belang van doordachte zitopstellingen voor effectief leren benadrukt (Fuchs et al., 2024).

Het laatste element van verbondenheid is het gebruik van leermiddelen. Actieve blended leeromgevingen worden gekenmerkt door een mix van analoge en digitale hulpmiddelen. Traditionele klaslokalen hebben vaak één bord aan de voorkant, wat de toegankelijkheid beperkt voor studenten achterin. In actieve leeromgevingen daarentegen zijn verschillende analoge hulpmiddelen geïntegreerd, zoals whiteboards, glazen schrijfpervlakken en beschrijfbaar tafelbladen. Deze tools stimuleren creativiteit, groepscohesie en actieve participatie, vooral wanneer ze strategisch door het lokaal verspreid zijn en gemakkelijk toegankelijk zijn voor zowel docenten als studenten. Digitale hulpmiddelen zoals projectoren, laptops en smartboards zijn eveneens essentieel voor het verbeteren van het leerproces en het verhogen van de interactie. De mogelijkheid om digitale content op meerdere schermen te projecteren, maakt het mogelijk voor studenten om op verschillende plekken en manieren met het lesmateriaal aan de slag te gaan, waardoor een polycentrische inrichting effectief is. Door de integratie van digitale en analoge tools ontstaan interactieve, studentgerichte leeromgevingen (Fuchs et al., 2024).

Figuur 9.4 vat de bevindingen samen in een overzichtelijke tabel. In deze tabel worden de drie hoofdcomponenten van verbondenheid—zichtbaarheid, mobiliteit en leermiddelen—weergegeven, die gezamenlijk bijdragen aan de effectiviteit van een actieve blended leeromgeving. Voor elk hoofdelement worden de specifieke sub-elementen benoemd. Onder elk sub-element staan de ontwerpvariabelen die volgens de literatuur bijdragen aan de verbetering ervan. Deze verbeteringen leiden tot meer verbondenheid en daarmee tot effectievere leeromgevingen.

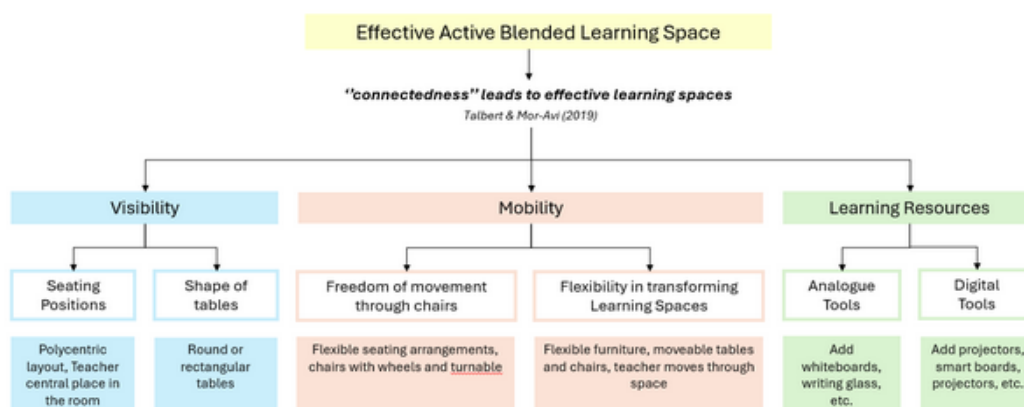


Figure 9.4 Integratie van Zichtbaarheid, Mobiliteit en Leermiddelen voor het verbeteren van de verbondenheid, wat leidt tot Effectieve Actieve Blended Leeromgevingen (Tazelaar, 2025, p. 42 visualisatie gebaseerd op Fuchs et al., 2024)

Conclusies over Effectieve Leeromgevingen

Een leeromgeving is een fysieke, sociale en psychologische setting waarin leren plaatsvindt, en waarin ervaringen en verwachtingen gezamenlijk worden gecreëerd door de betrokkenen (Rusticus et al., 2023). Recente ontwikkelingen in leeromgevingen benadrukken het belang van flexibiliteit, aanpasbaarheid en technologische integratie. Deze ontwikkelingen worden gedreven door een verschuiving naar studentgerichte en actieve leerbenaderingen, evenals een toegenomen focus op toegankelijkheid en samenwerking in het onderwijs. Al deze

elementen komen samen in de zogeheten Active Blended Learning Environments (actieve blended leeromgevingen).

Deze omgevingen worden gekenmerkt door zes kernelementen: een formele klaslokaalopstelling waarin de docent een centrale rol inneemt, het gebruik van flexibel meubilair, groepsgewijze zitarrangementen en de integratie van zowel digitale als analoge hulpmiddelen ter ondersteuning van leeractiviteiten.

Om een effectieve Active Blended Learning Space te ontwikkelen, moet verbondenheid (connectedness) worden bevorderd. Dit kan worden bereikt door de zichtbaarheid te vergroten—via groepsgewijze zitopstellingen en het gebruik van ronde of vierkante tafels—en door mobiliteit in het lokaal te stimuleren. Mobiliteit wordt ondersteund door bewegingsvrijheid mogelijk te maken via flexibel zitmeubilair en de mogelijkheid om de ruimte aan te passen. Tot slot is de aanwezigheid van geschikte leermiddelen, waaronder analoge materialen en digitale tools, essentieel.

Wanneer deze principes effectief worden gecombineerd, kunnen Active Blended Learning Environments de betrokkenheid, samenwerking en de algehele leerervaring aanzienlijk verbeteren.

Naast de lessen uit de literatuur voor actieve blended leeromgevingen heeft Tazelaar (2025) in haar masterthesis ook gekeken naar praktijkvoorbeelden van leeromgevingen en de effectiviteit van deze ruimtes. Enerzijds is onderzocht in hoeverre deze ruimtes de in deze literatuurstudie benoemde ontwerpprincipes en elementen daadwerkelijk toepassen. Anderzijds is geanalyseerd hoe effectief deze ruimtes worden ervaren door eindgebruikers en betrokken stakeholders. In het jaarrapport komt dit in hoofdstuk **B8** aan de orde.

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B8 Effectiviteit van Actieve Blended Leeromgevingen

This chapter is only available in Dutch

Tazelaar, J. M. (2025). *Creating Effective Learning Environments: The Power of Stakeholder Involvement*, TU Delft Repository.

<https://resolver.tudelft.nl/uuid:226624b7-2839-450b-aec7-53bd442fb8e5>

Supervised by Monique Arkesteijn & Vitalija Danivska

Key takeaways

ENGLISH:

- **Effectiveness is defined by both design quality and pedagogical alignment.**
A learning environment is only effective when the spatial and functional design aligns with its intended didactic use. The presence of core design features alone is insufficient if teaching practices do not correspond to the pedagogical model for which the space was designed.
- **Connectedness is a robust theoretical predictor of effectiveness.**
Literature-based evaluation confirms that visibility, mobility, and access to learning tools, operationalised through six core features, provide a coherent and applicable framework for assessing learning environment effectiveness across cases.
- **User experience largely validates the literature, but adds a critical missing dimension.**
End users consistently recognise the value of the six core features in shaping interaction, engagement, and learning experience. However, they also reveal that actual patterns of use, rather than design intent alone, strongly influence perceived effectiveness, a factor underrepresented in existing literature.
- **Misuse of innovative spaces significantly undermines effectiveness.**
Cases where active blended classrooms were used for traditional frontal teaching experienced reduced effectiveness, regardless of design quality. This highlights that inappropriate use can negate the benefits of otherwise well-designed learning environments.
- **Governance and scheduling mechanisms shape learning outcomes indirectly but decisively.**
How spaces are allocated, scheduled, and reserved plays a critical role in whether they are used as intended. Both over-integration into standard timetables and under-demand through specialised booking systems can lead to underperformance, pointing to a governance dilemma rather than a design failure.

NEDERLANDS:

- **Effectiviteit wordt bepaald door zowel ontwerp kwaliteit als didactische afstemming.**
Een leeromgeving is alleen effectief wanneer het ruimtelijke en functionele ontwerp in overeenstemming is met het beoogde didactische gebruik. De aanwezigheid

van kernontwerpkenmerken is op zichzelf onvoldoende wanneer de onderwijspraktijk niet aansluit bij het pedagogische model waarvoor de ruimte is ontworpen.

- **Verbondenheid vormt een robuuste theoretische voorspeller van effectiviteit.** De literatuur laat zien dat zichtbaarheid, mobiliteit en toegang tot leermiddelen, geoperationaliseerd via zes kernkenmerken, een samenhangend en toepasbaar kader bieden om de effectiviteit van leeromgevingen systematisch te beoordelen.
- **Gebruikerservaring bevestigt de literatuur, maar voegt een cruciale dimensie toe.**

Eindgebruikers herkennen de waarde van de zes kernkenmerken in het bevorderen van interactie, betrokkenheid en leerervaring. Tegelijkertijd tonen zij aan dat het daadwerkelijke gebruik van de ruimte, en niet alleen het ontwerp, een doorslaggevende invloed heeft op de ervaren effectiviteit, een aspect dat in de literatuur minder expliciet wordt benoemd.

- **Oneigenlijk gebruik van innovatieve leeromgevingen ondermijnt hun effectiviteit aanzienlijk.**

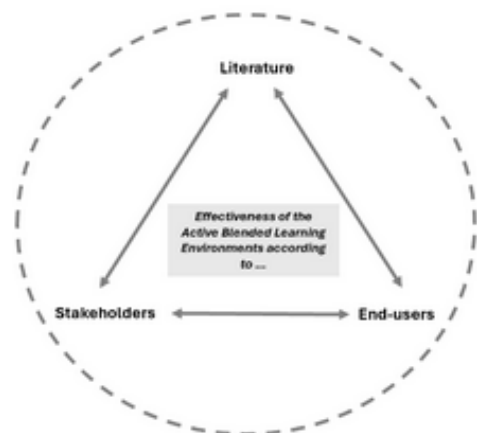
Wanneer actieve blended leeromgevingen worden ingezet voor traditioneel frontaal onderwijs, neemt de effectiviteit sterk af, ongeacht de kwaliteit van het ontwerp. Dit onderstreept dat verkeerd gebruik de potentiële meerwaarde van innovatieve leeromgevingen teniet kan doen.

- **Governance en roostering beïnvloeden leeruitkomsten indirect maar beslissend.**

De wijze waarop leeromgevingen worden toegewezen, gereserveerd en ingepland bepaalt in hoge mate of zij conform hun ontwerpintentie worden gebruikt. Zowel automatische toewijzing binnen het standaardrooster als beperkte vraag via gespecialiseerde reserveringssystemen kan leiden tot onderbenutting of verkeerd gebruik, wat wijst op een bestuurlijk en organisatorisch vraagstuk in plaats van een ontwerpfout.

Effectiviteit van Leeromgevingen

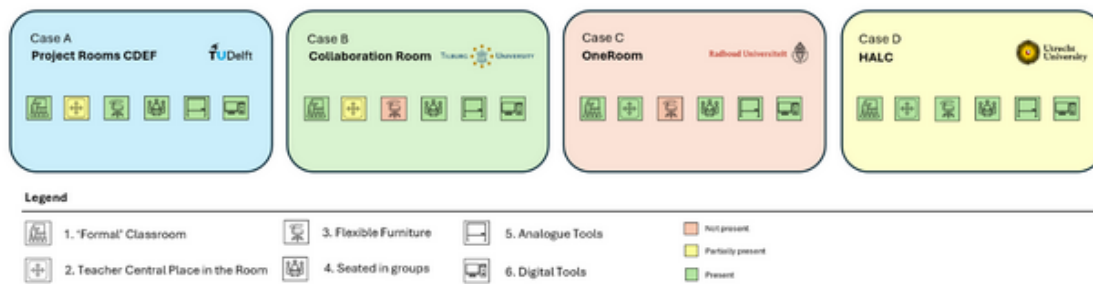
De effectiviteit van de leeromgevingen wordt in dit onderzoek beoordeeld vanuit drie perspectieven: de literatuur, eindgebruikers en stakeholders (Figuur 10.1). Volgens de literatuur (chapter B7) wordt een effectieve leeromgeving gekenmerkt door verbondenheid, wat wordt bereikt door zichtbaarheid, mobiliteit en leermiddelen. Deze drie elementen zijn verder vertaald naar zes kernkenmerken: 1) een formeel klaslokaal, 2) de docent heeft een centrale positie in de ruimte, 3) de aanwezigheid van flexibel meubilair, 4) studenten zitten in groepen, 5) de aanwezigheid van analoge tools en 6) de aanwezigheid van digitale tools. De literatuur stelt dat wanneer alle zes kenmerken aanwezig zijn, de omgeving voldoet aan de criteria voor zichtbaarheid,



Figuur 10.1. De effectiviteit van leeromgevingen is gebaseerd op drie perspectieven: literatuur, eindgebruikers en stakeholders (Tazelaar, 2025, p. 143)

mobiliteit en toegang tot leermiddelen — en daarmee verbondenheid bereikt en als effectief kan worden beschouwd.

De volgende vier cases zijn onderzocht (1) *project rooms* CDEF van de Technische Universiteit Delft (TUD) in het ECHO gebouw, (2) *collaboration room* van de Universiteit Tilburg (TiU) in CUBE gebouw, (3) OneRoom van de Radboud Universiteit (RU) in het Elinor Ostrom gebouw en (4) de Hybrid Active Blended Classroom (HALC) van Utrecht University (UU) aan de Bolognalaan 101. Figuur 10.2 laat zien in welke mate elk van de zes kernkenmerken aanwezig is in de afzonderlijke cases. Case D - UU is de enige case die volledig aan alle zes kenmerken voldoet. In Case A - TUD zijn vrijwel alle kenmerken aanwezig, behalve het kenmerk dat betrekking heeft op de centrale positie van de docent in de klas. Dit kenmerk wordt slechts gedeeltelijk vervuld. Hoewel het lokaal een duidelijk gedefinieerde voorkant heeft (wat niet per se de bedoeling is van dit kenmerk), zorgen de ruimtelijke opstelling en de beweegruimte tussen de groepstafels ervoor dat de docent zich toch centraal kan positioneren en tussen de tafels kan bewegen om instructie te geven. Hetzelfde geldt voor Case B - TiU.



Figuur 10.2: Effectiviteit beoordeeld op basis van de literatuur: Aanwezigheid van kernkenmerken per case (Tazelaar, 2025, p. 143)

Echter, zowel Case B – TiU als Case C - RU missen flexibel meubilair, wat de aanpasbaarheid beperkt. Op basis van de literatuur kan daarom worden geconcludeerd dat Case D – UU de meest effectieve leeromgeving is, en Case B – TiU de minst effectieve, gezien het aantal aanwezige kernkenmerken.

Naast het beoordelen van effectiviteit op basis van de literatuur, werd de ervaren effectiviteit van de leeromgevingen ook geëvalueerd vanuit het perspectief van eindgebruikers. De resultaten van de enquêtes leverden twee belangrijke inzichten op.

Ten eerste verwezen gebruikers vaak naar de aanwezigheid — of afwezigheid — van de kernaspecten als onderdeel van hun leerervaring. In Case D -UU gaven respondenten bijvoorbeeld aan dat de groepsopstellingen interactie bevorderden, dat de centrale positie van de docent meer beweging door de ruimte mogelijk maakte (wat eveneens tot meer interactie leidde), en dat de aanwezigheid van digitale tools zoals schermen en whiteboards op de tafels het gemakkelijker maakte om materiaal te delen met klasgenoten. Aan de andere kant werd in dezelfde case ook het gebrek aan flexibel meubilair genoemd als een nadeel, omdat dit het voor een groot deel van de klas moeilijk maakte om het scherm aan de voorkant goed te zien. Deze bevindingen bevestigen dat — vanuit het perspectief van deze eindgebruiker — de aanwezigheid van deze zes kernkenmerken zoals gedefinieerd in de literatuur in deze cases ook bijdraagt aan de ervaren effectiviteit van een leeromgeving.

Ten tweede bracht de enquête een aanvullende factor aan het licht die de ervaren effectiviteit beïnvloedt, maar die in de literatuur niet expliciet wordt benadrukt en dat is de wijze waarop de ruimte daadwerkelijk wordt gebruikt. In de Cases B - TiU, C - RU en D - UU gaven meerdere deelnemers aan dat de ruimtes (deels) anders werden gebruikt dan waarvoor ze ontworpen waren en dit had invloed had op hoe effectief ze werden ervaren. In Case B - TiU merkte een respondent bijvoorbeeld op: "Deze zitopstelling is niet ideaal voor bepaalde activiteiten, zoals hoorcolleges." Vergelijkbare opmerkingen werden gemaakt in Cases A – TUD en C - RU, zoals: "Verander de positie van de tafels, gericht op de docent," en "Een opstelling waarbij je direct naar je tafel kijkt, werkt mogelijk beter voor een hoorcollege." Uit de enquête bleek verder dat in Cases A - TUD, B – TiU en deels C – RU nog steeds traditionele frontale colleges werden gegeven, in plaats van de blended learning-methodes waarvoor de ruimtes ontworpen zijn. Case D – UU daarentegen paste blended learning daadwerkelijk toe zoals bedoeld. Dit toont aan dat de manier waarop een leeromgeving wordt gebruikt een aanzienlijke invloed heeft op hoe effectief deze wordt ervaren.

Deze bevindingen onderstrepen het tweedelige karakter van effectiviteit in leeromgevingen: Enerzijds wordt effectiviteit bepaald door het ruimtelijke en functionele ontwerp — met name door de aanwezigheid van de zes kernkenmerken. Anderzijds moet het beoogde didactische gebruik van de ruimte overeenkomen met de daadwerkelijke toepassing ervan. Wanneer deze afstemming ontbreekt, en er alternatieve (traditionele) onderwijsvormen worden toegepast, kan de effectiviteit van de ruimte zelfs worden ondermijnd.

Dit wordt ook weerspiegeld in de reacties van stakeholders wanneer hen gevraagd werd naar de effectiviteit van de ruimtes. In alle vier de cases spraken stakeholders hun tevredenheid uit over het ontwerp van de leeromgevingen. In sommige gevallen waren bepaalde kernkenmerken niet geïmplementeerd, maar dit was altijd het resultaat van een bewuste afweging ten gunste van andere elementen die als waardevoller werden beschouwd. Echter, wanneer deze afwegingen worden vergeleken met de ervaringen van eindgebruikers, blijkt dat in alle gevallen het ontbreken van deze specifieke kernkenmerken wordt genoemd als verbeterpunt dat de effectiviteit van de ruimte zou kunnen verhogen. Dit suggereert dat stakeholders in toekomstige projecten zouden moeten streven naar het integreren van alle kernkenmerken, in plaats van sommige op te offeren ten gunste van anderen.

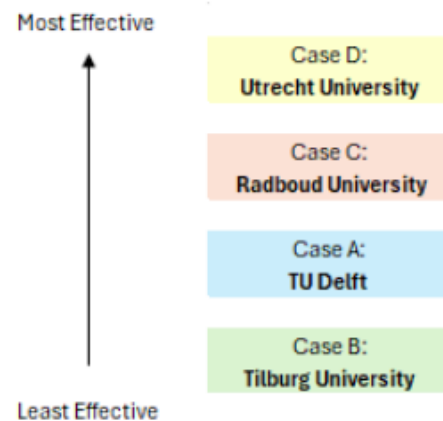
Ondanks de algemene tevredenheid over het functionele ontwerp, zijn er onder stakeholders ook gemengde meningen over het daadwerkelijke gebruik en de adoptie van de leeromgevingen. In Cases C – RU en D – UU werd een speciaal reserveringssysteem geïmplementeerd om ervoor te zorgen dat de ruimtes doelgericht en in overeenstemming met de juiste onderwijsmethoden gebruikt zouden worden. In de praktijk merkten stakeholders echter op dat het aantal reserveringsaanvragen laag bleef, en dat de ruimtes vaak ongebruikt of onderbenut bleven.

In tegenstelling hiermee werden de ruimtes in Cases A – TUD en B – TiU geïntegreerd in het standaardrooster, wat betekende dat ze automatisch werden toegewezen zonder dat docenten daar specifiek om hoefden te vragen. Hoewel dit ervoor zorgde dat de ruimtes vaak werden gebruikt, gaven de enquêteresultaten aan dat dit gebruik vaak niet strookte met de pedagogische principes waarvoor ze ontworpen zijn. In deze gevallen werden de ruimtes voornamelijk ingezet voor traditioneel onderwijs, in plaats van blended learning.

Dit roept een kritische kwestie op: óf de vraag naar deze innovatieve leeromgevingen is onvoldoende, óf de ruimtes worden verkeerd gebruikt, puur omdat ze beschikbaar zijn en niet omdat ze voorzien in een specifieke onderwijskundige behoefte. Deze mismatch in gebruik kan de ervaren effectiviteit van de ruimte aanzienlijk beïnvloeden.

Al met al kan op basis van de analyse van de vier cases worden geconcludeerd dat Case D – UU de meest effectieve leeromgeving biedt. Dit komt door de aanwezigheid van alle kernkenmerken zoals gedefinieerd in de literatuur — waarvan bekend is dat ze een effectieve leeromgeving ondersteunen — in combinatie met het feit dat de ruimte wordt gebruikt in overeenstemming met het oorspronkelijke doel.

Case B – TiU scoort daarentegen het laagst in termen van effectiviteit. Dit komt enerzijds door het ontbreken van meerdere essentiële ontwerpkenmerken, wat het beoogde gebruik van de ruimte belemmert en in sommige gevallen zelfs tot negatieve ervaringen leidt. Anderzijds draagt de misalignment tussen het ontwerp en het daadwerkelijke gebruik van de ruimte verder bij aan de lage effectiviteit. Het oneigenlijke gebruik van de ruimte blijkt daarmee een belangrijke factor in de tegenvallende prestaties.



Figuur 10.3. Ranking van de LE's op basis van effectiviteit (Tazelaar, 2025, p.144)

Referenties

Tazelaar, J.M. (2025). Creating Effective Learning Environments: The Power of Stakeholder Involvement Exploring how Stakeholder Involvement can be optimised in University Learning Environments, geraadpleegd op 11 augustus 2025 <https://resolver.tudelft.nl/uuid:226624b7-2839-450b-aec7-53bd442fb8e5>

B9 Stress in the Learning Environment

Meijer, B. (2025). *Stress in the Learning Environment*, Master's thesis, TU Delft Repository.

Supervised by Monique Arkesteijn, Vitalija Danivska & Sophie Schuller

Key takeaways

- **The design of study spaces affects how stressed and focused students feel.**
Students' ability to concentrate and relax is influenced by the physical environment, such as noise levels, lighting, layout, and overall atmosphere. These effects occur through how students *experience* the space, not simply because they are in a room.
- **Room A and Room B offer clearly different study experiences.**
Room A (BK City) is an older, more traditional study space with fixed desks facing forward, warmer colours, and a more informal, homely atmosphere. Room B (Echo) is a newer study space with flexible, movable furniture, better acoustic control, and a calm, modern design intended to support focused work.
- **Room B helped students focus more easily.**
Students reported that concentrating felt easier in Room B, with a moderate improvement in focus ($d = 0.554$, $p = 0.069$). In Room A, focus slightly worsened. This suggests that quieter, more structured environments can support demanding study tasks.
- **Students *felt* physically calmer in Room B, but their bodies did not always show it.**
Self-reported bodily stress decreased significantly in Room B ($p = 0.044$, $d = 0.533$), meaning students felt less tense. However, stress measured through saliva (cortisol) did not change significantly in either room (Room A: $d = -0.224$; Room B: $d = -0.144$). This shows that feeling calmer does not always immediately translate into measurable biological change.
- **There is no single 'best' study space for everyone.**
Some students preferred Room B for intense, focused work, while others found Room A more emotionally comforting and better suited for relaxed or reflective tasks. Preferences varied by person and activity, highlighting the importance of offering different types of study spaces rather than one universal solution.

Introduction

In recent years, stress among university students has emerged as a critical concern, reflecting broader societal challenges surrounding mental well-being in young people (American Psychological Association (APA), 2020). The World Health Organization (WHO, 2017) reports a significant increase in mental health disorders over recent decades, with the impact being particularly acute among younger populations. Research by Kessler (2007) underscores that mental health challenges often begin to manifest between the ages of 16 and 24, coinciding with the ages of university students. This developmental phase is marked by heightened vulnerability due to academic pressures, social transitions, and personal growth milestones, making university students a group at elevated risk for mental health challenges (APA, 2020). Stress, depression, anxiety, loneliness, and even burnout have become increasingly prevalent among this demographic (Auerbach et al., 2016).

Across Europe, recent surveys indicate that mental health difficulties and high stress are common among university students. According to the Eurostudent study (Cuppen, 2022), over one-third of students report low emotional well-being, with rates approaching 60% in some countries. The European University Association (EUA) also notes that around 40% of higher-education students experience mental health challenges, and approximately 20% meet criteria for clinical disorders, of which numerous cases are stress-related (Hauschildt, 2022). In the Netherlands, data from the Trimbos Institute show that 56% of students report high to very high stress, while 44% experience symptoms of anxiety or depression (Dopmeijer, 2023).

Stress is a multidimensional process that involves both subjective feelings and biological responses (Selye, 1956; Lazarus & Folkman, 1984; Persiani, 2021). It arises when individuals perceive environmental demands as exceeding their coping capacity, a process shaped by appraisal mechanisms in the brain (Demerouti et al., 2010; Bakker & Demerouti, 2007). This can activate both the sympathetic nervous system (SAM) and the hormonal stress system (HPA axis), resulting in changes in experience, behavior, and physiology (Shah, 2024; Juster et al., 2010).

This research investigates how different spatial characteristics of university study environments influence students' **psychological and physiological stress**. It focuses on the contrast between a traditional and a newer study space at Delft University of Technology, and combines environmental psychology with architectural and real estate perspectives.

By identifying how specific design features affect student stress, the study offers insights for improving campus environments. These findings are particularly relevant for universities aiming to promote wellbeing, optimise space use, and anticipate future learning needs.

The main research question was: **“What is the relationship between (new) physical learning environments and stress among students at Dutch universities?”**

Conceptual framework

This research builds on an interdisciplinary framework that combines environmental psychology, stress physiology, and spatial design theory.

Stress is understood as both a **psychological** and **physiological** response to external demands. Drawing from Slimmen et al. (2022), the model incorporates four key stress domains relevant to students:

- academic pressure
- financial stress
- family/social stress
- extracurricular pressure.

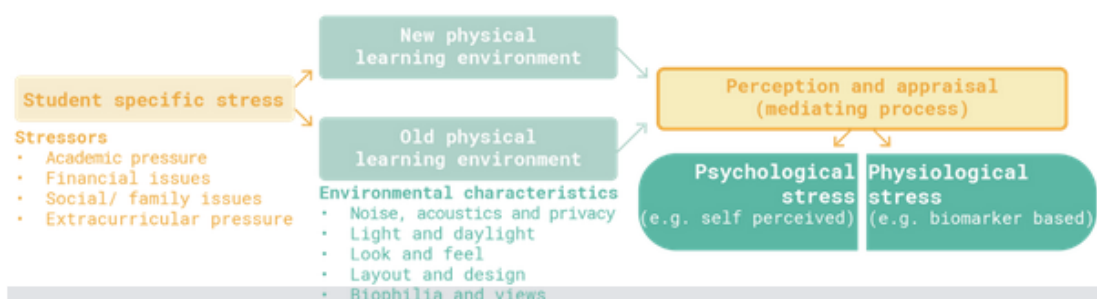
These personal stressors shape how students perceive and respond to their environment.

The physical learning environment is analysed through five design-related characteristics derived from workplace wellbeing research (Kropman et al., 2022; Bergefurt et al., 2023):

1. Noise, acoustics and privacy
2. Lighting and daylight
3. Layout and design
4. Biophilia and views
5. Look and feel

These characteristics influence stress not directly, but through **perception and appraisal**, a mediating process that determines whether a space is experienced as calming, distracting, or demanding.

The framework also distinguishes between **perceived stress** (measured via self-report) and **physiological stress** (measured through salivary cortisol), acknowledging that these may diverge, especially in short-term exposures.



Figuur 11.1: Conceptual framework, based on Slimmen et al., 2022 and Bergefurt et al., 2023 (Meijer, 2025)

Methods

This study used a so called experimental **within-subject AB design** to investigate how physical learning environments influence student stress. That means that each of the **13 participants** experienced two different study spaces at TU Delft, one older and one newer. The rooms differed in lighting, acoustics, spatial layout, and interior design.

To examine how physical environments influence student stress, two architecturally contrasting rooms at TU Delft were selected.

- Room A (Hall C, BK City) represents a traditional study environment. It features a square 12×12 m layout with a fixed, front-facing desk setup for 72 students. The room combines white-painted walls, a warm red carpet, and a high unfinished ceiling with exposed beams and ducts, evoking a historic-industrial aesthetic. Large windows (40 m²) provide strong natural daylight, especially in the back (up to 6000 lux), though this may cause glare. The room is relatively quiet (40 dB) but allows some outside noise due to dated insulation. While there are no indoor plants, views of trees and a small park offer visual access to nature.
- Room B (Hall D, Echo) is part of TU Delft's newest academic building, designed with sustainability and wellbeing in mind. It has a 13.5×14 m rectangular layout with flexible, wheeled furniture in a side-facing arrangement. The space is acoustically optimised (30.3 dB), evenly lit (max 3600 lux), and visually calm, with cool blue tones, natural accents, and floor-height windows overlooking treetops and a campus square. The atmosphere was often described as modern, clean, and focused, though occasionally "clinical".

These rooms offered distinct environmental profiles, providing a strong basis for analysing their effects on stress and study experience.

Participants were asked to engage in a **60-minute individual study session** in both rooms, working on a personal academic task (e.g. reading or preparing an exam). The order in which the students used the rooms was randomised to reduce sequence effects. The study sessions were conducted in a controlled setting, with no interaction or background noise.

Stress was assessed using a multi-method approach:

- A custom self-report survey before and after each session measured four indicators: overall stress, difficulty focusing, self-reported physiological stress, and perceived environmental influence.
- Stress can be measured with cortisol levels and therefore, salivary cortisol samples were collected immediately before and after each session, then frozen for laboratory analysis to assess physiological stress.
- Participants also answered open-ended questions, which were analysed qualitatively to capture nuanced experiences and room preferences.

Statistical analysis were performed to evaluate significant differences between rooms.

Results

The study combined quantitative and qualitative data to assess how two contrasting learning environments influenced student stress and focus.

Quantitative Findings

Self-reported stress showed modest but informative differences.

- Overall stress decreased slightly in both rooms but was not statistically significant (Room A: $d = 0,115$; Room B: $d = 0,464$).
- It became easier to focus in Room B with a moderate effect size ($d = 0,554$; $p = 0,069$), while Room A it showed a small increase in difficulty.
- Self-reported physiological stress decreased in both rooms. In Room B, this reduction was statistically significant ($p = 0,044$; $d = 0,533$), indicating a clear subjective calming effect.
- Perceived environmental influence remained stable in both rooms

Salivary cortisol levels did not change significantly in either room.

6. Room A showed a small decrease ($d = -0,224$); Room B a slight increase ($d = -0,144$), but both were statistically insignificant.
7. A repeated-measures ANOVA confirmed no significant main or interaction effects on physiological stress.

These findings highlight a divergence between perceived and physiological stress: students reported feeling calmer in Room B, but this was not reflected in cortisol levels, likely due to the short exposure window.

Qualitative Findings

Open responses revealed rich individual variation.

- Room A was described as warm, calming, and emotionally comfortable, suited for relaxed or reflective work.
- Room B was seen as quiet, modern, and conducive to focus, especially for demanding tasks.
- Participants frequently mentioned acoustics, lighting, and layout as influential features. Ergonomic discomfort and task fit also affected room preference.

Overall, Room B supported focus and perceived relaxation, while Room A offered emotional ease. Preferences were highly individual, suggesting no one-size-fits-all solution.

Conclusion

This study shows that **the physical learning environment does influence how students experience stress**, but in nuanced, task- and person-dependent ways.

Newer spaces, such as Room B, were more often associated with improved focus and lower self-reported physiological stress. These effects were supported by both surveys and qualitative responses. However, no significant differences were found in physiological stress as measured by salivary cortisol, and overall stress levels remained stable in both environments. Meanwhile, Room A was valued for its warmth and emotional comfort, especially during less intense study tasks.

The findings highlight the importance of **spatial variety** on campus. Different students, tasks, and moods benefit from different settings, suggesting that one-size-fits-all design solutions are unlikely to meet the diverse needs of university populations.

Stress in learning environments emerges from the interaction between internal state and external space. Rather than seeking a universal “best” study space, universities should aim for **diverse, adaptive, and psychologically supportive environments** that empower students to self-regulate and study in ways that match their own needs and context

Discussion

The findings of this study point to a complex, layered relationship between space and stress. Four insights stand out.

First, the contrast between self-reported and physiological stress was especially clear in Room B, where students reported feeling calmer, yet cortisol levels slightly increased. This may reflect **productive stress** (or “eustress”) linked to concentration and mental effort, not distress. The room’s quiet, uncluttered layout supported focus, but hormonal responses may have lagged or responded differently.

Second, preferences revealed a trade-off between **restoration and productivity**. Room A’s warm tones and atmosphere fostered emotional ease, while Room B’s modern design enhanced cognitive focus. This suggests that no single space is ideal for every student or task, the fit between user and environment matters most.

Third, many environmental effects likely occurred below the level of **conscious awareness**. Even participants who claimed the room didn’t influence them still showed patterns of stress response and preference. This aligns with research on neuroarchitecture and spatial heuristics, showing that people intuitively associate certain layouts, colors, or sounds with either safety or activation, even if they can’t explain why.

Finally, the study reinforces the value of using **both physiological and self-reported stress measures**. While each has limits, self-report can be biased, and cortisol can be ambiguous, their combination revealed important discrepancies. The divergence is not a flaw, but a finding: it shows that stress is a dynamic, context-sensitive process, shaped by both the mind and body. These insights support a more personalised, flexible approach to campus design, one that respects the psychological and physiological complexity of student life.

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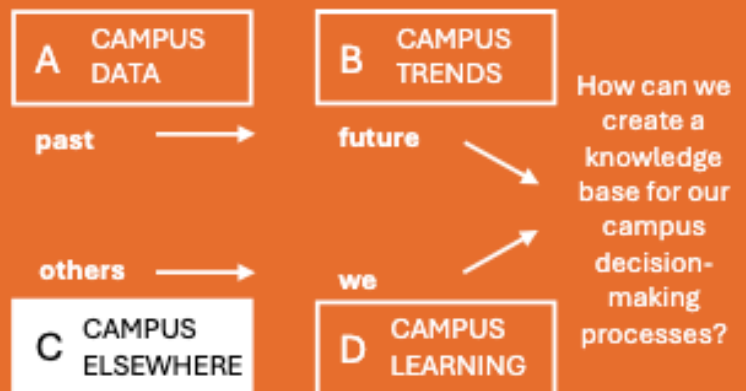
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Part II

CAMPUS NL 2024/2025 RESULTS



Part C – ELSEWHERE

C1 Het onderwijs van morgen en de campus van vandaag - Lessen uit het onderwijs van nu

This chapter is only available in Dutch

Maik Kocken, Jackie de Vries & Pity Jongens (2025)

Dit rapport maakt deel uit van deel C: Campus Elsewhere, waarin zowel verschillende modellen voor campusbeheer van verschillende organisaties als ervaringen van verschillende organisaties met hun onderwijsruimten worden onderzocht. Nu Nederlandse universiteiten te maken hebben met veranderende behoeften en evoluerende onderwijsvormen, helpen deze inzichten campusbeheerders om ruimtelijke strategieën af te stemmen op toekomstige behoeften. Ze bieden praktische hulpmiddelen zoals scenarioplanning, persona-ontwikkeling en studenttrajecten om besluitvorming in onzekere situaties te begeleiden.

Wij zijn dankbaar voor de bijdrage van Aestate aan het jaarrapport Campus NL 2024-2025 waarin ze hun ervaringen als professionals bij universiteiten, hogescholen en het MBO delen. In het bijzonder willen wij ir. Maik Kocken, dr.ir. Jackie de Vries en dr.ir. Pity Jongens de auteurs van deze rapportage hartelijk bedanken. Deze rapportage is tevens hoofdstuk **C1** van het jaarrapport.

Key takeaways

ENGLISH:

- **Campus managers must create value under uncertainty and resource constraints.**

Educational models are evolving rapidly, while campus spaces often remain standardised. Combined with fluctuating student numbers, funding cuts, and competition for talent and research income, this creates a persistent mismatch that makes long-term investment decisions complex and risk-sensitive.

- **Digitalisation, educational flexibilisation, and sustainability are reshaping spatial demand.**

The shift toward time- and place-independent learning, lifelong learning, and student-centred pathways is changing the mix of spaces required, with greater demand for collaborative and flexible environments and reduced reliance on traditional lecture rooms. Sustainability increasingly shapes both campus operations and pedagogy.

- **User involvement, especially student participation, is essential for effective campus development.**

Students and academic staff hold different expectations of learning environments. Methods such as personas and student journeys help surface these differences and translate them into spatial strategies that better reflect actual use rather than assumed needs.

- **Physical space alone cannot deliver educational change.**
Innovative spaces underperform when organisational structures, scheduling, assessment methods, and user behaviour do not align with the intended educational concept. Interdisciplinary interaction and informal learning can be enabled by design, but require supporting governance and educational logistics.
- **Future-proof campus planning depends on robust strategies with local adaptability.**
Scenario planning enables institutions to test campus strategies against multiple possible futures. The most resilient approach combines standardisation where possible with targeted flexibility, ensuring that space supply, demand, and actual use are explicitly aligned.

NEDERLANDS:

- **De campusmanager stuurt op waarde onder onzekerheid en schaarste.**
Onderwijs verandert snel, terwijl campusruimten vaak standaard blijven, dit creëert een structurele mismatch. Door fluctuerende studentenaantallen, bezuinigingen en concurrentie om talent en onderzoeksgeld worden investeringskeuzes risicovoller en gevoeliger voor conflicterende belangen.
- **Digitalisering, flexibilisering van onderwijs en duurzaamheid herdefiniëren de ruimtevraag.**
De kernverschuiving is van tijd en plaatsgebonden onderwijs naar een mix van synchroon, asynchroon en studentgestuurd leren, dit verandert de behoefte aan ruimtetypen, zoals meer samenwerking, minder traditioneel frontaal, en een campus die duurzaamheid ook didactisch uitdraagt.
- **Draagvlak en effectiviteit ontstaan via actieve gebruikersbetrokkenheid, vooral van studenten.**
Studenten en docenten blijken verschillende verwachtingen te hebben van onderwijshuisvesting. Persona's en student journeys maken die verschillen zichtbaar en bruikbaar, waardoor besluitvorming minder docent-gedreven wordt en beter aansluit op daadwerkelijk gebruik.
- **Ruimte werkt pas als organisatie, onderwijslogistiek en gedrag meebewegen.**
Innovatieve ruimtes presteren slecht wanneer ze als standaardconcept worden uitgerold, verkeerd worden geroosterd, of niet passen bij het onderwijsconcept, examensysteem of cultuur. Interdisciplinariteit en ontmoeting kunnen worden gefaciliteerd, maar niet afgedwongen zonder organisatorische randvoorwaarden.
- **Toekomstbestendige campusplanning vraagt om een robuuste basis met lokale variatie.**
Scenarioplanning helpt strategieën te toetsen op robuustheid onder verschillende toekomsten. De effectieve mix is standaardisatie waar het kan, maatwerk waar het moet, met flexibiliteit in inrichting en digitale faciliteiten, en met ontwerp dat expliciet vraag, aanbod én daadwerkelijk gebruik samenbrengt.

1. Inleiding

Onderwijsinstellingen, of het nu gaat om mbo, hbo of wo, maken gebruik van ruimtes om onderwijsactiviteiten te huisvesten. Het onderwijs heeft zich de afgelopen decennia sterk ontwikkeld onder invloed van diverse factoren. De onderwijsruimtes, en daarmee de campus, zijn echter maar beperkt veranderd; vaak worden nog steeds standaardruimtes en leeromgevingen ontwikkeld. De vraag is of het onderwijs van de toekomst nog wel gaat passen binnen de huidige inrichting van de Campus?

Dit stelt de campusmanager voor een uitdaging. Hoe voeg je met beperkte middelen waarde toe aan het campusvastgoed wanneer je niet precies weet wat de toekomst brengt? Deze taak is extra complex omdat de ontwikkelingen bij en doelstellingen van diverse belanghebbenden kunnen conflicteren. Het is aan de campusmanager om deze belangen te verenigen, oplossingen te vinden en te wegen en voorstellen te doen om de campus aan te passen aan het onderwijs van morgen.

In de praktijk zien wij dat draagvlak, betrokkenheid van gebruikers en een balans tussen standaardisatie en flexibiliteit succesfactoren zijn om dit proces in goede banen te leiden. In het bijzonder wordt vanuit de praktijk van het campusmanagement steeds vaker benadrukt dat het essentieel is om de betrokkenheid van gebruikers actief te stimuleren. Door hen te betrekken bij besluitvormingsprocessen en hen een stem te geven in de ontwikkeling van de campus, kan een omgeving worden gecreëerd die beter aansluit bij hun dagelijkse ervaringen en verwachtingen. De bijdrage van studenten blijft helaas veelal beperkt in deze trajecten.

Daarnaast is de vraag welke stappen nodig zijn voor het creëren van draagvlak, het stimuleren van betrokkenheid van studenten en het vinden van een balans tussen standaardisatie en flexibiliteit. Uit onderzoeken die wij afgelopen jaren hebben gedaan blijkt dat studenten een ander beeld hebben van onderwijshuisvesting dan docenten. Het dan ook van belang om dit mee te nemen in besluitvorming. In dit paper zal daarom, aan de hand van diverse voorbeelden uit de praktijk, worden onderzocht hoe de campus van vandaag kan worden aangepast aan het onderwijs van morgen. Hiermee bieden we de campusmanagers een instrumentarium voor effectieve campusontwikkeling.

Leeswijzer

In deze paper beschrijven we eerst de context waarin de campusmanager opereert en de invloeden waarmee hij te maken krijgt, zodat de complexiteit van de opgave helder is. Vervolgens leggen we een aanpak om de optimale mix en ordening van ruimten binnen een onderwijsinstelling te bepalen uit. Hierin staan scenarioplanning, gebruik van persona's en student journeys centraal. Aan de hand van diverse praktijkvoorbeelden illustreren we hoe deze aanpak kan worden toegepast en welke resultaten dit kan opleveren. We sluiten af met de belangrijkste lessons learned.

2. De context van de campusmanager

De hedendaagse onderwijspraktijk, en daarmee de campus, staat onder invloed van diverse ontwikkelingen. Het gaat dan voornamelijk om drie belangrijke factoren: digitalisering, nieuwe organisatievormen en duurzaamheid in de breedste zin van het woord.

Digitalisering verandert de manier waarop onderwijs wordt aangeboden en de daarvoor benodigde ruimtes. Tijdens de coronapandemie werd onderwijs digitaal aangeboden via platforms zoals MS Teams en Zoom, maar echte digitalisering gaat verder. Het biedt functionaliteiten voor tijd- en plaatsonafhankelijk studeren, vooral bij zelfstudie en asynchrone leeractiviteiten, wat leidt tot variatie in onderwijspraktijken en een nieuwe ruimtevraag. Denk aan een grotere behoefte aan collaborative classrooms en minder vraag naar traditionele klaslokalen of collegezalen.

Daarnaast wordt onderwijs steeds flexibeler en meer student-specifiek, wat andere **organisatievormen** vereist. Voorbeelden hiervan zijn leven lang ontwikkelen, eigen leerpaden en micro-credentials. Het is belangrijk om leeractiviteiten zo te organiseren en te begeleiden dat studenten optimaal betrokken raken bij hun eigen leerproces en leeropbrengst. Dit vraagt om flexibiliteit in en van de omgeving waarin leeractiviteiten plaatsvinden, zowel fysiek (waar of wanneer activiteiten plaatsvinden of waar of wanneer kan worden gestudeerd) als organisatorisch (door wie en op welke wijze studenten worden gevolgd, hoe leeractiviteiten kunnen worden afgerond).

Duurzaam onderwijs is de derde belangrijke ontwikkeling. Studenten en instellingen zijn zich steeds meer bewust van hun bijdrage aan klimaatdoelstellingen. Het verduurzamen van gebouwen is al een gegeven; nu gaat het vooral om het integreren van duurzaamheid in onderwijs. Het gaat dan om het curriculum, pedagogisch-didactische aanpak, bedrijfsvoering en de rol van de campus. Denk bijvoorbeeld aan het integreren van duurzaamheid en ecologie in het curriculum, waarbij de campus kan dienen als een voorbeeld voor hands-on leren en het bevorderen van duurzaam bewustzijn.

De opgave van de campusmanager

Elk onderwijsinstituut is anders, naast verschillen in opleidingen zijn er verschillen in cultuur, kernwaarden en opvattingen. Daarom bestaat er ook niet één optimale campus; de vorm en functie van een campus worden bepaald door de keuzes die gemaakt zijn en worden over hoe het onderwijs gefaciliteerd wordt en welke uitstraling de instelling nastreeft. Deze keuzes zijn gebaseerd op de eerdergenoemde organisatie kernwaarden, maar ook de bestaande portefeuille en de financiële middelen van de instelling zijn bepalende factoren, waardoor elke campus uniek is.

Onderwijsruimten zijn kostbaar, en de middelen die hierin worden geïnvesteerd kunnen niet elders worden besteed. De campusmanager moet daarom zorgvuldige keuzes maken over de aard en omvang van deze investeringen, die langdurige effecten hebben. Door veranderende studentenaantallen (Figuur 12.1), bezuinigingen op de overheidsfinanciering voor onderwijs (Ministerie van Financiën, 2025) en toenemende concurrentie bij het verkrijgen van onderzoeksgelden of het werven van talent, wordt het steeds belangrijker om schaarse middelen effectief te besteden.

De campusmanager moet waarde toevoegen aan het campusvastgoed door belangen van verschillende groepen te balanceren en oplossingen te vinden. Rekening houdend met de veranderingen in het onderwijs, het curriculum, de onderwijsgevenden en studenten. Dit is een complexe taak, omdat de belangen vaak tegenstrijdig zijn en ontwikkelrichtingen niet eenduidig.

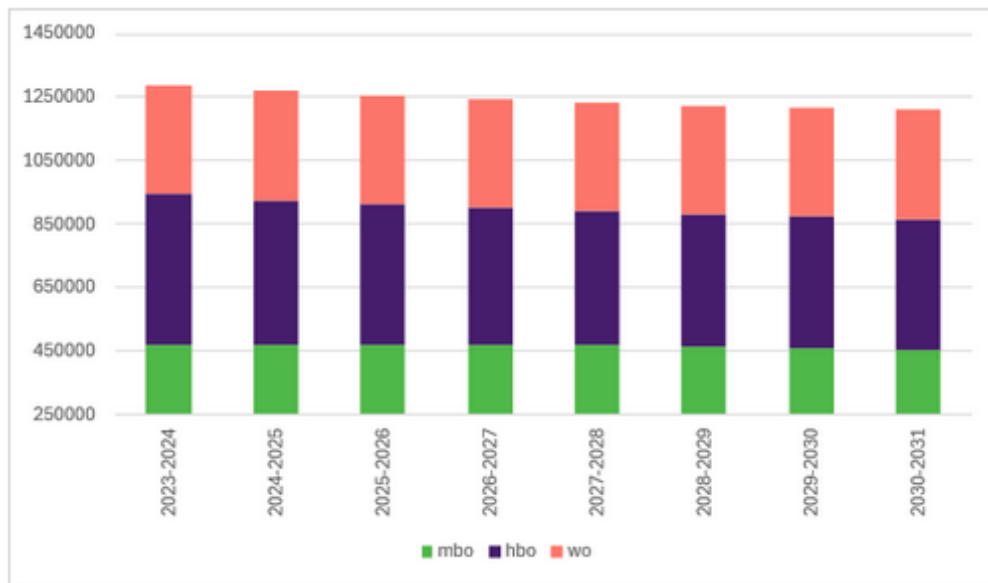


Figure 12.1: Onderwijsprognoses (Ministerie van OCW, 2024)

3. Aanpak voor toekomstbestendige campusplanning

Niemand kan de toekomst voorspellen. Toch moet de campusmanager anticiperen op mogelijke veranderingen zodat de campus toekomstbestendig blijft. Om hier gestructureerd mee om te gaan, wordt in deze sectie een aanpak uiteengezet voor het bepalen van toekomstige trends en het formuleren van een optimale mix van ruimten. Centraal in deze aanpak staan scenarioplanning, persona's en student journeys.

Scenarioplanning is een strategisch managementinstrument dat organisaties kunnen gebruiken om zich voor te bereiden op een onzekere toekomst. De methode richt zich niet op wat zal gebeuren, maar op wat kan gebeuren, zodat de men in staat is veerkrachtig te reageren wanneer ontwikkelingen zich daadwerkelijk voordoen.

a. Scenarioplanning

Scenarioplanning richt zich dus op het verkennen van lange termijnontwikkelingen en het maken van robuuste strategische keuzes in een context die steeds meer complex en onzeker is. Door uit te gaan van de waarschijnlijkheid van ontwikkelingen en de mate van beïnvloeding, helpt het onderwijsinstellingen om zich voor te bereiden op verschillende mogelijke toekomsten, in plaats van zich te richten op één enkele (wens) denkrichting. Dit maakt het mogelijk om te reflecteren en te discussiëren over risico's, kansen en de mogelijkheden om hierop voor te bereiden.

Een voorbeeld is de uitwerking van de Future Campus door SURF (2024). Hierin zijn de belangrijkste drijvende krachten en trends geformuleerd die de toekomst van de campus zouden kunnen beïnvloeden. Vervolgens zijn op basis van sessies met diverse stakeholders conceptscenario's (mogelijke toekomsten) opgesteld. Er is onderscheid gemaakt in vier archetypen: groei, discipline, transformatie en ineenstorting. In de onderstaande figuur zijn de scenario's samengevat. De scenario's dienen met een kritische blik benaderd te worden. Ze zijn niet bedoeld om de toekomst te voorspellen of enige vorm van wenselijkheid of

onwenselijkheid te suggereren. De uitkomst van een scenario kan zowel positief en negatief zijn, afhankelijk per persoon of organisatie.



Figure 12.2: Scenario's voor de campus in 2040 (SURF, 2024)

b. Persona's en user journeys

Om gebruikers van gebouwen en hun ervaring te begrijpen zijn het opstellen van persona's en user journeys geschikte methoden. Persona's zijn fictieve profielen die representatief zijn voor verschillende gebruikersgroepen, gebaseerd op onderzoek naar hun demografische kenmerken, gedragingen, doelen en uitdagingen. Van de persona's kunnen (user) journeys worden uitgewerkt. Dit zijn visuele of beschrijvende weergaven van de stappen en touchpoints die een persona doorloopt in een bepaalde leer- of werkomgeving, met als doel inzicht te krijgen in de gebruikerservaring. Juist voor het betrekken van de studenten zijn deze methoden geschikt vanwege hun expliciete voorkeuren. De opgestelde persona's kunnen daarnaast gebruikt worden voor de organisatie van het onderwijs, in de marketing is het gebruik van persona's een bekend middel.

Hahné (2023) heeft deze methode toegepast om de behoeften van (toekomstige) MBO-studenten te achterhalen. In Figuur 12.3 zijn persona's en student journeys als voorbeeld weergegeven (Hahné, 2023). In sessies met studenten is per persona een "dag in de week" ingevuld: Hoe laat kom je aan, wat wil je dan doen en waar wil je dat doen? Zo kan de koppeling tussen gewenste bouwstenen per persona (bijvoorbeeld praktijkruimte, werkgroepzalen, focusplekken) en de verdeling over behoeftezones (rust, ruis en rumoer) opgesteld worden. Deze resultaten vormen een mogelijke basis voor het opstellen en toetsen van de uitgangspunten van de leeromgeving.

In de figuur is de dag van Robbin weergegeven. Robbin arriveert met de fiets op school en geeft in de ochtend de voorkeur aan instructies in groepen, gevolgd door samenwerking in projectgroepen. Dit vindt plaats in een instructiezaal of werkruimte voor ongeveer 20 personen met een flexibele inrichting, waar zowel geconcentreerd werken als overleggen mogelijk is, afhankelijk van de onderwijsactiviteiten van die dag. Belangrijk is dat de groepen ook uit kunnen wijken voor overleg in open of gesloten ruimtes. Na de lunch wil Robbin graag actief bezig zijn, wat neerkomt op praktijklessen in een daarvoor bestemde ruimte binnen de zone rumoer of ruis. De dag wordt afgesloten met projectwerk in een overlegkamer die geschikt is voor informeel overleg en meer ruis.

Activiteiten				
Theorie met aansluitend samenwerken in groepen	Korte pauze tussen de lessen door	Lange lunch pauze	Praktijks/ opdrachten	Samenwerken in groepen
Zone: rust	Zone: rumoer	Zone: rumoer	Zone: rumoer of rust	Zone: rust
Mogelijke bouwstenen				
- Algemene vakken in centraal gelegen instructieruimte voor maximaal 20 personen - Werkgroep zalen bij de kern van de opleiding voor +/- 20 personen met uitzicht van de identiteit - Werkruimte voor +/- 20 personen met een flexibele inrichting in de kern van de opleiding - Uitzichtmogelijkheden voor overleg in open en gesloten ruimtes (2-4 personen) vanuit de werkruimte	Ontspanning op centrale plekken met lunch, fruit en activiteiten (tafeltennis etc.)	- Ontspanning op centrale plekken met lunch, fruit en activiteiten (tafeltennis etc.) - Open omgevingen in huiskamer settingen voor informeel ontmoeten en netwerken - Een plek om op adem te komen, mediteren en bieden gezamenlijk plaats kunnen vinden	Praktijgerichte ruimtes waar men overtuigd in groepen kan samenwerken aan projecten	- Overlegruimten voor informeel en formeel overleg in open en gesloten ruimtes (1-4 personen) - Overlegruimten voor informeel en formeel overleg in open en gesloten ruimtes (5-8 personen) - Werkplekken voor samenwerken in een formele niet domein specifieke setting

Figure 12.4: Persona's, student journeys, en bouwstenen uit 'De wensen en behoeften van de onderwijsgebruiker van de toekomst' (Hahné, 2023)

4. Praktijkvoorbeelden

De hierboven beschreven aanpak kan in de dagelijkse praktijk van de campusmanager meerwaarde bieden. In deze sectie worden verschillende cases uit de praktijk behandeld om de resultaten en effectiviteit van scenarioplanning, persona's en user journeys in de praktijk te illustreren of om te laten zien hoe het gebruik van de aanpak tot andere inzichten had kunnen leiden. Deze praktijkvoorbeelden laten zien hoe inzicht in de uiteenlopende behoeften van gebruikers bijdraagt aan het creëren van een passende onderwijsomgeving.

a. Veranderende financiële context

Wij constateren dat onderwijsinstellingen die bezig zijn met nieuwbouwplanning voor hun campus de afgelopen jaren steeds vaker geconfronteerd worden met een veranderende financiële context. Sinds kort ligt voor de overheidsfinanciering voor het hoger onderwijs een flinke bezuiniging op tafel (Ministerie van Financiën, 2025), en onderwijsinstellingen willen zo veel mogelijk voorkomen dat deze hun primaire proces raken. Daarom is de campus één van de zaken waar deze bezuinigingen als eerste zal worden gevoeld. Campusmanagers die bezig zijn met ambitieuze plannen om moderne faciliteiten te realiseren, worden nu, midden in hun planning, geconfronteerd met afnemende financiering, wat hen dwingt hun strategie aan te passen. In deze situatie kan scenarioplanning een cruciale rol spelen.

Om hierop voorbereid te zijn begint de campusmanager in de initiatieffase van het project met het identificeren van relevante externe ontwikkelingen die hun financiering en nieuwbouwplannen beïnvloeden. Ze analyseren de economische situatie, politieke beslissingen, demografische veranderingen, technologische ontwikkelingen en sociale trends. Deze factoren vormen de basis voor het ontwikkelen van verschillende mogelijke scenario's. Hieronder zijn drie voorbeelden uitgewerkt:

- **Scenario 1** gaat uit van stabiele financiering. In dit geval kunnen de nieuwbouwplannen zonder grote aanpassingen worden uitgevoerd

- **Scenario 2** houdt rekening met verminderde financiering. De universiteit moet haar plannen aanpassen, bijvoorbeeld door te kiezen voor goedkopere materialen of een kleinere bouw. Ze kunnen ook alternatieve financieringsbronnen zoeken. Daarnaast kunnen ze kostenbesparende maatregelen nemen, zoals multifunctionele en gedeelde ruimtes.
- **Scenario 3** beschrijft een situatie van drastische bezuinigingen. De universiteit moet mogelijk haar nieuwbouwplannen uitstellen of herzien om kosten te besparen. Dit kan betekenen dat ze prioriteit moeten geven aan de meest essentiële faciliteiten en andere projecten moeten uitstellen.

Door scenarioplanning toe te passen, kunnen instellingen die te kampen krijgen met veranderende omstandigheden dus beter voorbereid zijn op onzekerheden en strategische keuzes maken die hen helpen hun doelen te bereiken ondanks afnemende financiering.

b. 'De dag van ...'

Voor de herinrichting van Hogeschool A zijn de dagelijkse activiteiten van docenten, studenten en medewerkers, evenals hun verwachtingen voor de toekomst in kaart gebracht. In meerdere sessies is "de dag van..." ingevuld. Hierbij werd de deelnemers gevraagd de optimale dag in de week in 2030 te beschrijven. Vervolgens is gevraagd welke ruimten, voorzieningen en diensten daarvoor nodig zijn. De gestelde vragen omvatten onder andere: Hoe werk of studeer ik gedurende de dag? Op welke tijdstippen vinden mijn activiteiten plaats? Wat heb ik nodig om mijn werk of studie goed te kunnen uitvoeren? De verkregen input, die is verzameld met de activiteitenagenda in Figuur 12.4, is vervolgens uitgewerkt naar persona's en journeys.

De combinatie van de verschillende journeys liet een tegenstelling in de toekomstverwachtingen van studenten en docenten zien. Docenten gaven over het algemeen de voorkeur aan een meer traditionele didactiek voor theorie, met grote hoorcolleges en kleinere werkgroepzalen voor praktijk verdeeld over de dagen in de week om de studielast te beperken. Studenten daarentegen hadden juist behoefte aan intensieve en interactieve lessen waarbij theorie direct aan praktijk kan worden gekoppeld, met kleinere groepen en een nadruk op samenwerking. Daarnaast wilden studenten juist laagdrempelig toegang hebben tot docenten terwijl docenten de voorkeur hadden voor het werken met afspraken. Ook gaven studenten de voorkeur aan het concentreren van lesuren op een beperkt aantal dagen per week. Hierdoor konden zij op de overige dagen werken en hoefden zij niet vijf keer per week naar de locatie te reizen.

Op basis van deze resultaten koos Hogeschool A ervoor om haar locatie optimaal af te stemmen op de opgestelde journeys. Dit betekende het creëren van een grote centrale ontmoetingsplek met goede koffie, nabij het Student Succes Centrum. Rondom deze centrale plek zijn alle opleidingen geordend met praktijklokalen, zodat zichtbaar is wat er gedaan wordt. De generieke theorieluimten zijn verderop in de torens ondergebracht. Dit voorbeeld laat zien dat de persona's en journeys van studenten en docenten belangrijk was voor het ontwikkelen van een onderwijsomgeving die optimaal aansluit bij de verwachtingen en didactische behoeften van beide groepen. Wanneer alleen de inbreng van docenten mee was genomen waren waarschijnlijk andere keuzes gemaakt.



Figure 12.5: De centrale ontmoetingsplek van Hogeschool A; Links de oude , rechts de nieuwe situatie. (Aestate)

c. Ruimte voor informele ontmoeting

Het ontmoeten en delen van kennis wordt steeds belangrijker in het onderwijs. Er is een toenemende vraag naar informele ruimtes waar studenten en docenten elkaar op een laagdrempelige manier kunnen ontmoeten en kennis kunnen delen. Bij Hogeschool B bleek echter dat er grote verschillen in benutting van deze ruimtes ontstonden. Moonen (2025) richtte zich daarom op het verklaren van dit fenomeen en het vinden van manieren waarop onderwijsinstellingen het gebruik van informele ruimtes voor studenten en docenten kunnen stimuleren.

Bij Hogeschool B werden de ontmoetingsruimten voor docenten en studenten, waarvan twee voorbeelden zijn weergegeven in Figuur 12.6, breed ingevoerd na een succesvolle pilot bij één studierichting. De ruimte die door de gebruikers als positief werd beoordeeld, werd als 'standaard' ruimte overgenomen. Echter bleek het ruimteconcept, dat was ontwikkeld voor één studierichting, niet succesvol bij andere studierichtingen. De benutting was laag en er was beperkt sprake van ontmoeten en kennisdeling vergeleken met het succesvolle voorbeeld (Moonen, 2025).



Figure 12.6: Voorbeelden van onderwijsruimten voor persoonlijke interacties en mentorschap (links) en persoonlijke- en functionele interacties (rechts) (Moonen, 2025)

Dit voorbeeld illustreert dat het succes van een goede informele student- en docentruimte verder reikt dan alleen het faciliteren van een fysieke ruimte. De benutting van deze 'standaard' ruimtes bleek afhankelijk van de locatie in het gebouw en mate waarin het onderwijsconcept van de studierichting informeel contact tussen docent en student nastreefde. Bij een toekomstig vraagstuk is het volgens Moonen (2025) daarom belangrijk om te bedenken welke vorm van contact tussen studenten en docenten gewenst is (persona's), na te gaan waar de vraag naar een informele student- en docentruimte vandaan komt (journeys), en stil te staan bij de cultuur en de ontwikkelingen binnen de universiteit, hogeschool of opleiding (scenario's).

d. Gedeelde onderwijsgebouwen bij universiteiten

Universiteiten richten zich bij de ontwikkeling van hun campus steeds meer op het stimuleren van ontmoetingen tussen studenten van verschillende opleidingen om interdisciplinaire samenwerking te bevorderen (Kocken, 2024). In lijn met deze ambitie hebben diverse universiteiten gedeelde onderwijsruimten en gebouwen ontwikkeld.

Onderwijsgebouwen zijn steeds minder vaak aan één faculteit verbonden en worden ontworpen met de intentie om de interactie tussen studenten van verschillende faculteiten te faciliteren. Die gebouwen bevatten over het algemeen een divers scala aan onderwijsruimten die geschikt zijn voor verschillende didactische vormen en flexibel kunnen worden ingedeeld, evenals studieplekken (Figuur 12.7). Na de ingebruikname van deze gebouwen blijkt echter vaak een spanning te bestaan tussen de organisatorische doelstellingen en de voorkeuren en behoeften van gebruikers.

Uit interviews met studenten bleek dat zij zich in deze onderwijsgebouwen, die specifiek zijn ontwikkeld met interactie en samenwerking in gedachte, vrijwel uitsluitend concentreren op hun eigen studie en programma. Wanneer studenten op zoek zijn naar interactie, vinden ze het praktischer om contact te leggen met studiegenoten van hun eigen opleiding, omdat het dan eenvoudiger is om vragen te stellen en hulp te krijgen. Daarom zoeken ze studieruimtes in de buurt van de thuisbasis van hun opleiding als ze hier meer behoefte aan hebben, of gebruiken ze digitale communicatie om in contact te komen met studiegenoten als ze in deze onderwijsgebouwen studeren (Kocken, 2024). Hieruit kan worden geconcludeerd dat de fysieke inrichting van onderwijsgebouwen interdisciplinaire samenwerking enkel kan faciliteren. Of er vervolgens interactie plaatsvindt hangt sterk af van een organisatorische aanpak die dergelijke samenwerkingen ondersteunt.

Dit voorbeeld laat zien dat het niet mogelijk is om interactie tussen studenten af te dwingen met enkel de fysieke ruimte, en dat het van belang is om van tevoren inzicht te hebben in de aanvullende voorwaarden waaronder studenten hier wél behoefte aan hebben. Inzicht in de behoeften van gebruikers door het opstellen van persona's en journeys had vooraf inzicht kunnen bieden in de spanning tussen de verwachtingspatronen van de organisatie en de campusgebruiker.

5. Afstemming tussen onderwijsinhoud en fysieke ruimten



Figuur 12.7: Voorbeelden van gedeelde onderwijsruimten (Links: Bloem, n.d., rechts: WUR, n.d.)

De overgang naar nieuwe onderwijsvormen brengt niet alleen veranderingen in didactiek en fysieke ruimte met zich mee, het vraagt ook om een andere benadering van examinering. Bij Hogeschool C is dit proces zichtbaar geworden toen, op verzoek van een specifiek college het onderwijs opnieuw werd ingericht: De dag start met een plenaire instructie, gevolgd door groepsgewijs uitwerken van opdrachten, en wordt afgesloten met een gezamenlijke presentatie. Het uiteindelijke doel is om het volledige curriculum te baseren op de individuele leerdoelen van studenten, waarbij toetsing plaatsvindt via portfolio's. Dit vraagt om een andere manier van beoordelen, gericht op ontwikkeling en reflectie in plaats van standaard kennistoetsen. Om de onderwijsruimten af te stemmen op deze manier van onderwijs zijn de ruimtes ingericht met verschillende werkplekken, verrijdbare whiteboards en in sommige gevallen digitale schermen (Figuur 12.8).

Het transitieproces van het oude curriculum naar het nieuwe curriculum vraagt tijd. Tijdens deze overgang werd er deels nog traditioneel getoetst, waarvoor de heringerichte ruimtes niet geschikt waren. Schriftelijke toetsen vereisen immers traditionele lokalen met tafels en stoelen. Omdat de onderwijsruimtes al opnieuw waren ingericht ontstond dus een tijdelijke behoefte aan extra onderwijsruimten. Deze schakeling tussen traditionele en vernieuwde onderwijsruimten zorgde niet alleen voor een verhoogde ruimtebehoefte, maar bracht ook verwarring teweeg bij zowel studenten als docenten. Deze situatie onderstreept het belang van een goede afstemming tussen onderwijsinhoud, onderwijslogistiek en de fysieke leeromgeving. De planning van ruimtelijke aanpassingen moet gelijke tred houden met de voortgang van het curriculumontwerp.



Figure 12.8: Vernieuwde onderwijsruimten (Aestate)

6. Projectgroep ruimten nieuwe stijl

Bij de introductie van de nieuwe projectgroepruimten bij Hogeschool D werd gekozen voor een andere aanpak: In plaats van aparte kleine projectgroepruimten werden meerdere projectgroepen tegelijk in één grote, open ruimte geroosterd (Figuur 12.9). De ruimte kan hierdoor ook gebruikt worden voor grotere groepen.

In de beginfase leidde dit tot twijfels en zorgen. Veelgehoorde vragen waren: Wordt het geen puinhoop? En zorgt dit niet voor veel herrie en afleiding? De angst voor chaos en geluidsoverlast was begrijpelijk, zeker in een onderwijsomgeving waar concentratie en samenwerking centraal staan.

Al snel werd duidelijk dat communicatie en begeleiding essentieel waren voor het creëren van draagvlak voor de nieuwe oplossing en een succesvolle invoering. Studenten en docenten moesten goed worden meegenomen in het waarom en hoe van de nieuwe opzet. Daarnaast waren duidelijke gedragsafspraken en afstemming tussen groepen noodzakelijk om de ruimte werkbaar te houden. Het zelfregulerend vermogen van de ruimte en gebruikers zorgt ervoor dat de overlast beperkt blijft. De openheid, dat er opgeruimd wordt en het eigenaarschap over de gehele ruimte dat de onderlinge afspraken worden gemaakt en gehandhaafd zonder tussenkomst van facilitair of een beheerder.

Hieruit blijkt dat deze nieuwe manier van werken goed kan functioneren, mits de fysieke ruimte wordt ondersteund door een duidelijke organisatie eromheen. Denk aan heldere instructies, begeleiding en het creëren van een gedeelde verantwoordelijkheid voor het gebruik van de ruimte. Inhoud van het onderwijs, fysieke ruimten en gedrag komen samen.



Figure 12.9: Projectgroepruimten nieuwe stijl bij Hogeschool D (Aestate)

De genoemde voorbeelden zijn slechts een kleine selectie uit de vele casussen van MBO-, HBO- en WO-instellingen waar ruimtes met ambitieuze en duidelijke doelstellingen zijn gerealiseerd, maar toch anders functioneren dan bedoeld. Deze voorbeelden illustreren dat er een minder passende omgeving ontstaat wanneer de wensen van een deel van de gebruikers niet of onvoldoende worden meegenomen in de planvorming. Deze conclusie is aanvullend op de succesfactoren die door SURF (SURF, 2025) zijn geïdentificeerd in het onderzoek naar 14 Nederlandse campusinnovaties: Zorg dan voor stevige bestuurlijke steun, een gemotiveerd en complementair team, een flexibele aanpak, actieve betrokkenheid van gebruikers én een inspirerende fysieke omgeving.

Andere voorbeelden (De Vries, 2007) tonen aan dat ontwikkelingen in de omgeving, zoals groei of krimp van studentenaantallen, veranderende financiering en samenwerkingen met het werkveld, invloed hebben op hoe de gerealiseerde ruimte na oplevering wordt ervaren. Dit komt niet altijd overeen met de oorspronkelijke intenties.

Vanuit deze praktijkervaringen zijn er een aantal succesfactoren te benoemen:

- Het beschrijven van mogelijke toekomsten aan de hand van ontwikkelingen en mate van invloed stelt instellingen in staat de robuustheid van de opgestelde strategie te toetsten en eventueel bij te stellen. Dit geeft ook de mogelijkheid de fysieke ruimte voor te bereiden op mogelijke veranderingen in gebruik in de toekomst, bijvoorbeeld door het aanpassen van de inrichting en/ of de digitale faciliteiten.
- Bij elk ruimtelijk vraagstuk is het belangrijk om te bedenken welke activiteiten uitgevoerd gaan worden, welke mate en vorm van contact tussen gebruikers (zoals studenten en docenten) gewenst is en op welke wijze deze aansluit bij de persoonlijke voorkeuren van de gebruikers (persona's).
- Het combineren van *journeys* van verschillende gebruikersgroepen, zoals studenten en docenten, is essentieel voor het ontwikkelen van een onderwijsomgeving die aan hun verwachtingen en leerstijlen voldoet, waardoor onderwijsinstellingen gerichte strategieën kunnen ontwikkelen en voorkomen dat ruimtes niet aan de gebruikersbehoeften voldoen.
- Interactie tussen studenten (maar ook tussen medewerkers en tussen medewerkers en studenten) kan niet worden afgedwongen met enkel de fysieke ruimte; hoewel ruimtes interdisciplinaire samenwerking kunnen vergemakkelijken, hangt daadwerkelijke interactie sterk af van een organisatorische aanpak die dergelijke samenwerkingen ondersteunt.
- Het is belangrijk dat er een balans gevonden wordt tussen standaardisering en maatwerk. Ook binnen een instelling zijn er verschillen in onderwijsvormen, cultuur en gebruikers. De onderwijsomgeving moet voldoende flexibel zijn voor deze couleure lokale, zonder dat elke ruimte een maatpak is. Dit kan door onderscheid te maken tussen de genoemde robuuste basis en de mogelijkheid te variëren in inrichting.
- Ruimten worden ingericht voor bepaalde activiteiten, het gebruik kan afwijken. Het is essentieel dat het ruimte aanbod wordt afgestemd op de ruimtevraag (behoefte) én het gebruik. Roosteren, onderwijslogistiek speelt hierbij een essentiële rol. Door bij ontwerp zowel het aanbod als de vraag en het gebruik mee te nemen ontstaat meer "ruimte".

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C2 Hoe creëer je een onderwijsgebouw in erfgoed?

This chapter is only available in Dutch

Bauke Meijer, Paul Drewes, Richelle de Jong, Saskia Knoop, Bram Lobeek, Jan-Willem Moerkerk, Monique Arkesteijn (2025)

Key takeaways

ENGLISH:

- **Future-oriented education can be successfully embedded in historic heritage.**

The AMvS demonstrates that modern, flexible, and shared educational spaces can be realised within partially monumental buildings when heritage values are treated as design drivers rather than constraints. Old and new are deliberately integrated through careful restoration, transparent new additions, and material choices that respect historical layers.

- **Educational vision provides the organising logic for spatial design.**

The spatial programme of AMvS is explicitly derived from Utrecht University's educational vision, which balances qualification, socialisation, and personal development. This results in spaces that prioritise collaboration, interaction, active learning, and informal encounter, rather than faculty-specific or highly specialised rooms.

- **Shared, flexible learning spaces improve efficiency and adaptability.**

By shifting from faculty-bound, bespoke classrooms to generic yet adaptable learning spaces, the AMvS supports diverse teaching formats while improving occupancy and utilisation. This approach is particularly relevant in a context of budget constraints and changing group sizes.

- **Sense of belonging and social connection are treated as spatial design objectives.**

The building is not only designed for teaching efficiency, but also for fostering a sense of belonging. Spaces such as the orangerie and the collaborative teaching room are deliberately used to support social interaction, interdisciplinarity, and inclusivity, even for larger student groups.

- **Successful campus development requires integration of spatial, technical, and social strategies.**

The AMvS shows that effective educational buildings emerge from the alignment of heritage preservation, sustainability, technical performance, organisational use, and behavioural considerations. Physical design alone is insufficient; collaboration with heritage authorities, behavioural researchers, and users is essential for long-term success.

NEDERLANDS:

- **Toekomstgericht onderwijs kan worden ingepast in historisch erfgoed.**

Het AMvS laat zien dat moderne, flexibele en gedeelde onderwijsruimten goed te realiseren zijn binnen (deels) monumentale panden, mits erfgoedwaarden als

uitgangspunt voor het ontwerp worden genomen. Door zorgvuldige restauratie, transparante nieuwbouw en doordachte materiaalkeuzes versterken oud en nieuw elkaar.

- **De onderwijsvisie vormt de leidraad voor het ruimtelijk ontwerp.**

De ruimtelijke opzet van het AMvS is direct afgeleid van de onderwijsvisie van de Universiteit Utrecht, waarin kwalificatie, socialisatie en persoonsvorming in balans zijn. Dit vertaalt zich in ruimten die samenwerking, ontmoeting en activerend leren faciliteren, in plaats van sterk faculteitsgebonden of gespecialiseerde lokalen.

- **Gedeelde en flexibele onderwijsruimten vergroten efficiëntie en wendbaarheid.**

De verschuiving van specifieke, faculteitsgebonden ruimten naar generiek ingerichte maar aanpasbare leeromgevingen maakt het mogelijk uiteenlopende onderwijsvormen te ondersteunen en tegelijkertijd de bezetting en benutting te verbeteren. Dit is essentieel in tijden van financiële druk en veranderende groepsgroottes.

- **Welzijn en 'sense of belonging' zijn expliciete ontwerpdoelen.**

Het gebouw is niet alleen ontworpen voor functioneel onderwijsgebruik, maar ook om verbondenheid te stimuleren. Ruimten zoals de orangerie en de collaboratieve onderwijsruimte ondersteunen sociale interactie, interdisciplinariteit en inclusiviteit, ook bij grotere studentenaantallen.

- **Effectieve campusontwikkeling vraagt om integratie van ruimte, techniek en organisatie.**

Het AMvS toont aan dat toekomstbestendige onderwijsgebouwen ontstaan door samenhang tussen erfgoedzorg, duurzaamheid, technische prestaties, organisatie van gebruik en aandacht voor gedrag. Fysiek ontwerp alleen is onvoldoende; samenwerking met erfgoedinstanties, gebruikers en gedragsdeskundigen is cruciaal voor blijvend succes.

De ontwikkeling van het Anna Maria van Schurmangebouw, een nieuw onderwijscentrum in de historische binnenstad van Utrecht

De Universiteit Utrecht (UU) is bezig om in het hart van de historische binnenstad van Utrecht een nieuw onderwijscentrum te realiseren in een complex van vier gedeeltelijk monumentale panden: het *Anna Maria van Schurmangebouw* (AMvS) (Figuur 13.1). Dit hoofdstuk beschrijft de totstandkoming van dit onderwijscentrum: van onderwijsvisie tot restauratie, van stedenbouw tot samenwerking, van experiment tot gebruik. Hoe combineer je toekomstbestendig onderwijs met zorg voor erfgoed?

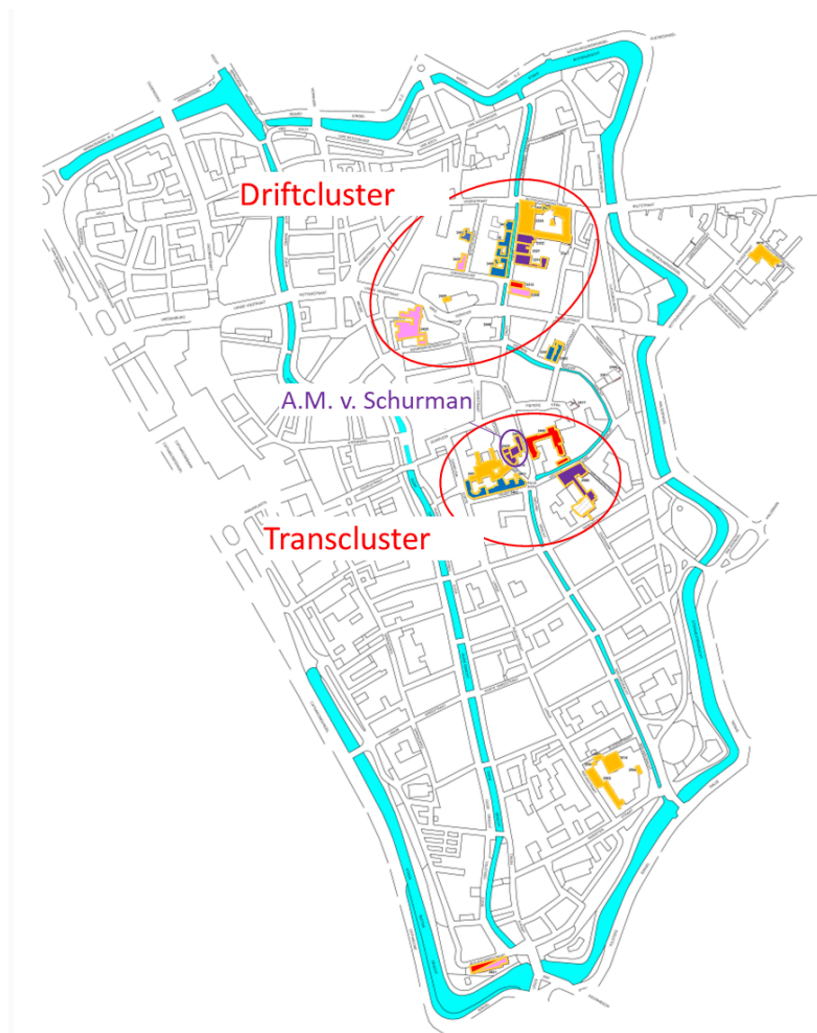


Figuur 13.1: Anna Maria van Schurmangebouw (bron: DP6 architectuurstudio, via DP6 co-auteur De Jong)

De historische aanwezigheid van de UU

De UU is sinds 1636 aanwezig in de historische binnenstad van Utrecht. Door de eeuwen heen is gebleken dat de aanwezigheid van de universiteit voor de stad Utrecht van grote betekenis is. De stad Utrecht was bijvoorbeeld mede-financier bij de ontwikkeling van het huidige Academiegebouw (ca 1891). Naast de ontwikkeling van het Utrechts Science Park (USP; voorheen De Uithof), blijft de UU met twee faculteiten (Geesteswetenschappen en REBO) strategisch gehuisvest in de binnenstad. Om effectieve bedrijfsvoering mogelijk te maken, zet de UU in op het versterken van twee binnenstadclusters, het Driftcluster en het Transcluster (Figuur 13.2). Het AmvS maakt deel uit van het Transcluster.

De naam is symbolisch: Anna Maria van Schurman was in 1636 de eerste vrouwelijke student van Nederland, en moest nog vanuit een afgeschermd ruimte onderwijs volgen. Het AMvS wil juist een uitnodigende en inclusieve omgeving creëren. De locatie is treffend, Anna Maria van Schurman betrok in 1627 een woning aan de huidige Achter de Dom 8 in Utrecht.



Figuur 13.2: regio binnenstad met Driftcluster, Transcluster (bron: Universiteit Utrecht, UU)

Opgave: ruimte voor onderwijs in historisch erfgoed

De binnenstad van Utrecht is een bijzondere plek voor academisch onderwijs: rijk aan geschiedenis én levendige ontmoetingen. Tegelijkertijd vraagt het intensieve gebruik van deze waardevolle gebouwen om slimme, toekomstgerichte keuzes. Uit analyse bleek dat er in de binnenstad op termijn een tekort aan geschikte onderwijsruimte dreigde – vooral voor grotere groepen studenten (meer dan 20 personen). Het inpassen van modern onderwijs in monumentale panden is echter geen eenvoudige puzzel.

Met respect voor de historische context én oog voor de behoeften van nu en straks, is gekozen voor een integrale aanpak: het samenvoegen van meerdere panden en het toevoegen van nieuwbouw in het gebied Achter Sint Pieter en Achter de Dom. Zo ontstaat een samenhangend geheel dat ruimte biedt aan flexibel, gedeeld en goed gefaciliteerd onderwijs.

Waar onderwijsruimten vroeger vaak faculteitsgebonden en specifiek waren, zetten we nu in op gedeeld gebruik, efficiëntie en kwaliteit. De onderwijsvoorzieningen zijn generieker ingericht, maar sluiten nog steeds aan bij uiteenlopende onderwijsvormen. Zo maken we de binnenstad duurzaam geschikt voor toekomstgericht onderwijs. Met de huidige

bezuinigingen in het onderwijs is dat van groot belang om ook een betere bezetting en benutting te bewerkstelligen.

Onderwijsvisie als basis

Het onderwijs aan de Universiteit Utrecht kent een grote diversiteit aan vormen: van kleinschalig bachelor onderwijs tot interdisciplinair masteronderwijs, promotietrajecten en onderwijs voor professionals. Wat deze vormen bindt, is de onderwijsvisie van de UU. Die verbindt leren aan maatschappelijke vraagstukken, stimuleert samenwerking over de grenzen van disciplines heen en is gericht op drie doelen: kwalificatie, socialisatie en persoonsvorming. Goed onderwijs is het resultaat van een zorgvuldige balans tussen deze drie doelen.

- **Kwalificatie:** Studenten verwerven wetenschappelijke kennis en vaardigheden en ontwikkelen een kritische houding. Dit vormt hen tot professionals die een waardevolle bijdrage kunnen leveren aan de maatschappij.
- **Socialisatie:** Studenten leren zich te bewegen binnen academische, sociale en professionele culturen, praktijken en tradities. Zo ontwikkelen zij de vaardigheden om effectief te functioneren binnen de universitaire gemeenschap, hun vakgebied en de samenleving als geheel.
- **Persoonsvorming:** Studenten ontwikkelen zich tot zelfstandige en verantwoordelijke individuen. Ze worden gestimuleerd om zichzelf vragen te stellen over wat ze willen leren, wie ze zijn, wie ze willen worden en hoe ze willen bijdragen aan de maatschappij.

Het onderwijs van de UU wordt gegeven volgens de volgende principes:

- **Sterke academische basis:** Ons onderwijs biedt studenten een solide academische basis met diepgaande kennis in een of meerdere disciplines. Daarbij ligt de nadruk op interdisciplinaire samenwerking en maatschappelijke relevantie. Onze Open Science-principes en aandacht voor wetenschappelijke integriteit zorgen voor transparantie en kwaliteit.
- **Betrokkenheid bij de maatschappij:** Bij de UU leren studenten verder te kijken dan hun eigen discipline. Ze werken samen aan complexe maatschappelijke vraagstukken, ontwikkelen een kritische en constructieve houding en oefenen met helder communiceren en ethisch handelen.
- **Ruimte voor persoonlijke ontwikkeling:** We geven studenten de ruimte om eigen keuzes te maken en zichzelf te ontwikkelen. Onze docenten helpen studenten bij het ontwikkelen van vaardigheden zoals leiderschap, samenwerking en aanpassingsvermogen, die essentieel zijn voor hun toekomst.

Ruimte die goed onderwijs mogelijk maakt

Het onderwijsgebouw AMvS is ontworpen vanuit de onderwijsvisie van de UU. Dat betekent: ruimte voor ontmoeting, samenwerking en activerend leren. In tabel 13.1 vind je een overzicht van ruimte en omvang.

Tabel 13.1: overzicht omvang, aantal en type ruimten AMvS

Ruimte	Aantal	m ² f.n.o
Werkgroepruimten	2x 24p, 4x 20p, 5x 30p	647
Active learning space	1 ruimte voor 30 studenten	71,5
Collaboratieve onderwijsruimte	1 ruimte voor 60 studenten	107,5
Projectruimten	4x 6p, 9x 8p	218,5
Studieplekken	60 personen	221
Ontmoetingsplekken	52	dubbel ruimtegebruik
Overlegplekken	62	dubbel ruimtegebruik

De onderwijsruimten zijn herkenbaar, flexibel en doordacht ingericht. Door de keuze voor modulaire inrichting, flexibele opstellingen, schrijfbaar wanden en open zones nodigen ze uit tot samenwerking en interactie (Figuur 13.3). Zo ondersteunt het gebouw de variatie aan onderwijsvormen die de UU rijk is – nu en in de toekomst.



Figuur 13.3: studieruimte op begane grond (bron: DP6 architectuurstudio, via DP6 co-auteur De Jong)

Experimenteren met ruimte en gevoel van verbondenheid

Binnen het programma Future Learning Spaces experimenteert de UU met nieuwe onderwijsconcepten. In het AMvS gebeurt dit onder meer in de collaboratieve onderwijsruimte. Hier wordt niet alleen geëxperimenteerd met ruimtelijke inrichting, maar ook met de sociale dimensie: hoe kan een ruimte bijdragen aan het gevoel van 'sense of belonging' bij het faciliteren van wel 60 studenten? Overigens sluit de ruimte een meer klassieke onderwijsvorm niet uit, om zo de bezetting optimaal te houden.

Bouwen met respect voor de tijd

Het onderwijscentrum verrijst op een plek vol geschiedenis – van Romeinse vicus en middeleeuwse kelders tot negentiende-eeuwse stadspanden en een voormalige bank. Vier bestaande panden, waaronder drie rijksmonumenten, worden zorgvuldig met elkaar verbonden via een lichte, transparante orangerie, die fungeert als hoofdentree en hart van het gebouw (Figuur 13.4). De renovatie brengt de rijkdom aan tijdlagen tot leven. Historische elementen worden hersteld of opnieuw zichtbaar gemaakt, met behulp van kleuronderzoek en oude foto's. Nieuwe ingrepen sluiten hierop aan – met bio-based en gerecyclede materialen als hedendaagse vertaling van monumentale kwaliteit. Zo ontstaat een vernieuwd geheel waarin oud en nieuw elkaar versterken, en waarin erfgoed toekomst krijgt.



Figuur 13.4: entree orangerie (bron: DP6 architectuurstudio, via DP6 co-auteur De Jong)

Technische en maatschappelijke eisen geïntegreerd

Monumentaal erfgoed verduurzamen is complex. Isolatie, ventilatie, akoestiek, toegankelijkheid – alles vraagt om maatwerk. In het ontwerp van het AMvS zijn deze aspecten subtiel en functioneel verwerkt. Denk aan lambrisering die zowel de akoestiek als ventilatie ondersteunt, en aan een centrale trap die meerdere vloerhoogtes overbrugt en tegelijk de lift integreert. Zo voldoet het gebouw aan de eisen van nu, met respect voor de waarden van het verleden.

Verbinden van gebouwen, mensen en disciplines

De orangerie verbindt de verschillende panden op de begane grond tot één logisch, samenhangend geheel. De transparante structuur opent zich naar de binnentuin en biedt zicht op de lucht en de Domtoren. Het AMvS wordt daarmee niet alleen een fysiek knooppunt, maar ook het hart van het Transcluster: een plek voor ontmoeting, samenwerking en verbinding tussen studenten, docenten, onderzoekers en gasten – over faculteitsgrenzen heen.

Verantwoordelijkheid nemen: erfgoed, omgeving en gedrag

Het gebruik van historisch vastgoed brengt verantwoordelijkheden met zich mee – zowel in het omgaan met erfgoed als in de impact op de omgeving. Monumentale waarden zoals hoogteverschillen of detaillering staan soms op gespannen voet met eisen van toegankelijkheid of duurzaamheid. De UU werkt hierin nauw samen met de Rijksdienst voor Cultureel Erfgoed.

Ook sociaal-maatschappelijke vraagstukken krijgen aandacht. De komst van studenten en medewerkers beïnvloedt de leefomgeving in de binnenstad. Rookgedrag, fietsparkeren en geluidsoverlast zijn reële aandachtspunten. Daarom werkt de UU samen met gedragsonderzoekers, onder meer van de faculteit Sociale Wetenschappen, om via communicatie en gedragssturing overlast te beperken. Denk aan fietscoaches die studenten bij de start van het collegejaar wegwijs maken in voorzieningen.

Realisatie

De UU verwacht medio 2026 te starten met de werkzaamheden en na de realisatie kijken we uit om het gebouw in gebruik te nemen voor een succesvolle bijdrage aan het onderwijs en onderzoek.



Figuur 13.5: orangerie (bron: DP6 architectuurstudio, via DP6 co-auteur De Jong)

Reflectie

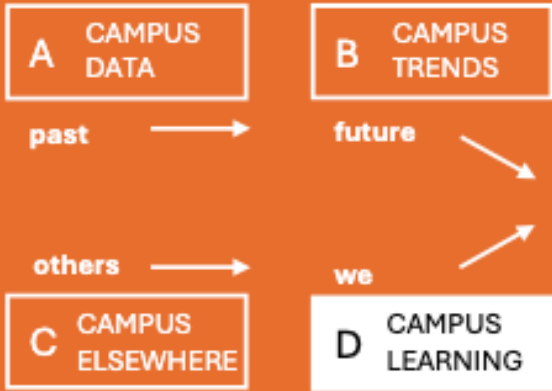
De ontwikkeling van het Anna Maria van Schurmangebouw laat zien hoe een universiteit in staat is een toekomstbestendig onderwijsgebouw te ontwerpen met zorg voor erfgoed in de huidige tijd van verduurzaming. Waar ruimte is voor nieuwe onderwijsvormen en geanticipeerd wordt op de veranderende groepsgrootte. De combinatie van analyse, ontwerp, overzicht en detail om het belang van erfgoed die blijkt uit de onderwijsvisie en restauratie, de stedenbouwkundige inpassing en samenwerking met de gemeente waar ruimte is voor experiment tijdens het gebruik. Een veelbelovende ontwikkeling waarbij we uitkijken naar de ingebruikname van het gebouw en de evaluaties van het gebruik.

Het gebouw is een mooi voorbeeld van een aantal onderwijskundige trends die in hoofdstuk B2 zijn geïdentificeerd: het belang van duurzaamheid en publieke waarden (zoals erfgoed), meer mogelijkheden tot flexibiliteit en personificatie en een groeiend belang van welzijn, socialisatie en inclusiviteit, interdisciplinariteit en met de active learning space ook het integreren van blended en hybride onderwijs.



Part II

CAMPUS NL 2024/2025 RESULTS



Part D – LEARNING

D1 – An overview of Dutch campus management networks

Jasmine Bacani (2025)

Key takeaways

- **Collaborative dialogue enables shared problem framing and solution building.**
Structured group discussions and panel exchanges functioned as effective platforms to surface common dilemmas in learning-environment management and to co-develop strategies across Dutch universities.
- **Campus planning must shift from reactive to strategic and mission-aligned.**
Short-term, ad hoc space decisions are increasingly inadequate. Universities need proactive planning frameworks that explicitly align spatial decisions with educational missions, long-term institutional goals, and anticipated change.
- **Meaningful user involvement is a critical success factor.**
Teachers, students, and schedulers must be actively engaged in planning and decision-making processes. Without this involvement, spaces risk misalignment with actual pedagogical practices and patterns of use.
- **Data-driven governance strengthens fairness and efficiency.**
Centralised, transparent data systems support more equitable and evidence-based allocation of space and resources, improving both operational efficiency and institutional trust.
- **Flexibility and multifunctionality are central to future campus value.**
Scarcity of space and budgets can act as a catalyst for innovation when approached strategically. Flexible, multifunctional spaces are essential to support blended and active learning, adapt to changing educational needs, and enable campuses to function as shared resources for both education and society, a priority that strongly aligns with the 2025–2026 thematic focus.

1. Introduction

With increasing complexity and shifting global trends, campus managers need to support their decisions with the insights and knowledge of others. This is due to the strategic nature of real estate management where decisions can be costly and have long-term consequences. To make evidence-based decisions, campus managers can benefit from networks acting as platforms for knowledge exchange.

A network is defined as a set of actors (individuals, work units, or organisations) and the set of ties representing some relationship, or lack of relationship, between them (Brass et al., 2004). In Bacani et al.'s (2024a) baseline measurement survey of knowledge exchange among Dutch university campus managers, several networks were listed by the survey respondents. This provided an initial overview of networks established and governed by universities, as well as external partners, on the different facets of campus management. Furthermore, this shows that the demand for knowledge exchange has already been acknowledged by campus managers and actions have been taken to respond to it.

However, there is a lack of information on the members of these networks and what occurs within them. This report provides an in-depth analysis on some of the networks provided in Bacani et al.'s (2024a) overview, paying close attention to networks that predominantly have campus management professionals working for Dutch universities.

The idea behind the network roadmaps is to familiarize all campus management professionals across Dutch universities with various networks that may be relevant to them. This would enable them to determine whether they or other colleagues should join or contact a particular network to strengthen the knowledge exchange landscape of campus managers.

Using qualitative interviews with network members, the characteristics of networks are documented and presented in the form of network profiles (referred to as "routekaart(en)" in Dutch). Synthesising the network information maps, conclusions will be presented regarding commonalities between networks.

2. Methods

Using a snowball sampling technique, campus directors or HOI members acting as partners of the research project, referred the author to other potential participants. They were provided with an overview of networks and requested to provide the contact information of potential members within their own universities. In the event that a provided contact was not an active member, other participants were referred to the author.

Between January and May 2025, the members were contacted via email for semi-structured online interviews of approximately 30 minutes. These interviews were recorded using Microsoft Teams and transcribed for further analysis.

Responses were categorized and presented in the network profiles based on network structure, members, focus areas, activities, tools, drivers, barriers, and learning outcomes in the form of member stories. Due to a lack of response from any members of certain networks, the overview provided here is partial and belongs to an ongoing process of work.

How to read the routekaarten

The routekaarten/network profiles in the following section are organized alphabetically and must be read from top to bottom. At the top of the routekaart, the network structure are categorized as follows:

Top-down (initiated by department heads and above) or Bottom-up (informally initiated by employees with shared interests)

Strategic (long-term business activities), Tactical (medium-term business activities) or Operational (short-term business activities)

Main network (independent) or Sub-network (emerging from a main network)

The four main sections of the roadmaps provide information on the following:

The types of institutions involved and the structure of the network in terms of core groups

The methods and tools used by network members to exchange knowledge

The drivers and barriers faced by network members

Verbatim quotes from interviews with members about how they have benefited from participation and their examples of learning outcomes

Network routekaarten



Duurzaamheids-coördinatorenoverleg

Top-down	Strategic	Main network
Bottom-up	Tactical	Sub-network
	Operational	

Members	50-60 members from research universities and universities of applied sciences
Focus areas	Subgroups: Algemeen, Afval, Biodiversiteit, Catering, Circulariteit, CSRD, Evenementen, Inkoop, Licht Uit!, Mobiliteit, Onderwijs, Organisatie Bijeenkomsten, Sustainable Labs, and UNL Sustainability working group

Activities	- Physical overall meeting every year at a host university with (internal or external) speakers, round table discussions, workshops/parallel working groups, and campus tours (usually arranged by two institutions together) - More active subgroups also hold online and physical meetings
Tools	- Teams channel, email - Excel mailing list

Drivers	- Discuss experiences and common issues - Get an overview and references of what other universities are doing to get ideas and prioritise tasks - Creating more impact by sharing - Sustainability requires transformation
Barriers	Time limitations (especially in keeping all subgroups active)

Member stories - Learning outcomes	"You can't translate what they're doing in Groningen exactly one-to-one to Maastricht University, that's clear. But that doesn't mean that it's not really helpful to know what they're doing and to see what things we can copy. And I think there's enough to copy" "It also helps to build the case if you can say, well, they're doing this and that at this university and we haven't done anything about it. It's one of the arguments that you can use" "The biodiversity group also do some actions together, like the biodiversity challenge. They do a bioblitz together to show the state of biodiversity on their campuses and [have a competition on] who has the most biodiverse campus" "For mobility, when you're writing a policy or want to arrange something, it's really nice to hear experiences from others – what they have done with which projects and what helped" "You can get ideas and things from all kinds of perspectives... If you're working on a topic that's new for you and but you know that on a certain university, they're already working on it, you have a network to find a way"
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Contact:

Member - Rabbe Dormans | rabbe.dormans@maastrichtuniversity.nl



Energie-coördinatoren overleg

Top-down	Strategic	Main network
Bottom-up	Tactical	Sub-network
	Operational	

Members	20-30 members from research universities, universities of applied sciences, and academic hospitals 6 members in core group arranging meetings and agendas
Focus areas	Everything related to energy: costs, awareness, behavioural change, monitoring, etc.
Activities	Physical meeting 2x/year at a host university with (internal or external) speakers, round table discussions, and campus tours
Tools	- Teams channel - Online energy monitoring reporting tool (as part of an agreement with national authorities)
Drivers	- Discuss experiences and common issues - Manage and interpret legal obligations efficiently - Get an overview and references of what other universities are doing to get ideas and prioritise tasks - Informally benchmark progress
Barriers	- Time limitations - Knowledge alignment considering members' varied job functions
Member stories - Learning outcomes	"We have an agreement with national authorities for monitoring your energy use. So we have... an online system to share this data, to monitor the development and energy use over the years. "I can use [what I hear from others] as a best practice reference to build my case. It's also good sometimes just to know how far other universities are with specific developments, and if it's worthwhile also going into it or not, to kind of prioritize" "For example, the behaviour change programme. At the time, I said, well, I think it's important, but I don't really have the capacity within our university and the time to really set up such program. In the end, I didn't really get any approval for additional capacity on this. And I saw that at other universities, it is also quite difficult. So I kind of stopped putting energy into that topic" "It kind of helps me to get an overview and also to prioritize. If you see certain topics where you see that other universities are a lot further, then you know, we have to go further on that topic" "If you see on a certain topic that other universities are still also kind of struggling and just in the phase of inventory and seeing what are next steps to take, for example for implementation of certain legal obligations. Then you know, then we don't have to prioritize it too much because it's more something that just really has to develop still"

Contacts:

Chairman - Thijs Meulen | m.m.w.meulen@tue.nl

Core group member - Rabbe Dormans | rabbe.dormans@maastrichtuniversity.nl



Intercollegiaal rooster overleg

Top-down	Strategic	Main network
Bottom-up	Tactical	Sub-network
	Operational	

Members	26-30 members from research universities and universities of applied sciences
Focus areas	Everything related to educational planning: student administration, educational spaces, roosters/scheduling, etc.

Activities	- Online Teams meeting of an hour 4-5x/year where members whose universities are ahead of the specific topic give presentations, followed by a questions and answers round (prepared beforehand by the members) (Informal and voluntary) Workload sharing
Tools	- Teams channel (with recording and transcription) - Email

Drivers	- Discuss experiences and common issues - To tackle complex problems (e.g. new government structure, rising student numbers, budget cuts, etc.) - Get an overview and references of what other universities are doing to get ideas
Barriers	- Time limitations - Lack of clear mandates and knowing who's responsible for certain topics

Member stories - Learning outcomes	"It's an input for them to investigate further within their own universities" "You cannot derive direct solutions from it, but you can get an angle or something else that you can build on and try to discuss it within the organization. So... maybe it's interesting to research this further" "The TU Eindhoven is really excelling in [dashboards], they already have a team together with data analysts. They are really focusing on this particular part of the process and the data, so I think they are really far. I learnt a lot from what they are doing. I have a connection with the team, team leader, and manager of TU Eindhoven. I call them once or twice a year" "A lot of people in the network also collaborate together at the end of the meeting. If there's something interesting to talk about or they are trying to accomplish the same goal, they also connect with each other after the meeting to exchange" "A university had the same issues [as mine]. They wanted to collect data, but didn't know how to start and they connected with me and I told them my process of this is what I did on a strategical/tactical level, so you can use that as well to implement in your own university"
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Contacts:

Chairman - Jolande van Meer | J.C.J.M.vanMeer@tilburguniversity.edu

Member - Desmond Alberts | D.Alberts@tudelft.nl



Landelijk Hoofden Overleg Universitaire Sportcentra (LHO)

Top-down	Strategic	Main network
Bottom-up	Tactical	Sub-network
	Operational	

Members	• 13 research university members • 1 secretary arranging meetings and agendas
Focus areas	Budget cuts and prices, student competitions/tournaments, spatial projects and renovations of sports halls, health, and sports
Activities	3 online meetings in Teams and 3 physical meetings at alternating host universities with (internal or external) speakers, round table discussions, and campus tours
Tools	• Teams channel • Email • Whatsapp group • Benchmarking spreadsheet
Drivers	• Discuss experiences and common issues • Get ideas and learn from each other • Get an overview and references of what other universities are doing to get ideas and create an argument for your own CvB • Informally benchmark progress
Barriers	• Time limitations can sometimes lead to less participation by some members • Findings of studies (done through consultants) in one university cannot be directly applied/spread to another due to the costs involved
Member stories - Learning outcomes	"When you have a problem, just ask the question [in the app group or email group], and within one day, you have at least 9-10 reactions" "The benchmark [we do together] is really important because you can use it to your own executive board. There is a ranking in this benchmark and we agreed that you can use the ranking, but not the numbers. You can say the contribution of the executive boards in the Netherlands varies from 800,000 to 4 million per year and I think we should raise the contribution because if you look at others..." "There is an overview of all the accommodation which is used and some of [the universities] already have pedal courts. We don't have them. If you see that all universities offer them, you can go to your executive board and say, hey, we need this as well" "[The networks meetings] are time consuming... but the payoff is far more. I'm really pleased to go there because I like to see my colleagues to share ideas and to go home with some ideas or some practical solutions"

Contacts:

Secretary (until July 2025) - Jorg de Vette | j.devette@maastrichtuniversity.nl

Former secretary and member - Henri ten Klooster | henri.tenklooster@wur.nl



Overleg Beheer en Onderhoud

Top-down	Strategic	Main network
Bottom-up	Tactical	Sub-network
	Operational	

Members	14-15 members from research universities with different backgrounds: practical/technical and department heads - Chairman changes every meeting
Focus areas	Contractors, costs, project management, maintenance management, hiring process, etc.

Activities	Physical half-day meetings 4x/year at a host university with presentations, round table discussions, and campus tours
Tools	- Teams channel (inactive) - Email

Drivers	- Discuss experiences and common issues - Get to know each other and references of what other universities are doing to get ideas - Discuss and get to know potential solutions that can be applied to own university
Barriers	- Topics tend to be more technical/practical - Not all universities have heads of maintenance management

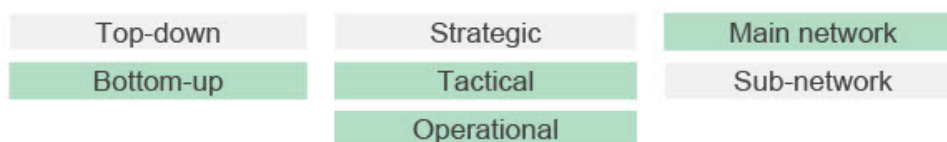
Member stories - Learning outcomes	"Sometimes you think, yeah, I'm the only one that has [this problem]. But it's good to learn that other universities have the same problems... You don't feel as alone" "You get to see things that are really good to know and you can learn a lot from" "There are lots of good ideas that you can use practically for any work everyday" "Previously we were in Amsterdam and the guy there had a presentation about how you can change your strategy for asset management to a system that allows steering wheels. That was quite a big difference from what we did in the last 30 years. I learned a lot from that. I had my contract manager with me and we immediately asked for more information later on and we also implemented it at the WUR" "With contractors... the prices are rising and there's problems... with legal conditions that we want to put up, but they don't accept. [In the network], I get ideas and am able to more or less implement them" "My first goal was to know the people from other universities... Now I can phone and ring them and mail everyone"
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Contacts:

Member - Eric Steinebach | eric.steinebach@wur.nl



Platform Beveiliging Nederlandse Universiteiten (PBNU)



Members	14 members from research universities
Focus areas	Security issues: protests and demonstrations, control rooms, etc.

Activities	Physical meeting every 3 months at a host university with (internal or external) speakers, round table discussions, and campus tours
Tools	Email

Drivers	• Discuss experiences and common issues • Get an overview and references of what other universities are doing to get ideas and prioritise tasks • Find relevant people in other universities (especially during emergency situations)
Barriers	• Time limitations (e.g. to make an agenda, other priorities, switching roles) • Lack of shared database and note-taking due to data confidentiality

Member stories - Learning outcomes	"We also learn from each other. For example, there are several universities that do not talk to the protesters and other universities choose to connect and talk with them. What are you going to do? To get a better understanding and connection, we exchange those types of ways to handle situations" "If a university wants to get a new control room or if we want to have a new product of some type to log information, that's also something that we exchange in the network" "We probably will get a new security company and we also have to produce documents for it. Yeah. So I will tell [the network members] a little bit about that and probably they will respond to me with some good advices or tell me, oh, we did that last year, I can send you the documents. So, I can learn from their documents" "It's very helpful to know your colleagues because sometimes incidents occur in other universities. For example, we had the situation in the academic hospital in Rotterdam with the shooting. But we had, as TU Delft, a class there. So that helps if I know my colleagues, so I can contact them and discuss the situation"
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Contacts:

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Member - Sebastiaan Star | b.star@tudelft.nl



Platform Kennisdeling Vastgoed Universiteiten en Hogescholen (PKVUH)

Top-down	Strategic	Main network
Bottom-up	Tactical	Sub-network
	Operational	

Members	30-40 active members and 90 registered members from research universities and universities of applied sciences 6 members in core group arranging meetings and agenda, 2 members of which are external/not affiliated with a university
Focus areas	Everything about real estate and facilities: finance, sustainability, projects, technique, etc.

Activities	- Online meetings 4x/year of 1.5 hours with presentations and opportunities for discussion during lunch hours - Meeting recordings, minutes, reports, documents, and requirements are shared in the platform
Tools	- Teams channel and Email - Sharepoint - BriefBuilder - Newsletter

Drivers	- Discuss experiences and common issues - Getting to know people and references of what other universities are doing to get ideas - Online meetings are easily accessible and time-efficient - Opportunities to work together
Barriers	- Funding to professionalise the platform (website, symposiums, etc.) - Meeting various levels of the organisation to broaden the network - Everything relies on voluntary support

Member stories - Learning outcomes	"If you see that a hospital uses hydrogen as a power source, we can ask them can you tell a little bit about it? And they do. A hospital in in Tilburg is going to build a new hospital and they invited us all over in April-May to come over and have a look at it and share their information about their new development" "It's not feeling alone in this world, that I'm not the only one who has this problem" "Besides sharing information with people who are interested, [it's also about] faces and numbers. So, now I know who I can call [if I have a question/problem] to get some background information - How did you get those numbers? What's your perspective? Why did you do this?"
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Contacts:

Core group member (external)- Robert Smit | robert@inlijnmanagement.nl

Core group member (external) - Gijben Hornes | hornes@briefbuilder.com



Samenwerkende arbo- en milieudiensten van academische ziekenhuizen en universiteiten (SAAZunie)

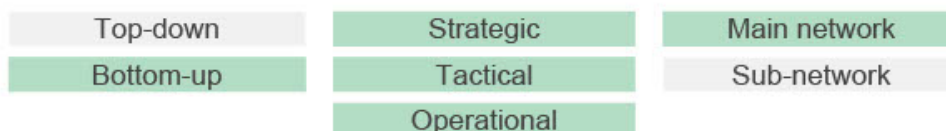


Members	- ca. 20 members from research universities and academic hospitals 2-3 members in core group arranging meetings and agendas
Focus areas	- Two main groups: (1) Health; (2) Safety and environment - The safety and environment group has multiple subgroups: biological safety, BHV, algemene veiligheid, arbeidsorganisatie, and a working group for the heads of the health, safety, and environmental departments of participating institutions.
Activities	- Quarterly meetings with all chairs of each working group - Physical meeting 2x/year at a host university with (internal or external) speakers, round table discussions, and campus tours (Informal and voluntary) Workload sharing
Tools	- Teams channel (becomes inactive after 90 days if not used; managed by UT) - One-on-one data sharing upon request via teams/email
Drivers	- Discuss experiences and common issues (to know who to contact further) - Manage and interpret legal obligations efficiently - Get an overview and references of what other universities are doing to avoid reinventing the wheel
Barriers	- Time limitations (e.g. to arrange more meetings, compare best practices, and compile learnings) - Some members are passive depending on the relevance of the topic
Member stories - Learning outcomes	"If I have an issue on a certain topic, I know which universities are working on the on the same issue, so I can kind of contact them" "If we have issues then we can kind of drop it in the community [Teams] and see if anybody is dealing or has dealt with a similar issue, so we kind of don't have to reinvent the wheel ourselves all the time" "It is also a continuous development and regulations of course, so we try to inform each other on what is the impact of new regulations. For example, the Omgevingswet is quite a big new law and we've tried to kind of do some analysis of the impacts together and kind of do some workload-sharing"

Contact:
Chairman of Environment group - Rabbe Dormans
rabbe.dormans@maastrichtuniversity.nl



Smart campus



Members	10-15 members from research universities, universities of applied sciences, and SURF (external) 2 chairmen arranging meetings and agendas
Focus areas	Everything related to smart campus: business cases, data platforms, pilot projects, applications development, etc.

Activities	Online and physical meetings 3-4x/year at a host university/SURF with (internal or external) speakers, round table discussions, and campus tours
Tools	Surfdrive, email

Drivers	- Discuss experiences and common issues - Get an overview and references of what other universities are doing to get ideas and prioritise tasks (especially with a new topic like smart campus) - Informally benchmark progress
Barriers	Time limitations (e.g. to prioritise knowledge exchange and bring together knowledge)

Member stories - Learning outcomes	"You can compare universities in different ways. So you could compare the ambitions that they have in their program plan or any kind of document that they made that gives an overview of what they want to do with regards to smart campus. Like pilot projects or things they've actually done, things that are in place now. So you can make it more specific and even compare like what kind of sensors they used or things like that, and to get cost estimates. Like if there are any kind of reports on what kind of benefits they have achieved, you can compare that" "On a strategic level, it helps because for some reason, even though universities aren't competitors, some people are very sensitive for the argument that other universities are already doing this and we're lagging behind. By nature, decision making in universities is very risk averse. So if other universities are doing it already and it's successful, that creates a sense of security that otherwise they wouldn't have" "The presentations that we do now really help people because they go really in depth about certain aspects of the smart campus and how universities basically brought something from idea to execution. You know, how they are planning things" "You get, at the very least, points of contact, like people you know. This university worked on this and that, so if I really want to know the details that I need to know, I can email them and we can follow-up"
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Contacts:
Chairman - Bart Valks | B.Valks@tudelft.nl



Universitair Vastgoed Informatie Platform (UVIP)

Top-down	Strategic	Main network
Bottom-up	Tactical	Sub-network
	Operational	

Members	~12 members from research universities - Chairman changes every meeting
Focus areas	Everything related to information management: BIM, classification of space types, etc.

Activities	- Physical meeting 4x/year of ~4 hours at a host university with (internal or external) speakers, and round table discussions - Collaboration on certain topics and workload sharing
Tools	- Teams channel where meeting notes and slides are shared - Email

Drivers	- Discuss experiences and common issues - Learn from what other universities are doing - Collaborate and work together - Gain knowledge and insight in how things can be changed
Barriers	- Time limitations - Getting top management involved

Member stories - Learning outcomes	"The UVIP is also to see whether [the members] can work together. The members drew up a plan together for classification of spaces . We have a joint list for that so everyone uses the same thing and that comes in handy because there's a yearly benchmark for all the universities for facilities and real estate. So now we are comparing apples with apples. It's different for different universities. They want to comply with it, but it's a lot of work to get everything because you have to rename all the spaces in all your buildings"
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Contacts:

Member - Jaco Kamphorst | jaco.kamphorst@wur.nl

Member - Krista Jansen | krista.jansen@wur.nl



Werkgroep Overleg Technische Informatie Beheer (WOTIB)

Top-down	Strategic	Main network
Bottom-up	Tactical	Sub-network
	Operational	

Members	• ~11 members from research universities • WOTIB is an operational sub-network of the strategic Universitair Vastgoed Informatie Platform (UVIP) network
Focus areas	BIM, GIS, document management, space management, material passports, maintaining technical data, etc.

Activities	Online meetings 6x/year of 2 hours with speakers and roundtable discussions
Tools	• Teams channel • Email

Drivers	• Discuss experiences and common issues about day-to-day business activities • Get an overview and references of what other universities are doing to get ideas • Online meetings are easily accessible
Barriers	• Time limitations and other priorities • Arranging the meetings and agenda • Members do not meet each other offline

Member stories - Learning outcomes	"It's nice to hear that other universities are struggling with the same problems as you are in the same difficulties" "A few years back, we had a presentation from a different university. I think it was TU Delft about their GIS system, so that kind of brought things a bit forward for us because we can also find arguments in our department to say this is why we should have this"
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Contacts:

Chairman - Adriaan Jung | a.r.jung@tudelft.nl

Member - Krista Jansen | krista.jansen@wur.nl



External: Universiteitsbibliotheken & Nationale Bibliotheek (UKB)

Dutch	University	Funded
International	Industry	Non-funded
	Government	

About

- Since 1976, UKB has been the collaboration between the 13 University Libraries and the KB National Library in the Netherlands. It facilitates knowledge sharing, benchmarks, enters into licenses, join subsidy applications, and represent UKB interests to governments and UNL. UKB aims to:
 - support and accelerate scientific progress by promoting and facilitating sustainable (open) knowledge for all
 - ensure reliable knowledge that is sustainably and freely available.

Members

- All 14 research universities
- Koninklijke Nederlandse Akademie van Wetenschappen
- Nederlandse Organisatie voor Wetenschappelijk Onderzoek
- Werkgroep Speciale Wetenschappelijke Bibliotheken

Focus areas

- Positioning: strategic issues that play a role for every UB - Which tasks are at the core of what we do and will remain there, and which tasks are more on the periphery? How do we relate to the (internal) organisation, and how do we position ourselves for the future?
- Open scholarly communication
- Development of employee competencies and skills: facilitating specific working groups and a joint program for the Scholarly Information Services

 <https://ukb.nl/>

 ukb@uu.nl

 06-34356910

Conclusion

The networks include not only universities, but also universities of applied sciences, and university medical centers, emphasizing the commonality of campus management challenges across the higher education sector. They are mainly bottom-up and rely on the capacity of volunteering members to arrange the agenda and meetings, known as the core group and typically led by a chairman.

Network meetings can be in-person held in different universities, or online where Teams is the most commonly used platform. Some networks also have hybrid meetings or alternate between in-person and online meetings. Regardless, participation is entirely voluntary and members decide which meetings to attend depending on the main theme that will be addressed.

The main driver mentioned by the interviewees across all networks was the commonality of issues regarding campus management and the need to share best practice and avoid reinventing the wheel. Members benefit from hearing about the issues other universities face and the solutions they have implemented to solve them, which they can take back to their own universities. As the networks are formed on a main theme, it is also a way for members to identify counterparts with similar knowledge and functions in other universities.

Despite the benefits of knowledge exchange, network participation is sometimes limited due to competing priorities in their day-to-day tasks. Since network participation is not a legitimate part of their work, it sometimes limits their ability to participate in meetings. Furthermore, arranging meetings and networks are also limited by the capacity of the volunteering core group and chairman.

Although the networks are an active response to the need for knowledge exchange in solving complex campus management knowledge, furthering the knowledge shared and created in the networks towards implementation and practice, require more time and capacity than available. The role of knowledge brokers as facilitators can potentially aid in this process, as evidenced by the variety of knowledge exchange activities that network organisations across Europe facilitate (Bacani et al. 2024b).

Further research is needed to develop comprehensive profiles for all networks. As new networks emerge and others become inactive, maintaining an up-to-date and exhaustive overview is an ongoing and evolving process.

The orchestra metaphor



Figure 14.5: Visualisation of the orchestra metaphor

To symbolise the diversity of inter-university networks presented in this report, the orchestra metaphor is visualized in Figure 14.5. Each network has great value in itself, just as individual sections of an orchestra can play beautifully. But just as those sections would play different pieces of music without coordination, these networks often focus exclusively on their own themes.

Without a conductor to ensure cohesion within the orchestra, no true symphony can be created. Similarly, these networks cannot contribute optimally to integrated campus management without a facilitator or coordinator to bring their knowledge together.

Campus NL recognises the importance of these connections, both within individual universities and in the broader network landscape. Now that universities are facing challenges such as budget cuts and sustainability targets — just as an orchestra must conform to a composer's score — cooperation and coordination are becoming even more important.

Discussion

The findings in this report provide campus management professionals with a broader understanding of networks that may be relevant and valuable to their work. These networks serve as platforms where one of the goals of Campus NL — bringing together the knowledge and resources of the 14 Dutch universities — can be pursued.

While the networks have the potential to support the sharing of best practices and strengthen inter-university connections, the analysis also reveals limitations that present clear opportunities for strengthening campus management practices through network facilitation and co-production.

Key takeaways

Main findings:

- Different higher education institutions and management levels participate in network activities, creating a rich breadth of knowledge at an operational, tactical, and strategic scale.
- Network meetings can occur in-person where different universities are used as meeting locations, online through Microsoft Teams, or in hybrid forms.
- The main driver for network participation is the sharing of best practices and meeting professionals in similar functions.
- Time is the main barrier in managing network activities and participation.

Implications

- Campus managers can join networks that are relevant to them based on the network profiles or become inspired to initiate their own network.

Dilemmas

- A lack of network facilitators place extra burden on the volunteering core group members and chairman who manage the networks alongside their day-to-day work tasks. The presence of a dedicated knowledge broker connecting campus managers and facilitating not only knowledge exchange, but also knowledge application could be a worthwhile investment for universities.

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D2 – Annual conference Campus NL 2024/2025 – 23 May 2025

Alexandra den Heijer (2025), on behalf of the Campus NL Research Team.

Key takeaways

- **Collaborative dialogue enables shared problem framing and solution building.**
Structured group discussions and panel exchanges functioned as effective platforms to surface common dilemmas in learning-environment management and to co-develop strategies across Dutch universities.
- **Campus planning must shift from reactive to strategic and mission-aligned.**
Short-term, ad hoc space decisions are increasingly inadequate. Universities need proactive planning frameworks that explicitly align spatial decisions with educational missions, long-term institutional goals, and anticipated change.
- **Meaningful user involvement is a critical success factor.**
Teachers, students, and schedulers must be actively engaged in planning and decision-making processes. Without this involvement, spaces risk misalignment with actual pedagogical practices and patterns of use.
- **Data-driven governance strengthens fairness and efficiency.**
Centralised, transparent data systems support more equitable and evidence-based allocation of space and resources, improving both operational efficiency and institutional trust.
- **Flexibility and multifunctionality are central to future campus value.**
Scarcity of space and budgets can act as a catalyst for innovation when approached strategically. Flexible, multifunctional spaces are essential to support blended and active learning, adapt to changing educational needs, and enable campuses to function as shared resources for both education and society, a priority that strongly aligns with the 2025–2026 thematic focus.

1. Introduction

The preceding chapters analyzed data from participating universities, examined trends in learning environments, and presented both practical insights and international perspectives. Building on these findings, the aim of this chapter is to explore key dilemmas and challenges identified in earlier sections, and to formulate potential solutions through structured group and panel discussions. These discussions involved representatives from Dutch universities, members of the Campus NL project team, and affiliated researchers active in campus management, real estate development, and facility and asset management.

This chapter is structured into four main sections. Following the introduction, the methodology section outlines the organization of the group discussions and the analytical approach. The third section presents and interprets the key findings, and the final section summarizes the outcomes.

By capturing recurring concerns, innovative approaches, and potential strategies discussed during the congress, this chapter provides valuable input for ongoing academic research, institutional planning, and policy development related to campus management.

2. Methodology

Objectives and attendance

On May 23, 2025, the second annual *Campus NL* conference was held at the historic building of TU Delft's Faculty of Architecture. In addition to a large hall for presentations, there was also an open area for discussions and informal exchanges, which was decorated with posters displaying the results of CAMPUS NL research. The conference consisted of two main parts. The morning program focused on interactive presentations on various themes presented by different members of the Campus NL network and group discussions on the findings of Campus NL's 2024/25 annual report. Participants engaged in interactive group sessions aimed at interpreting the results and collaboratively addressing shared challenges in campus management.

In the afternoon, the focus shifted toward follow-up actions related to the theme of learning environments and a broader exploration of future campus development and urgent strategic issues.

Table 14.1: Annual conference: programme (only available in Dutch) (source TUD for CampusNL 2025).

Tijd	Onderdeel	Locatie	Toelichting
09.30 – 10.00	Ontvangst met koffie en thee	Berlagezaal 2	
10.00 – 10.30	Opening dagvoorzitter en presentatie voorlopige onderzoeksresultaten 2024/2025 met als thema ‘innovatieve leeromgeving’ - intro 3' Jan Lintsen over urgenties en veranderende context universiteiten	Plenair – Berlagezaal 1	Het Campus NL onderzoeksteam zal de onderzoeksresultaten 2024/2025 presenteren, waaronder het gebruik van onderwijsruimtes in 133 universiteitsgebouwen.

10.30 – 11.00	Interactieve presentatie met stellingen en vragen over de onderzoeksresultaten, en mogelijke toekomststrategieën en oplossingen. - pitch 3' Maurice Paas / TiU over gebouw-beslissingen n.a.v. inzicht in ruimtegebruik - pitch 5' VU over hun onderwijslogistiek - pitch 5' RU over onderwijslogistiek bij RU	Plenair – Berlagezaal 1	Via menti.com discussiëren de deelnemers interactief over de onderzoeksresultaten en de toekomst van onderwijsruimte en de campus.
11.00 – 11.15	Koffie- & theepauze	Berlagezaal 2	
11.15 – 12.30	Discussies in groepen over dilemma's* en oplossingsrichtingen. * zie lijst met dilemma's en achtergrondinformatie ter inspiratie - kerngroepleden zijn gespreksleiders, per groep ook een campuscontact en onderwijs-specialist	Break-out rooms	Deelnemers gaan in verschillende break-out rooms een aantal dilemma's bespreken gerelateerd aan het thema van dit jaar. Deelnemers worden vooraf ingedeeld en indeling kan voor de start van de break-out rooms gevonden worden.
12.30 – 13.30	Lunch	Berlagezaal 2	Met mogelijkheid voor wandeling door gebouw.
13.30 – 14.30	Paneldiscussie en terugkoppeling break-out rooms	Plenair – Berlagezaal 1	Voorzitters van de break-out rooms bespreken samen de uitkomsten en discussies uit de verschillende break-out rooms. Welke dilemma's zijn er voor de campus van de toekomst?
14.30 – 15.15	Leren van buitenlandse universiteits-/ campusnetwerken, inclusief hun dilemma's - intro / pitch 3' Gerben Smit over belang van kennisplatforms & -netwerken voor lerende campusorganisatie en beter onderbouwde campusbeslissingen - presentatie 20' PhD student Jasmine Bacari + Alexandra den Heijer over lessen vanuit buitenland: zowel inhoud als hoe ze kennis delen (+ interactie) - pitch 3' over Europees congres in januari 2026 op de VU campus in Amsterdam door Alexandra den Heijer + Franc van Nunen - illustraties Mark van Huystee - eindstatement 2' Boudewijn met ervaringen UNL met "kracht van het interuniversitaire netwerk": samen sterker	Plenair – Berlagezaal 1	Hoe kunnen we (nog beter) leren van elkaar? Het onderzoeksteam deelt wat we kunnen leren van buitenlandse universiteiten-netwerken. Voorafgaand is er kort tijd om koffie en thee te halen.
15.15 – 15.30	Vervolgacties en Campus NL-Quiz	Plenair – Berlagezaal 1	Deelnemers bespreken vervolgacties en sluiten de dag af met een Campus NL-Quiz (met prijzen)

15.30 – 16.30	Napraten met (borrel)hapje en drankje	Berlagezaal 2	
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As part of the conference, targeted group discussions were conducted to support the *Campus NL* research theme for 2024/25, with the aim of establishing a shared understanding of key challenges and priorities in the development and management of new learning environments.

The objectives of the group discussions were to:

- Discuss both pre-identified and emerging dilemmas and challenges in managing learning environments at Dutch university campuses;
- Identify possible solutions to address these challenges collaboratively

Six parallel discussion groups were organized to facilitate consensus-building across participating institutions. Each group comprised individuals with varied roles in higher education, encouraging a multidisciplinary exchange of perspectives. In total, 47 participants - primarily from real estate and campus management - representing 11 of the 14 Dutch universities took part in the sessions.

In the afternoon, the results of the different groups were discussed during a panel discussion to find consensus.

Table 14.2: Group allocation and participants (source TUD for CampusNL 2025).

Group 1 (Facilitator: Monique Arkesteijn)	Marc Horsten, Judith Vroemen, Wouter Zum Vörde, Sive Vörding, Naima Chouaati, Leonie van den Heuvel, Marc Hulshof, Harold Swartjes, Yinyin Au
Group 2 (Facilitator: Julia Kudła)	Franc van Nunen, Danko Roozemon, Nanda van Rijn Koppers, Femke Kamp, Pepijn Bakker, René den Houting, Ronald Schaik, Anne van Dortmont
Group 3 (Facilitator: Martin Lejewaan)	Gerben Smit, Daisy van der Schaft, Sam Neijman, Maike Dunlap, Bert Zwiep, Johan Mensink, Anja Biehl, Jan Lintsen
Group 4 (Facilitator: Thomas Vogl)	Boudewijn Peters, René Hagels, Jet Bierman, Kees van Rooijen, Bert Huizing, Niels van Rijn, Els van Haasen, Erik Raets
Group 5 (Facilitator: Julie Tazelaar)	Chris Suijker, Freek Heemskerk, Paul Uiterdijk, Rolf Heling, Marjan Oliehoek, Suzanne Vahl, Silvy Leijh, Mark van Huystee
Group 6 (Facilitator: Alexandra den Heijer)	Koen Fleuren, Ties Broeren, Alexander van Drooge, Marlous van de Koppel, Monique Thomas, Mijke Kromdijk, Jaco de Wildt
Group 7 (Facilitator: Jasmine Bacani)	Eise Ebbelink, José van Schie, Maurice Paas, Nynke Dam, Stefan Titus, Simon Witteman, Julie Hornix

Workshop summary

All participants were present in person, congregated in a single lecture room, with no remote participation. The group discussion was meticulously structured to address the delineated objectives.

In the end of the interactive presentations, Prof. Alexandra den Heijer, provided an summary overview of the context, objectives and the procedure of the group discussions. After a coffee break, the participants were distributed equally into seven different groups with seven facilitators and moderators. Participants were then provided with a paper copy of the main questions with explanations. The groups delved into the questions, with teams randomly assigned to foster diverse discussions. The groups were guided by a template, which had been distributed a week before the conference to support preparation. It encouraged participants to reflect on the 'real world' dilemmas and challenges facing their universities in relation to the given themes, and how these may be addressed going forward. The template covered the following five themes:

(1) Educational and workplace concepts are changing

- Is education largely on-campus or off-campus?
- Due to "hybrid working," students are on campus more often than staff: desirable?
- Interventions to get users back to campus? (What's driving them away?)
- Active and blended learning is a trend, but it requires more space, money, energy, and instructor hours?

(2) Can teaching spaces be scheduled (even) more efficiently?

- "Group size follows room size": is scarce supply the key?
- Dynamic scheduling: adapting to actual occupancy?
- Applying higher occupancy standards during busy weeks (currently 70-75%)?
- Overbooking rooms because maximum room capacity is rarely used?
- Making part of the space "unschedulable"/"non-reserveable" for daily flexibility?

(3) Multifunctional use of spaces? (teaching in non-teaching spaces)

- Use (empty) office space for teaching?
- Better equip (empty) restaurants for teaching/group work
- Share space (public & private) with third parties more often, also social responsibility
- Can the campus be used more efficiently, or has it reached its limit?

(4) How to involve end-users (employees, students) in more efficient use?

- Create more information and awareness about the costs of vacant classrooms or unused offices.
- Without (environmental) cost awareness, "claiming behavior" will not disappear; is an app necessary?
- Also work with "credits": more travel possible with sustainable behavior?
- Dedicated workspace or a higher travel budget? (Develop a carbon choice model?)
- More autonomy for students and instructors: find the most suitable, available space themselves.

(5) How can we anticipate shrinkage and other future scenarios?

- Share smart strategies?
- Flexible study options at Universities NL and Campus NL in the future? Or Campus EU?

Each group discussion was allotted 75 minutes, after which moderators summarized the key findings. Brief feedback and open discussion were invited from the broader group following each presentation. While facilitators generally refrained from direct participation in the debates, they occasionally contributed literature-based insights when relevant.

All sessions were conducted in Dutch and structured around five open-ended questions. Discussions were recorded via Microsoft Teams and subsequently transcribed and translated into English for analysis. Transcriptions were revised for readability, following guidelines by Fuß and Karbach (2014), and verified for accuracy by the moderators.

Following the lunch break, a panel discussion was held in which one representative from each group presented their findings. The session was moderated by Jan Lintsen an executive board member and vice-chair of the board of executives of the University of Amsterdam.

To support thematic synthesis and enhance clarity, key discussion points and recurring themes were identified using AI-supported text analysis. Transcripts were summarized with the assistance of an AI language model (ChatGPT, OpenAI), focusing on insights aligned with the pre-defined discussion topics. All summaries were subsequently reviewed by the research team to ensure accuracy and faithful representation of the original content.

3. Results

a. Group discussions



Figure 14.1: Impressions from the group discussions

(1) Group: Summary of Key Themes

Group 1 reflected on the set of predefined themes, focusing on the complex trade-offs universities face in managing campus space amid evolving educational needs, financial pressures, and cultural expectations.

Educational Space Use & Flexibility

The group discussed the move from function-specific rooms toward more flexible and multifunctional environments. There was strong interest in repurposing underused spaces (e.g., combining teaching and event functions), while acknowledging the tension between short-term efficiency and long-term adaptability.

Contact Learning vs. Self-Study

While participants expressed a clear preference for enhancing in-person education (lectures, seminars), they also acknowledged the importance of informal learning spaces such as

libraries, hallways, and cafés. Understanding where learning truly occurs was seen as critical for effective campus design.

Utilization vs. Educational Quality

Group members voiced concern that dominant metrics like occupancy rates or cost per square meter often sideline pedagogical goals. They stressed the need to balance quantitative data with qualitative insights into student engagement, teaching effectiveness, and overall learning quality.

Engagement, Belonging & Wellbeing

A strong sense of belonging was highlighted as essential to student success and mental health. Participants emphasized that spatial and scheduling decisions should foster informal interaction and community-building, especially for first-year students navigating the transition into university life.

Decision-Making & Stakeholder Involvement

The group raised concerns about limited involvement of teachers and students in policy and space-related decisions. While formal structures like councils exist, their effectiveness and representativeness were questioned. A call was made for more transparent, inclusive processes.

Scheduling & Planning Challenges

Participants identified a persistent mismatch between long-term real estate planning and short-term scheduling practices. Planning cycles often fail to align with actual teaching needs, and inconsistencies in usage data complicate decision-making.

Blended & Active Learning

Although there is enthusiasm for blended and active learning models, the group noted that such spaces are frequently underused or misaligned with actual teaching practices. Effective implementation requires thoughtful room design, strategic planning, and faculty engagement.

Financial Pressure & Institutional Identity

Budget cuts are prompting institutions to make space-related decisions that risk compromising their educational mission. Participants warned against allowing cost-efficiency to override academic values, urging universities to reaffirm their identity as learning communities.

Incentives & Behavioral Nudges

Examples were shared of using light-touch strategies to encourage more efficient practices—such as scheduling incentives or labels like “We Work Smart” to communicate new procedures and promote behavioral change.

Organizational Culture & Long-Term Thinking

Finally, the group emphasized that meaningful progress depends on cultural change. A shift is needed from reactive, short-term decisions to long-term, mission-driven planning that incorporates diverse perspectives and fosters shared ownership.

Conclusion

Group 1 concluded that balancing space efficiency with educational quality and campus experience requires inclusive decision-making, cultural change, and strategic flexibility. Cost-saving measures should be carefully weighed against their long-term educational impact, and both data and dialogue should guide future planning.

(2) Group: Summary of Key Themes

Group 2 contributed to the structured dialogue on future campus development by exploring the predefined themes that shape how universities can optimize their physical spaces while maintaining educational quality and student wellbeing. Their discussion focused on overcoming structural, cultural, and technical barriers to flexible and student-centered space use.

Multifunctional Use of Educational Space

Participants discussed the need to balance formal educational needs with informal student use, such as self-study or social interaction. Many spaces remain underused due to rigid scheduling practices or limited awareness. The group supported the designation of multifunctional spaces—formally scheduled for classes but available informally during off-hours.

Data-Driven Space Management

Technological tools like WiFi sensors are gaining traction to monitor space occupancy and guide more effective usage. These tools could help students identify available study spots and assist institutions in adjusting room allocation. However, many universities still lack centralized, transparent data systems, limiting their ability to make evidence-based decisions.

Cultural Resistance and Fragmentation

A major challenge lies in institutional fragmentation. Faculties and departments often operate in silos, resisting centralized coordination. The group described universities as functioning like “mini-secondary schools,” with isolated governance, which hinders broad reforms and undermines cross-campus alignment.

Financial Pressure as a Catalyst for Change

While budget cuts were seen as painful, they were also viewed as an opportunity to rethink the university’s spatial footprint and educational priorities. If space optimization can generate savings, it may help reinvest in student wellbeing and educational innovation. Still, participants warned against allowing finance to become the sole motivator for change.

Educational Quality vs. Efficiency

The group explored the tension between increasing efficiency (e.g., larger class sizes, room consolidation) and preserving teaching quality. Without thoughtful pedagogical design and adequate support, larger classes risk undermining learning outcomes. Participants called for balance and sensitivity to disciplinary differences in space and teaching needs.

Leadership and Shared Responsibility

Institutional leadership was highlighted as essential—but must be grounded in transparency and shared vision. The discussion emphasized that responsibility should be distributed across all levels, including academic staff, deans, schedulers, and facility professionals. Greater professionalization of facilities roles was also encouraged.

Student Wellbeing and Social Spaces

There was concern about the limited availability of inclusive, inviting social spaces on campus. Many students feel isolated or unsupported, especially if traditional student associations don’t meet their needs. Group 2 stressed the importance of designing for emotional as well as physical accessibility.

Sustainability and Smart Use

Environmental goals can align with smarter space management. The group advocated for responsive infrastructure—such as heating and lighting systems tied to occupancy—to reduce energy waste. Sustainability was viewed as a driver for long-term, flexible campus planning

Conclusion

Group 2 concluded that **scarcity can act as a lever for positive transformation**, if approached strategically. The future campus must be designed around **multifunctionality, student-centered planning, and environmental awareness**, underpinned by **coordinated leadership and transparent data systems**. Universities must evolve beyond rigid structures to create adaptive environments that support both learning and wellbeing.

(3) Group: Summary of Key Themes

Group 3 contributed to the cross-institutional dialogue by examining how universities can strategically respond to financial constraints, demographic shifts, and evolving pedagogical demands. While recognizing the inevitability of campus shrinkage, the group emphasized the importance of inclusive, data-informed, and user-centered approaches to ensure that spatial efficiency does not come at the cost of educational quality.

Financial Constraints and Campus Shrinkage

The group discussed the growing financial and demographic pressures that are prompting universities to reduce their physical footprint—by as much as 25% in some cases. Strategies include postponing new construction, divesting underused buildings, and intensifying space optimization. Yet, the emotional and symbolic value of certain campuses (e.g., urban sites in Amsterdam) complicates these decisions, revealing the cultural significance attached to place.

Balancing Innovation and Costs

Participants explored the friction between educational innovation—such as blended learning or active pedagogies—and the financial and spatial resources these approaches often require. The group called for more realistic planning horizons (10–15 years) and promoted the idea of “simple innovation”: improvements that do not necessarily rely on high-tech or costly interventions.

User-Centered Design and Space Utilization

Designing learning environments without input from users was seen as a persistent pitfall. Group 3 advocated for participatory design processes that include students and faculty. Although flexible and technology-enhanced spaces are being developed, they are often underused due to misalignment with user needs, lack of training, or overly complex systems.

Cultural and Generational Shifts

A generational divide was noted in the adoption of new teaching and learning methods. Younger faculty and students tend to embrace digital tools and flexible education, whereas more senior staff and administrators may be slower to adapt. Institutional hierarchies and traditional governance models were seen as barriers to innovation and cultural change.

Coordination Between Departments and Institutions

The discussion highlighted a lack of coordination both within and across institutions. Fragmented governance models and isolated faculty planning undermine efforts to optimize

space and educational delivery. The group emphasized the need for shared institutional visions and more collaborative interdepartmental planning frameworks.

Flexible Use and Shared Facilities

Universities are increasingly rethinking how to share and repurpose space—e.g., converting offices into classrooms, opening facilities for student use in the evenings, or promoting cross-faculty co-location. These strategies were seen as essential to reducing overhead while fostering collaboration and more vibrant campus life.

The Role of Data and Measurement

Group 3 recognized the value of using data—such as occupancy rates, energy consumption, and scheduling efficiency—to inform planning. However, there was caution about an overreliance on quantitative metrics. Participants urged institutions to consider qualitative dimensions like student experience, community feeling, and spontaneous collaboration when evaluating space performance.

Governance, Vision, and Leadership

A lack of long-term vision from leadership was identified as a recurring challenge. Participants called for rectors, deans, and planners to articulate clearer strategic directions, particularly to guide facility decisions and housing strategies. Policy instability and short-termism were seen as major obstacles to meaningful transformation.

Conclusion

Group 3 agreed that campus downsizing is inevitable due to financial pressures and declining student numbers, but it can be an opportunity for positive change with careful, long-term planning. Meaningful involvement of students, faculty, and staff in designing and using spaces is crucial to ensure they meet educational needs. The group emphasized focusing on practical, cost-effective innovations rather than costly high-tech solutions.

Cultural and generational divides pose challenges, requiring leadership that encourages experimentation and collaboration across departments. Better coordination is needed to break down silos and create flexible, shared campus spaces. While data is useful, decisions must also consider community, collaboration, and educational quality. Ultimately, clear vision and leadership are essential to align campus spaces with the university's long-term goals.

(4) Group: Summary of Key Themes

Group 4 discussed key challenges and strategies related to **space optimization and campus shrinkage** in response to demographic and financial pressures.

Space Optimization & Shrinkage

Universities are facing shrinking student populations and tighter budgets, pushing them to reduce space usage. This is leading to divestment of buildings and a shift from faculty-owned facilities toward shared, centrally managed campus spaces focused on efficiency.

Timetabling & Space Utilization

Scheduling inefficiencies cause mismatches between room types and actual usage, resulting in underutilized spaces. Centralized scheduling systems and real-time usage monitoring (e.g., via Wi-Fi sensors) offer solutions, but adoption is slow and sometimes resisted by staff.

Top-Down vs. Bottom-Up Change

Large-scale changes like building divestment and timetable reform require strong top-down

leadership. However, successful implementation depends on involving end-users, including teachers and students. The consensus-driven “polder model” culture can slow decisions.

Cultural and Behavioral Barriers

Academic freedom and autonomy create resistance to efficiency measures, such as late teaching hours or relocating classes. Meanwhile, students increasingly favor recorded lectures, reducing on-campus presence and complicating space planning.

Multifunctional & Flexible Use of Space

There is a growing focus on replacing large lecture halls with smaller, flexible group spaces. Libraries, corridors, and canteens are being reimagined as informal learning and social zones. Universities also explore shared public-private uses for events and conferences.

Incentives and Budgeting

Financial incentives like rent models and cost accountability can encourage efficient space use. However, many faculties lack transparency regarding real estate costs, leading to a disconnect between space users and budgets.

Campus Attractiveness & Student Needs

Students prioritize social spaces, flexibility, and a welcoming atmosphere over traditional lectures. Universities are improving amenities, adding gender-neutral facilities, and seeking user feedback to make campuses more appealing.

Security vs. Openness

Increasing security concerns require better access control (e.g., badge systems), but universities strive to maintain open, inclusive academic environments—a challenging balance to achieve.

In **conclusion**, Group Four emphasized that universities must carefully balance efficiency, flexibility, and inclusiveness as they navigate demographic changes and evolving expectations. While progress may be slow, clear vision, data-informed decision-making, and broad stakeholder engagement can drive effective transformation. Ultimately, fostering multi-functional, high-occupancy, and attractive campuses will be crucial for long-term sustainability.

(5) Group: Summary of Key Themes

The group discussion of Group five highlighted several critical challenges and opportunities in optimizing university scheduling and space management. A major issue identified was **scheduling congestion during prime times**, particularly on Mondays and Tuesdays, compounded by instructor preferences for limited availability. This tension between individual autonomy and institutional efficiency creates bottlenecks, often leaving schedulers caught between competing demands. Encouraging early and proactive communication of instructor availability emerged as a key strategy, with approximately half of scheduling flexibility dependent on such cooperation. Institutions are increasingly moving from informal, ad-hoc space allocation to more formalized models, including “space budgeting,” to improve transparency and resource management.

Cultural and structural barriers remain significant, as legacy practices and informal hierarchies inhibit communication and cooperation. Many instructors remain unaware of the broader institutional scheduling processes, perpetuating a culture of individualism that conflicts with collective efficiency goals.

The discussion also focused on the **flexible and multifunctional use of space**, noting that while some traditional lecture halls are underutilized or ill-suited to flexible formats, informal and hybrid learning environments are gaining prominence. The COVID-19 pandemic accelerated trends toward repurposing existing spaces, such as converting video rooms into hybrid teaching zones, blurring the lines between classrooms, meeting rooms, and student social spaces.

In terms of **governance and decision-making**, institutions vary in their balance between centralized control and decentralized autonomy. Clear prioritization among competing uses—lectures, exams, continuing education—remains a persistent challenge, highlighting the need for transparent policies and leadership support to empower schedulers and administrators.

Financial pressures are driving **campus strategy and future planning** discussions, with budget constraints prompting consolidation of functions, reduction of redundant facilities, and innovative visions of universities as civic assets. Proposals included creating national centers of excellence and integrating campuses more closely with urban neighborhoods to foster social vibrancy and reduce isolation.

Looking ahead, participants advocated for a **return to core institutional values**, with planning increasingly driven by function and societal impact rather than traditional building typologies. Hybrid institutional models combining academic, vocational, and public services were suggested as adaptive responses to evolving demands.

In conclusion, the group emphasized the importance of shared responsibility among instructors, schedulers, and administrators to balance individual preferences with institutional priorities. Achieving efficient scheduling and space use requires cultural shifts toward collaboration, formal support for schedulers, and the development of multifunctional, adaptable spaces. Transparent, data-driven governance coupled with innovative financial models such as space budgeting will be crucial for universities to meet future challenges.

Moreover, universities are called upon to expand their public role, contributing to societal resilience through climate-safe infrastructure and community integration. Exploring unconventional campus models and cross-sector partnerships was encouraged as a way to reimagine the university's place in society.

(6) Group: Summary of Key Themes

Group 6's discussion focused on the challenges and strategies universities face in anticipating shrinking student populations and optimizing campus space accordingly. Institutions are increasingly considering the closure or repurposing of underutilized buildings, alongside flexible scheduling and multifunctional spaces, to adapt effectively to future demands.

A key tension emerged between the need for **efficiency and cost-cutting** and the imperative to maintain educational quality. Faculty members often find themselves balancing

budget constraints with the expectations of modern, flexible teaching formats, while resistance to change remains a significant barrier due to concerns over workload, autonomy, and uncertainty.

The group also highlighted important **cultural shifts in educational formats**, noting a decline in traditional large lectures and a rising preference for hybrid learning, smaller group interactions, and informal, student-centered spaces supported by digital tools.

Issues of **mobility and accessibility** surfaced as well, especially in the context of sustainability goals like reduced car use on campus. Challenges such as paid parking, limited transport options, and shrinking personal office space could negatively impact faculty presence and working conditions.

Structural **fragmentation of responsibility and misaligned incentives** persist in campus management, where faculties benefit from space usage but are often insulated from related costs. Participants underscored the need for funding models that align incentives with institutional goals, promoting shared accountability for space and energy consumption.

Despite aspirations toward inclusive governance, the involvement of students and junior staff remains limited. Universities are experimenting with participatory formats, such as user groups and masterclasses, to better engage stakeholders and raise awareness of space-related issues.

Finally, the group addressed challenges in restoring vibrant **campus experiences post-COVID**. Attracting students and staff back requires more than functional infrastructure; welcoming environments, social spaces like coffee corners, and a strong sense of community are essential to avoid campuses feeling empty or transactional.

In conclusion, Dutch universities confront the dual mandate of downsizing intelligently while safeguarding educational quality and engagement. Success depends on visionary leadership, restructured incentives, and meaningful user participation. Moving forward, the focus must pivot from preserving traditional campus models toward designing agile, collaborative, and attractive environments that meet evolving academic and societal needs.

b. Panel talk

This panel discussion brought together representatives from earlier group sessions to reflect on shared challenges and emerging strategies in higher education. Each discussion group, formed around key institutional themes, nominated a member to present their insights during the panel. The resulting conversation revealed common concerns and aspirations across universities regarding timetabling, campus use, educational quality, and long-term institutional development



Figure 14.2: Impressions of the panel talk moderated by Jan Lintsen

Timetabling and Educational Planning

Groups highlighted ongoing difficulties in aligning student and staff schedules, calling for better integration of educational planning with staff availability. There was a strong desire for more autonomy and flexibility in scheduling, with an emphasis on quality over purely logistical efficiency.

Shrinking Student Numbers and Budget Cuts

Declining enrollments and continued austerity measures were widely seen as threats to educational quality. While a few institutions (e.g., Eindhoven) reported growth, most participants expressed concern about the long-term implications of budget cuts narrowly focused on space and efficiency metrics.

Flexibility in Education and Space

Flexibility emerged as a central theme—spanning pedagogy, spatial design, and organizational models. While adaptable learning environments are increasingly necessary, their cost raises questions about feasibility in financially constrained settings.

Campus Presence and Engagement

Participants noted a clear divide between student and staff presence on campus. Travel costs and institutional policies were cited as factors limiting staff engagement. Yet, the campus was reaffirmed as a vital space for community-building and informal learning.

Hybrid Learning and Institutional Complexity

The shift toward hybrid formats has introduced new planning complexities. While digital options expand access, participants warned against overreliance. The trend of students selecting courses across institutions also challenges scheduling and infrastructure planning, signaling a move toward more individualized, flexible learning models.

Educational Quality and Institutional Role

Discussions emphasized the importance of moving beyond efficiency-driven decision-making. Institutions were encouraged to maintain a strong focus on learning environments, long-term outcomes, and their broader societal mission.

Student Wellbeing and Life Skills

Groups expressed growing concern for student wellbeing, highlighting financial, social, and mental health pressures. There was strong interest in embedding life skills—such as resilience and collaboration—into curricula, and in ensuring accessible, supportive campus environments.

Lifelong Learning and Future Development

Finally, universities were urged to embrace their role in lifelong learning. This involves not only flexible educational formats but also structural support—such as mentoring and coaching—to help individuals navigate dynamic career paths and personal growth over time.

Conclusion panel talk

The panel discussion revealed a shared concern among participants about the challenge of balancing short-term operational constraints—such as budget cuts, limited space, and staffing pressures—with the pursuit of long-term educational goals, including quality, inclusion, and future-readiness. A strong call emerged for more integrated collaboration

between educators, administrators, and facility managers to ensure coherent, forward-looking decision-making. Underpinning much of the discussion was a recurring tension: how to preserve a vibrant, inclusive campus community while adapting to an increasingly fragmented, flexible, and digital educational landscape. Addressing this tension will be essential for shaping resilient and responsive universities in the years ahead.

c. Summary of conference

The presentation about “Campus Elsewhere” (and “Campus Learning”) after lunch – by Jasmine Bacani and Alexandra den Heijer - highlighted the vital role of informal networks in fostering innovation and collaboration within higher education and research institutions, emphasizing the importance of casual interactions among researchers and stakeholders and between campus managers of universities. The Dutch research and education ecosystem was praised for its decentralized, collaborative nature, seen as a major strength. However, Jasmine Bacani’s PhD research acknowledged that other countries have developed more formal structures for managing research and education, suggesting the Netherlands could benefit from enhanced coordination and strategic focus to meet future challenges.

Addressing concerns over declining student numbers and reduced funding, Alexandra den Heijer questioned how to maintain campus engagement in an increasingly hybrid educational environment. She emphasized the growing importance of using data and campus tools effectively, with coordinators and campus managers playing a key role in driving data-informed decisions that support innovation.

Drawing inspiration from European initiatives and cross-border knowledge exchange, the speech recognized shared international challenges such as funding, talent retention, and energy transitions. Finally, the speakers are enthusiastic about the Dutch role as a “starter motor” in creating the European network, advocating for greater visibility, shared ambition, and active participation in shaping the future of (European) campuses. The European Universities Estates Conference (EUEC) in January 2026 (27th+28th) is proudly hosted by Vrije Universiteit Amsterdam. Alexandra den Heijer emphasizes that the conference is ‘free’ for university delegates, since the private sector plays a large role in the organisation and encourages Dutch universities to exchange knowledge with European peers next year.



Figure 14.3: Photo left: Campus NL team members from academia, from left Julia Kudła, Thomas Vogl, Alexandra den Heijer, Jasmine Bacani, Monique Arkesteijn); photo middle: Franc van Nunen presenting university networks across Europe; photo right: Mark van Huystee drawing during workshop sessions

4. Conclusion

The group discussions and panel session at the second annual Campus NL conference provided a valuable platform to explore pressing challenges in the management of university learning environments in the Netherlands. The objectives of these sessions were twofold: (1) to discuss both pre-identified and emerging dilemmas in managing learning environments at Dutch university campuses; and (2) to collaboratively identify potential solutions to these challenges.

Across six diverse discussion groups and the concluding panel talk, participants consistently emphasized the urgency of adapting campus strategies to shifting student demographics, hybrid learning modalities, and financial constraints. While the Dutch higher education system benefits from its decentralized, collaborative nature, there is a growing need for stronger coordination, strategic vision, and better alignment between space use, educational goals, and institutional planning.

Recurring themes included the importance of shared responsibility in space planning, the need for transparent and centralized data systems, and the critical role of meaningful user involvement - especially from educators and students - in the design and management of learning spaces. Participants also advocated for a cultural shift: from reactive, cost-driven decisions toward proactive, mission-aligned campus development.

Flexibility, multifunctionality, and inclusiveness emerged as guiding principles for future campus design. The discussions highlighted how carefully managed scarcity can drive innovation, and how blended learning and campus community building must be supported through thoughtful design, robust faculty development, and long-term planning. Ultimately, these conversations underscored the power of collaborative dialogue among institutions, facility managers, and educators in shaping resilient and future-ready campuses. During the day, illustrator Mark van Huystee made a visual report during the plenary sessions (see Figure 14.4).

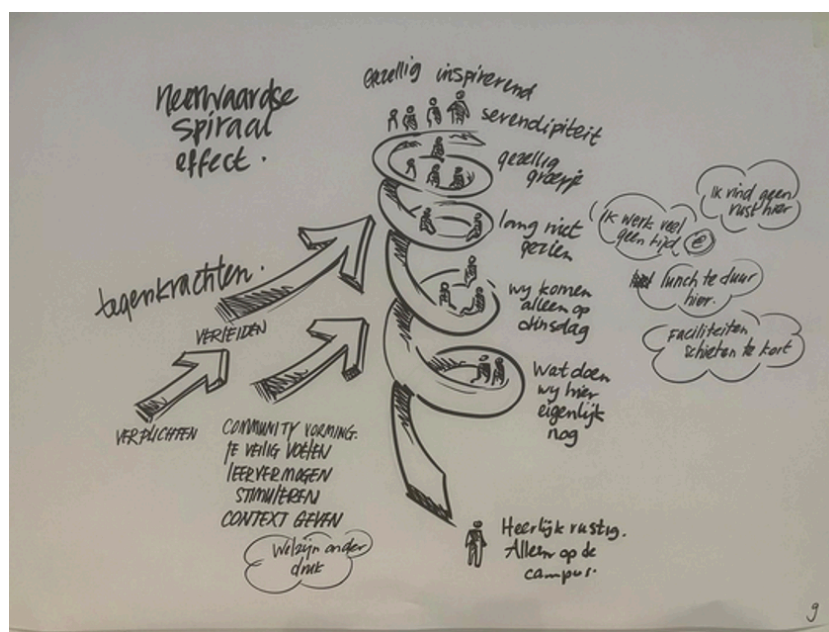


Figure 14.4: Presenting the Campus NL results of the annual conference (23 May 2025) visualization by Mark van Huystee

References

Fuß, S. and Karbach, U. (2014), Grundlagen der Transkription, Verlag Barbara Budrich, Stuttgart, doi: 10.36198/9783838550749.



Part III

CONCLUSIONS, STRATEGIES & NEXT STEPS

Part III – Conclusions, strategies & next steps

Summary of conclusions

Alexandra den Heijer and Thomas Vogl (2025)

This section presents the conclusions of Part D of the annual Campus NL research report and provides a comprehensive summary of the project activities and findings for the year 2024–2025.

In the first year of the four-year Campus NL research project (2023–2027), the central theme was “hybrid working.” In the second year (2024–2025), the focus shifted toward the theme of “education”, which was explored across all four research components (A–D). Concurrently, foundational work was undertaken to develop generic management information to support campus decision-making.

In parallel, further steps were taken to develop campus management information tools, based on collective data and insights from Dutch universities. Over the course of four years, the project aims to develop a “campus dashboard and control panel” that will allow for an integrated understanding of the organizational, functional, financial, and (energy)technical implications of campus decisions. Conversely, it also seeks to clarify which organizational policies, user requirements, financial considerations, and sustainability goals should inform those decisions.

The key conclusions for each research component are summarized below.

Part A – Campus DATA

Part A presents an inventory of campus data, encompassing both the existing campus in relation to its historical development and current projects that signal future transformations. The following preliminary statements describes the scope and methodological considerations that serve to contextualize the subsequent conclusions.

- **Campus NL is not intended as a benchmarking tool for comparing individual universities; it provides an overall picture.** Hence, its purpose - both in the previous report (Den Heijer et al. 2024) and in the current study - is to provide a representative overview of the past, present, and potential future developments of the Dutch university campus landscape as a whole. A fully comprehensive dataset is neither necessary nor feasible, as it would require a disproportionate effort from participating institutions. The focus is therefore on aggregated, national-level data, combining inputs from all Dutch universities to create an overall picture.
- To prevent unintended comparisons or rankings, **university names are anonymized through coded identifiers.** Consistent with the overarching objective, the emphasis lies on understanding broad trends rather than analyzing or judging inter-university differences. Nonetheless, recognizing that individual institutions may wish to identify their own data, campus decision-makers have been provided with their specific codes for internal use.
- The **figures presented in Campus NL are supplied directly by universities and may differ from other resources**, such as annual reports, administrative records, or external benchmarks (e.g., Colliers 2022 or 2024). Such discrepancies may result from differences in definitions or the specific timing of data collection. These variations have been acknowledged in the analysis by adjusting the level of numerical precision where

necessary or explicitly noting the sources of divergence. Over the past decade, consistent data collection has become increasingly challenging due to the growing complexity of university structures, many of which now function as networked organizations with shared personnel, infrastructure, and financial systems. As such, precise quantification is not the primary goal.

- **Data is used to support strategic thinking and decision-making for Campus NL.** The emphasis is on identifying plausible ranges - for example, in space usage, building conditions, or cost levels - that are sufficiently robust to inform scenario development and guide future campus strategies. In sum, the data gathered serves a strategic rather than statistical function: to provide a grounded, representative foundation for shaping the future of Campus NL.

A1/A2 Campus NL in numbers and functions

Findings from Part A – CAMPUS DATA describing the current state of the campus in general, and teaching spaces in particular. These insights are relevant for weighing the dilemmas outlined above. In addition to facility costs (which are only available as an average per m²; see Dilemma 5), surface area data are also available. Notably, the total surface area of Campus NL has remained virtually unchanged for decades - hovering around 4.5 million m² - even as the number of students and staff has increased significantly. Several campus publications have already noted that this efficiency is due to more intensive space use, multifunctional space allocation, and off-campus work (such as working from home or at partner organizations).

Nevertheless, it is a sign of organizational flexibility that dynamic and rapidly growing Dutch universities still function within relatively static buildings. At the same time, it is precisely the teaching spaces that have become increasingly flexible over the past decade, as seen in the most recent buildings: lecture halls can now be subdivided using movable walls, and furniture is increasingly mobile and reconfigurable.

This results in the following dilemma for Campus management:

- *In order to jointly evaluate alternatives for educational space, users (lecturers, researchers, and other staff) must be more directly confronted with the (environmental) costs of their choices.¹ This enables them to think creatively about effective, yet also environmentally and financially sustainable, solutions.*
 - (a) *What does a lecture hall cost per hour?*
 - (b) *What is the cost of a reserved but unused conference room? (Could it be repurposed for teaching?)*
 - (c) *What is the trade-off between a dedicated personal workspace and a significantly higher travel budget?*
- *Some portion of space should be designated as "non-schedulable" or "non-reservable" to allow for daily flexibility - spaces that can still be booked "last minute."*



A3 Utilisation of educational space

The composition of educational space typically consists of a limited number of very large lecture halls and many medium or smaller rooms. Data from several universities indicate that the largest (amphitheater-style) lecture halls have relatively high occupancy/utilization because they are also the scarcest. Do schedulers or space users adjust their needs due to

scarcity, shifting more easily to days or time slots other than their preferred ones? This appears to be the case.

The largest halls are often shared facilities at the university level (located in generic buildings), whereas small halls are often abundantly present within faculty buildings. This territoriality (and exclusivity for certain user groups) can negatively affect occupancy and utilization.

Universities generally consider occupancy (adequate availability over time) more important than capacity utilization, especially since attendance is usually not mandatory for lectures. The trend to accommodate active & blended learning more effectively with specialized educational facilities also requires space sharing to share costs or derive more benefits.

Almost half of the universities included in the database have an occupancy norm (target value for hours occupied relative to maximum availability) ranging from 70-75%. Campus NL achieves better occupancy than (capacity) utilization.

This results in the following dilemma for Campus management:

- (a) *Should scheduling be based on peak times or on average occupancy, and in the case of peaks, should space users be asked to adjust their demands?*
- (b) *Do these figures provide a reason to modify scheduling processes?*
- (c) *Do these figures justify lowering the space standards? (i.e., square meters of educational space per student)*
- (d) *Or should different standards apply for peak periods compared to less busy periods?*

Within the current space standards, education can be well scheduled with lecture halls still having overcapacity. Universities that explicitly apply space norms appear to use educational space more efficiently.

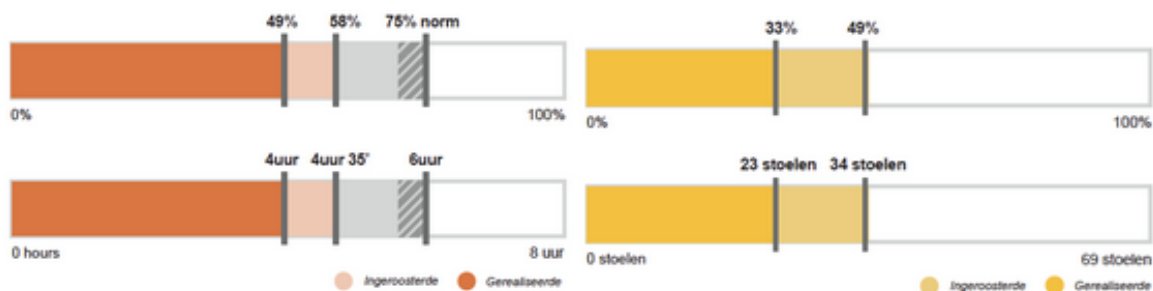


Figure 15.1: Average occupancy of educational spaces at Campus NL relative to a 70-75% target norm: that is 6 hours out of 8 available hours per day; (right) average utilization of space capacity.

The next figure shows occupancy and (capacity) utilization percentages for different types of educational spaces, both scheduled (pre-booked) and actually measured.

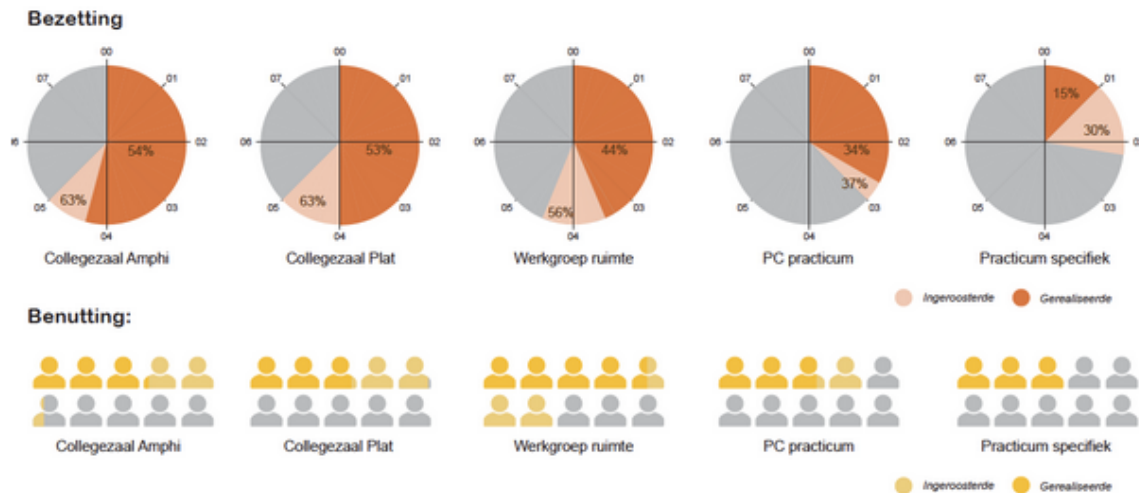


Figure 15.2: occupancy and (capacity) utilization percentages for different types of educational spaces

The largest lecture halls appear to be the best utilized (highest realized occupancy). In nearly all types of educational spaces, actual capacity is substantially underutilized; this also applies to scheduled capacity utilization (based on enrolled students per course).

(a) Doubling group size—for example, as a cost-saving measure—should not be a problem given the average utilization rate of 33% across all spaces at Campus NL, and 45% for tutorial rooms.

(b) Universities could "overbook" rooms in terms of capacity, considering the "no-show" rate can reach several tens of percent. But do universities dare to risk overcrowded spaces, for example at course start? Is this reason to downscale space capacity during a course?

MSc thesis Menno in 't Veld

Efficient knowledge exchange is important for organizational success, especially in the multifaceted real estate industry. As the industry navigates rapid changes, complexity, and diverse stakeholders, the ability to share information, expertise, and insights is crucial. When managing big real estate portfolios, in the case of universities, the exchange of knowledge about real estate can play a beneficial role for the management of the buildings. However, barriers such as the lack of shared databases and repositories, inconsistencies in knowledge sharing tools, and limited technological utilization hinder the effective exchange of knowledge and collaboration between universities. Existing literature recognizes the potential benefits of AI in everyday use and the importance of tools in overcoming challenges regarding knowledge exchange. But the optimal contribution of AI remains an area requiring further research. Therefore, this research explores how Artificial Intelligence, specifically a Tailored GPT model, can address these barriers and enhance knowledge exchange about university real estate buildings. This research aims to address this gap by exploring the effectiveness of AI enhancing knowledge exchange about university buildings. Drawing on theoretical frameworks and empirical evidence, the research seeks to investigate how a knowledge database can be created for university real estate with the help of AI. Therefore, the goal of this research is how the exchange of knowledge between Dutch universities can be enhanced by the quick and effortless creation of a centralized AI-driven knowledge database for university real estate projects. The research uses a mixed-method approach, combining qualitative and quantitative analyses. The quantitative method involves

the theoretical background and creation of the knowledge database using four steps: finding, collecting, creating an overview, and analyzing and identifying. The qualitative method involves interviews with campus managers, in which the created knowledge database will be explained and in which the campus managers can give their feedback. In the synthesis, the results from the theoretical and empirical research will be demonstrated in an expert panel workshop. In this workshop the project database will be demonstrated to the campus managers or other related stakeholders to show how the database works and to get a final understanding on how the database can be further improved. Resulting in a database that can be used by campus managers to enhance the exchange of knowledge.

Link to the online version at TU Delft Library

<https://repository.tudelft.nl/record/uuid:5054ca30-e1b3-4728-8cef-6446764ed18a>.

MSc thesis Martin Lejewaan

Dutch universities are increasingly challenged to balance educational excellence with sustainable and efficient campus management. Amid tightening public budgets and rising space demands, sharing educational spaces with third parties, such as other educational institutions, government bodies, businesses, and community organizations, has emerged as a promising strategy. These collaborations offer opportunities for optimizing real estate usage, reducing underutilized space, generating additional revenue, and fostering societal engagement. However, the adoption of space-sharing practices remains limited and uneven, often falling short of institutional ambitions.

This thesis investigates the current drivers, barriers, and strategies that shape the sharing of educational spaces in Dutch universities. Drawing on a comprehensive mixed-method approach, including literature review, stakeholder surveys, and semi-structured interviews with facility managers and campus strategists, the study explores both operational realities and strategic frameworks underlying space-sharing initiatives. A central contribution is the development and application of the S.P.A.C.E. matrix (Strategic Fit, Practicality, Accessibility, Collaboration, Economics), which enables comparative analysis of universities' readiness and alignment for shared use of specific space types.

Findings reveal that while universities recognize the societal and financial value of shared spaces, significant obstacles remain. These include decentralized governance, cultural resistance among faculty, logistical and scheduling complexities, and unclear financial or legal frameworks for third-party use. Despite these barriers, pioneering practices across universities illustrate promising pathways for integrating third-party collaborations into long-term campus strategies. Moreover, the study highlights the role of national platforms like Campus NL in facilitating peer learning, benchmarking, and policy alignment across institutions.

This research contributes new theoretical and practical insights into campus real estate management, with implications for policymakers, university leaders, and planners. It supports a shift from ad-hoc sharing toward a more strategic, inclusive, and future-proof approach to educational space use, positioning the university as a collaborative node within broader knowledge ecosystems.

Link to the online version at TU Delft Library

<https://repository.tudelft.nl/record/uuid:09724da0-eb86-4c74-9a45-d4aea1209154>.

Part B – Campus TRENDS

This section of the study outlines future scenarios and campus trends, grounded in the evolving contextual landscape and the strategic policy decisions that universities may need or choose to make in response. These scenarios are informed by insights from academic research and are intended to support long-term planning.

The analysis incorporates several key components that frame the context for strategic campus decision-making. Reference estimates for future trends and scenario variables derived from scientific and grey literature as well as higher education scenarios developed by various stakeholders.

Subsequently, the discussion turns to trends in the learning environment, drawing conclusions from both practical implementation and theoretical perspectives. This includes systematic analysis of scientific and grey literature, university policy frameworks on visions and objectives collected for Campus NL, as well as findings from a workshop conducted by researcher from the TU Delft, which identifies key implications and lessons for universities navigating through these developments.

Hence, Part B describe developments in higher education, educational vision content, insights from the literature, and innovations in educational space. These are relevant to the considerations around all previous dilemmas.

B1 – Changing student numbers (Thomas Vogl, Alexandra den Heijer, UNL data)

The Reference Forecast provides projections on the future development of student and graduate numbers in higher education. These forecasts play a crucial role in determining institutional budgets, as funding is closely tied to student enrolment figures. Consequently, a decrease in projected student numbers directly translates into reduced income for universities.

The most recent version, the 2025 Reference Forecast (“RR” refers to the Dutch word “referentieraming” for “reference projection”), anticipates a further decline in student enrolment over the coming years. As seen in the B1 Chapter of the previous Campus NL report 2023-2024 (Den Heijer, 2024), earlier projections had estimated that the number of students in higher education would reach approximately 400,000. However, RR2025 revises this estimate downward, forecasting that student numbers will instead plateau around 300,000 by 2040.

These updated forecasts highlight the need for universities to prepare for long-term demographic shifts and associated financial implications.

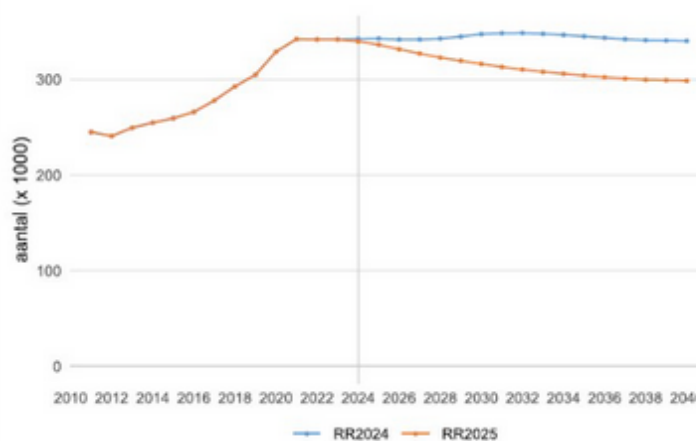


Figure 15.3: Number of university students: history and projections, based on respectively 2024 and 2025 data (source: reference projections “RR 2024” and “RR 2025”; UNL, 2025)

B2/B3 (mega)trends and their implications for higher education – an international perspective (Thomas Vogl, based on Curvelo Magdaniel et al. 2019)

Based on a narrative literature review, the following conclusions can be drawn, which determine the context of campus management.

Universities operate in an increasingly complex and uncertain environment, where long-term predictability is limited. As such, they must remain agile—continuously anticipating change and adapting accordingly (Curvelo Magdaniel et al., 2019). Global megatrends, including technological advancement, demographic shifts, and geopolitical developments, exert significant influence on higher education and must be actively monitored to ensure institutional resilience and strategic preparedness.

Recent political events, such as the war in Ukraine, highlight the tangible impact of global crises on university operations. These disruptions have led to rising energy costs, constrained funding, and limited collaboration and mobility for institutions in affected regions. At the same time, they have triggered increased support mechanisms for at-risk scholars and students, particularly from Ukraine, revealing both the vulnerabilities and adaptive capacities of the academic sector.

In this context, strategic campus planning must be informed by scenario thinking and grounded in flexible frameworks that allow for rapid response to external changes. By aligning with broader societal and geopolitical dynamics, universities can better safeguard their educational missions and public value in the face of an uncertain future.

Organizational drivers Trends: globalization and internationalization, change of knowledge culture as well as the demographic change leads to: - international partnerships (global campuses, joint degree programs, student/staff mobility) to improve their size and quality - increased demand for co-creation and transdisciplinary collaboration Dilemmas: - need for more education offers (e.g., micro-credentials) tailored to needs of companies but complex structures with lacking frameworks (format, design, funding and recognition) - need for more flexible schedules and virtual exchange - cultural diversity and equality while sustaining national values - chances attract talent and sustain student numbers	Physical drivers Trends: demographic changes and the rise of neo-ecology to deal with environmental challenges. - development of educational programs on environmental awareness and facilitate care of aging societies - adoption of energy-saving measures, green technologies, and circular design principles (incl. smart digital tools) - increased demand for flexibility and collaborative workspaces (living or field labs), personalization of education Dilemmas: - flexible, modular physical and virtual learning environment (accommodate diverse learning modalities, changing student numbers and individual needs) - adaption of the campus infrastructure with hard- and software (e.g., smart boards, VR tools, metaverse platforms).
Functional drivers Trends: demographic change, life and non-degree learning, urbanization, technical development, socialization and inclusivity - increased demand for educational programs to facilitate care of aging societies - increased need for capacity building in enrolment and recognition - managing classroom distractions through SMART teaching and policies - digital teaching and assessment enhanced expansion of distance learning, increased accessibility to education Dilemmas: - optimization through digital tools but cybersecurity and data storage - digital teaching but risk of infiltration, missing physical contact and social community => shift from campus as learning space to social hub	Financial drivers Trends: political turbulence, internationalization, technical development - operational costs (e.g., energy crisis) but also educational mobility - funding for universities (budget cuts for Dutch universities) - increasing demand for English courses and organization - provision of affordable accommodations for international students => challenging in overheated housing markets - automatization of administrative tasks - optimize space use, energy consumption and the facility management Dilemmas: - cost reduction by SMART tools but increased efforts for cybersecurity and data protection - Increased student numbers through international students but increased effort to provide English organization, housing and safeguard public values

B4 – Innovations in learning spaces (Julia Kudła, Thomas Vogl, Alexandra den Heijer)

Based on an analysis of the documents of the Campus NL stakeholders, the following conclusions can be drawn.

The analysis reveals that universities are navigating a complex landscape of competing strategic priorities, shaped by diverse educational policies and constrained resources. The coexistence of goals - ranging from societal engagement and innovation to inclusivity, accessibility, and spatial efficiency - creates inherent tensions that demand deliberate trade-offs. These strategic dilemmas highlight not only operational limitations but also deeper institutional values that guide decision-making.

These dilemmas also underscore the complexity of designing effective learning environments. Policymakers must ensure that the strategies adopted remain adaptable, inclusive, and responsive to emerging needs. A balanced approach that considers the reciprocal relationship between digital and physical spaces, as well as between structured and flexible learning formats, is essential for fostering innovative and inclusive educational environments that support both individual and collective development.

Digitalization further compounds the challenge, offering expanded access and global connectivity while simultaneously risking exclusion and a reduction in student well-being through diminished social interaction. Similarly, spatial planning must reconcile the demand for flexibility with the permanence of infrastructure investments, balancing multi-functional usability with the need for specialized, discipline-specific facilities.



Figure 15.4: Strategic dilemmas in higher education

In this context, universities must adopt strategic adaptability, ensuring that long-term planning remains aligned with rapidly evolving pedagogical models. Achieving this balance requires inclusive dialogue, robust scenario thinking, and ongoing reflection on how physical and digital environments can best support institutional missions and future-readiness in higher education.

Findings	Dilemmas
- Educational policies across the universities diverse strategic goals, though managing them simultaneously can create tensions - Differences reflect strategic dilemmas a. some institutions emphasize societal impact, engagement, and innovation b. others focus on accessibility, flexible learning, and optimizing physical space	- Limited resources (funding, infrastructure, and institutional capacity) => difficult trade-offs - Prioritizing one set of goals may come at the expense of another - Challenges in aligning long-term visions with immediate operational needs, stakeholder expectations, and policy frameworks - Balancing these competing priorities demands careful strategic planning and often reveals deeper institutional values and constraints. - Digitalization i. enhances access to learning opportunities and fosters global collaboration ii. risks widening the digital divide if all students do not have equal access to technology iii. reduction in face-to-face interaction and peer collaboration can negatively affect students' well-being, sense of belonging - Flexibility with long-term planning i. changing learning models demand adaptable spaces ii. infrastructure investments are costly and designed for the long term iii. flexible, multi-functional spaces often conflict with the need for specialized, discipline-specific facilities, such as labs or workshops, which require dedicated environments and cannot be easily reconfigured
Design	
- Implications a. Universities aiming to enhance societal impact and engagement i. open, communal spaces b. Focusing on accessibility and inclusivity i. emphasize quiet, structured environments that fulfil diverse learning needs	

B5 – Scientific literature review on trends in the learning environment (Thomas Vogl, Jet Bierman, Alexandra Den Heijer, Monique Arkesteijn)

Based on a systematic review of international scientific literature about the trends in learning environments, the following conclusions can be drawn.

This review highlights that current research on learning environments in higher education focuses largely on flexibilization, personalization, digitalization, and pedagogical innovation. While these themes reflect key educational shifts, important societal factors - such as demographic change, housing shortages, and equity - are rarely addressed. This indicates a gap between broader societal trends and campus research.

The literature also shows a strong focus on general learning environments like classrooms and libraries, while spaces such as labs, lecture halls, and exam rooms are underrepresented. This imbalance suggests missed opportunities to understand the full spectrum of learning spaces affected by educational change.

Most studies examine learning environments from functional and organizational perspectives, emphasizing user engagement, satisfaction, and collaboration. In contrast, physical and financial dimensions - critical for long-term campus planning - are often overlooked. This limits the practical value of research for decision-makers managing infrastructure and budgets.

Designing future-ready campuses requires a balance between flexibility and long-term usability. While digital tools and hybrid models offer new opportunities, they also introduce challenges related to access, social cohesion, and space use. Universities must design spaces that support diverse learning activities and adapt over time without compromising quality or equity.

Although frameworks like those by Finkelstein et al. (2016) and case studies from Utrecht University offer useful principles (such as visibility, mobility, and learning tools) most evidence remains Eurocentric and discipline-specific. Broader, interdisciplinary research is needed to provide comprehensive design principles for learning environments and to inform real estate, facility management, and strategic campus decisions.

In conclusion, universities must adopt integrated, cross-disciplinary approaches to learning space design - linking pedagogy, space, and institutional strategy. Future research should prioritize underexplored environments, connect physical and financial considerations, and reflect the full complexity of evolving educational models. Only then can learning spaces truly support inclusive, adaptable, and future-oriented higher education.

Implications - Design of innovative spaces with a focus on different activities, featuring task-orientated zones and the classroom layout and seating arrangements - o Active learning space: Round tables, flexible layout - o Blended learning: Round tables with chairs, semicircular seating - o New learning spaces: Open space, task-orientated zones, flexible furniture, mobile digital devices - o Sticky campus: Spaces for relaxation, eating, socializing, study - Morphology of the building (size, enclosures, floors, ceilings and internal division of the classrooms) influence design and needs to be considered. - o No one-size-fits-all solution - o Every organization has unique needs - o People who use and work in the space play a crucial role in assessing those needs and shaping the campus design - o Academics can act as clients and stakeholders in the project management - o Successful campus projects require strong leadership and alignment between teaching objectives and institutional strategies	Focus of scientific literature - Focus on flexibilization and personalization of education (n=32), general educational (n=27), digitalization of education (n=25) - Most educational trends focus on learning environments on campus locations (n=17), regular classrooms (n=16), and libraries (n=12) - Focus on the functional and organizational PREM perspectives. Gaps in scientific literature - Lack of research on population growth, diversity, aging and housing shortage (n=2), the increased importance of ethical awareness and public values (n=3) as well as the readiness of the campus to implement changes (n=5) - Lack of investigation on exam rooms and event rooms/aulas (n=1), laboratory (n=2), lecture hall and blended classrooms (n=3). - Lack of investigation on physical and financial perspectives in the context of campus management - Scarce data on design features of learning environments Dilemmas - Communication gaps between academics (focus on teaching and learning needs) and estate managers - User-centered participatory planning and design approach with a common language at its core are highly relevant
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B6 – Real world implications: evidence from a workshop (Thomas Vogl, Alexandra den Heijer, Monique Arkesteijn)

Based on the findings from Chapter B5, a workshop with practitioners was organized in March in Utrecht to test the findings and gain insights (real world cases) from practice.

The results revealed a clear alignment with international literature (Chapter B5), particularly in emphasizing active learning, hybridity, and the sticky campus approach. The most frequently pursued goals mentioned were flexibility, skill development, and student well-being and confirm the rising importance of adaptable and student-centered learning environments.

While these goals are widely shared, the translation into concrete design solutions remains ambiguous. Most identified spatial interventions focus on movable furniture and flexible walls, but these do not fully capture the complexity of the educational ambitions. This reflects a broader insight from the workshop: themes such as flexibility or hybridity are not only spatial but are shaped by the interplay between space, pedagogy, and user behavior.

Consequently, this chapter reinforces the need for a holistic, integrated design approach that considers not just physical modifications, but also the role of teaching practices and institutional strategies. Dutch universities, like their international counterparts, face the challenge of creating learning spaces that can accommodate diverse and evolving activities - especially under growing financial constraints. To navigate this, campus design must be adaptable, support multiple modes of learning, and reflect long-term educational priorities.

Themes: - Most learning spaces address different themes simultaneously. overall focus of the spaces lies in: - o Approaches: active learning (n = 15), hybridity (n = 9) and sticky campus (n = 9) approach. The least implemented approach is smart building (n = 4) - o Goal/trends: flexibility (n = 17), development of skills (n = 11) and increased student well-being (n = 10). The least implemented goals are development of the organization (n = 1), connection with neighborhood & surrounding area (n = 3) and the creation of community (n = 4) - o Type of space: Teaching (n = 20), study space (n = 18) and common space (n = 10) approach. - Most mentioned design implications: - o Movable furniture (n = 6) - o open and/wide space layout (n = 5) and - o AV resources (n = 4)	Future: - Main themes for the future: - o Consensus between all groups: ▪ flexibility (all groups) ▪ student well-being (two groups) ▪ interdisciplinarity (one group) ▪ active learning (one group) ▪ sustainability (one group) Financial constraints: • Financial constraints lead to the need for: - o more efficient use of space - o (or generally lower space requirements/space reduction) ▪ by e.g., implementing SMART tools to optimize space occupancy, supply and maintenance. - o Focus is increasingly on affordable projects dealing with flexibility of space/ functions and the student well-being
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This results in the following dilemma for Campus management:

What are the risks of anticipating a scenario that does not materialize, and how can a campus strategy accommodate uncertainties? Which forms of flexibility are most effective? (See also the trade-off between building and interior flexibility and organizational flexibility as discussed in a previous dilemma.)

Although there are various scenario variables for the university of the future, alongside general educational trends found in educational visions (flexibilization, digitalization, personalization, individualization), several counter-trends are also present: socialization (importance of groups and collectivity, also to combat loneliness and procrastination) and accountability (towards environmental goals and other SDGs - Sustainable Development Goals).

Frequently mentioned in educational visions and literature is the development of "active & blended learning," which deserves its own campus dilemma, as questions remain about the scale at which these trends are currently visible and still need implementation.

B7 – Effective active blended learning environments – lessons from literature (Tazelaar, Arkesteijn, Danivska)

Chapter B7 focused on blended learning environment and how they can be effectively designed and implemented.

Statements and dilemma derived from the Chapter are the following:

- (a) *Blended learning: we know how to design effective "blended learning" spaces.*
- (b) *Blended learning: there are "one-off experiments" (pilots), but we are not yet scaling up.*
- (c) *Blended learning: spaces are not always used as intended.*
- (d) *Blended learning: it has a higher footprint per student.*

Blended learning: can spaces be scheduled so that a limited number serve the entire university?

A learning environment is a physical, social, and psychological setting in which learning takes place, and in which experiences and expectations are co-created among its participants (Rusticus et al., 2023). Recent trends in learning environments emphasize the importance of flexibility, adaptability, and technological integration. These developments are driven by a shift toward student-centred and active learning approaches, as well as an increased focus on accessibility and collaboration in education. All these elements come together in so-called Active Blended Learning Environments.

These environments are characterized by six key elements by Talbert en Mor-Aviv (2019, cited by Fuchs et al., 2024): a formal classroom setup in which the teacher maintains a central position, the use of flexible furniture, group-based seating arrangements, and the integration of both digital and analogue tools to support learning activities.

To develop an effective Active Blended Learning Space, connectedness must be fostered. This can be achieved by enhancing visibility—through group seating and the use of round or square tables—and by promoting mobility within the room. Mobility is supported by allowing freedom of movement via flexible seating and the possibility to reconfigure the space. Lastly, the presence of appropriate learning resources, including analogue materials and digital tools, is essential.

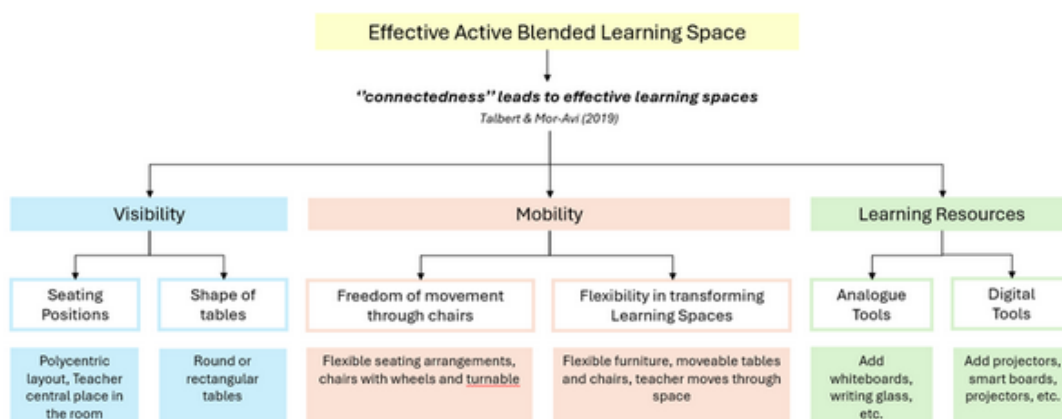


Figure 15.5: Integratie van Zichtbaarheid, Mobiliteit en Leermiddelen voor het verbeteren van verbondenheid, wat leidt tot Effectieve Blended Leeromgevingen (Tazelaar, 2025, p.42)

When these principles are effectively combined, Active Blended Learning Environments can significantly enhance engagement, collaboration, and the overall learning experience. Nevertheless, both educational visions and the literature reveal a gap between educational trends and their translation into spatial requirements. The financial consequences of increasingly differentiated and personalized education are rarely discussed. The most concrete demands relate to a diversity of educational space types and spaces for interaction between students and teachers, and among students themselves.

New buildings appear to provide extra space for social interaction, with a variety of room sizes and types furnished flexibly. Digitalization appears to increase costs, including energy consumption. The use of generative AI tools on the digital campus likely results in much higher energy consumption than ‘traditional’ education with more analog elements (group

work, discussions without laptops). This was emphasized during a UK university network meeting: the physical campus may be (much) more energy-efficient than the digital 'virtual' campus—not necessarily for the university itself, but for society at large.

B8 – Effective active blended learning environments (Tazelaar, Arkesteijn, Danivska)

- (a) Blended learning: we know how to design effective "blended learning" spaces.*
- (c) Blended learning: spaces are not always used as intended.*
- (d) Blended learning: it has a higher footprint per student.*
- (e) Blended learning: can spaces be scheduled so that a limited number serve the entire university?*

The effectiveness of the learning environments was not only examined in the literature (chapter B7) but also in practice in four cases at four different Dutch universities (Tazelaar, 2025). The effectiveness was assessed from three perspectives: the literature, end users and stakeholders involved in the design process of the space.

In the four cases studied, the six key characteristics from the literature for effective active blended learning (see B7) are not fully present in all cases. Case D - UU is the only case that fully meets all six characteristics, Case A - TUD has almost all characteristics, while Case B - TiU and Case C - RU lack flexible furniture, which limits adaptability. Based on the literature, it can be concluded that Case D – UU is the most effective learning environment and Case B – TiU the least effective, given the number of core characteristics present.

The findings of the students and teachers regarding the learning environments confirm that the presence of these six core characteristics contributes to their perceived effectiveness of a learning environment. It appears that effectiveness is determined on the one hand by the spatial and functional design. On the other hand, the survey revealed an additional factor that influences the perceived effectiveness, but which is not explicitly emphasised in the literature, namely the way in which the space is actually used.

The effectiveness of the learning environments was examined not only in the literature, Chapter B7, but also in practice through four case studies at four different Dutch universities, Tazelaar, 2025. Effectiveness was assessed from three perspectives, the literature, end users, and stakeholders involved in the design process of the space.

Across the four cases studied, the six core characteristics identified in the literature for effective active blended learning, see B7, were not fully present in all cases. Case D, UU, is the only case that satisfies all six characteristics. Case A, TUD, includes nearly all characteristics, whereas Case B, TiU, and Case C, RU, lack flexible furniture, limiting adaptability. Based on the literature, it can therefore be concluded that Case D, UU, represents the most effective learning environment, and Case B, TiU, the least effective, in terms of the number of core characteristics present.

Findings from students and lecturers confirm that the presence of these six core characteristics contributes to their perceived effectiveness of a learning environment. Effectiveness appears to be determined, on the one hand, by spatial and functional design. On the other hand, the survey revealed an additional factor influencing perceived

effectiveness that is not explicitly emphasised in the literature, namely the way in which the space is actually used. The intended pedagogical use of the space does not always align with its actual application. When this alignment is absent, and alternative, traditional teaching methods are adopted, the effectiveness of the space may even be undermined.

In some cases, specific core characteristics were not implemented, but this was always the result of a deliberate trade-off in favour of other elements considered more valuable. However, when these trade-offs are compared with the experiences of end users, it becomes evident that in all cases the absence of these specific core characteristics was mentioned as a point for improvement that could enhance effectiveness. This suggests that stakeholders in future projects should strive to integrate all core characteristics rather than sacrificing some in favour of others.

Overall, based on the analysis of the four cases, it can be concluded that Case D, UU, provides the most effective learning environment. This is due to the presence of all core characteristics combined with the fact that the space is used in accordance with its original pedagogical intent.

Among stakeholders, opinions are mixed regarding the actual use and adoption of these learning environments. Despite dedicated reservation systems in Case C, RU, and Case D, UU, the number of booking requests remained low, and the spaces were often unused or underutilised.

At the other universities, allocation of the spaces was integrated into the standard scheduling system, meaning they were automatically assigned without lecturers having to request them specifically. As a result, the spaces were frequently used, but their use often did not align with the pedagogical principles for which they were designed. In these cases, the spaces were mainly used for traditional teaching rather than blended learning. This raises a critical issue, either demand for these innovative learning environments is insufficient, or the spaces are being used simply because they are available, rather than because they respond to a specific educational need. This mismatch in use can significantly affect perceived effectiveness.

If efficiency is considered alongside effectiveness, it can be concluded that an Active Blended Learning environment, with a minimum requirement of 2.3 m² per student, Brown and Finkelstein, 2015, KU Leuven, 2023, requires more space than traditional classrooms. On average, between 0.3 and 0.65 m² more space per student is needed for Active Blended Learning when compared with TU Twente, which applies 1.65 m² per student for lecture and seminar rooms, TU Twente, 2019, and TU Delft Faculty of Architecture, 1.95 m², ES viewer, 2024. In the cases studied, between 2.5 and 3.1 m² per student was used for Case D, UU, and Case B, TiU, respectively.

B9 – Stress in the learning environment – two experiments at TU Delft (Meijer, Arkesteijn, Danivska, Schuller)

In recent years, stress among university students has emerged as a critical concern, reflecting broader societal challenges surrounding mental well-being in young people (American Psychological Association (APA), 2020). Across Europe, recent surveys indicate that mental health difficulties and high stress are common among university students.

Stress is a multidimensional process that involves both subjective feelings and biological responses (Selye, 1956; Lazarus & Folkman, 1984; Persiani, 2021). This study showed that the physical learning environment does influence how students experience stress, but in nuanced, task- and person-dependent ways.

Newer spaces, such as **Room B** in TU Delft's ECHO building, were more often associated with improved focus and lower self-reported physiological stress. These effects were supported by both surveys and qualitative responses. However, no significant differences were found in physiological stress as measured by salivary cortisol, and overall stress levels remained stable in both environments. Meanwhile, **Room A** in TU Delft's BK City building was valued for its warmth and emotional comfort, especially during less intense study tasks.

The findings highlight the importance of spatial variety on campus. Different students, tasks, and moods benefit from different settings, suggesting that one-size-fits-all design solutions are unlikely to meet the diverse needs of university populations.

In this study, physiological and subjective stress don't always align, showing the importance of multi-method measurement. Stress in learning environments emerges from the **interaction between internal state and external space**. Rather than seeking a universal "best" study space, universities should aim for diverse, adaptive, and psychologically supportive environments that empower students to self-regulate and study in ways that match their own needs and context

Part C – Campus ELSEWHERE

This part presents an international and industry-oriented perspective on the evolving context in which universities operate. It examines future scenarios and gives an international overview of practices that institutions may adopt or are required to consider in response to broader societal, technological, and demographic developments. These considerations are anchored in both academic research and practical experience.

C1 – Het onderwijs van morgen (Aestate)

Spaces with ambitious and clear objectives have been realised, but function differently to the intended purpose, the examples mentioned in this chapter are just a small selection of the many cases of MBO, HBO and WO institutions where this is the case. They illustrate that an environment that is less suitable is created when the wishes of some users are not or are insufficiently taken into account in the planning process. This conclusion aligns with the success factors identified by SURF (SURF, 2025) in its study of 14 Dutch campus innovations: Provide robust executive support, a motivated and complementary team, a flexible approach, active user involvement and an inspiring physical environment.

Dilemma:

Decisions regarding on-campus versus off-campus learning cannot be separated from decisions about hybrid work for staff: the success of on-campus learning is strongly dependent on a minimum number of on-campus working days. Does requiring "on-campus learning" also compel instructors to be more frequently on campus?

Although students indicate a preference for having their instructional contact hours concentrated on a limited number of weekdays (source: Aestate), in order to work or study elsewhere on other days and to schedule self-study more flexibly, aligning this with the availability of other students, (part-time) lecturers and academic staff involved in teaching is increasingly complex. If academic staff—whose workload typically consists of 40% teaching, 40% research, and 20% management—are theoretically expected to be on campus during the 40% of their time allocated to teaching, then under a culture or policy of "two days of working from home," research and management tasks will be carried out largely off-campus. As a result, the physical campus may increasingly become a location for teaching rather than for research.

Dilemma:

- (a) *With declining student numbers, sharing space becomes even more important to share costs or extract greater value from costly facilities such as "active & blended learning environments" (an educational trend, see also a following dilemma).*
- (b) *Sharing facilities with third parties (universities of applied sciences, hospitals/medical faculties, cinemas, theatres, conference centres, cultural facilities) already occurs but could be expanded to include other public building owners who can no longer shoulder costs alone and are seeking "new business models."*

Long-term scenarios typically account for major uncertainties in (international) enrollment and (public or private) funding. SURF (see figure below) adds scenario variables for the influence of ICT and digitalization on the campus, considering (de)flexibilization and personalization. Other scenario variables or dilemmas for administrators relate to resource scarcity: personnel, energy, space, money. This affects both primary processes (education, research) and secondary processes (housing, ICT, space norms, stricter sustainability requirements and ambitions).



Figure 15.6: Scenarios for the campus in 2040 (based on SURF, 2024, also via Aestate contribution in Part C)

C2 – Trends in education: a case of University of Utrecht (VKZ)

The Anna Maria van Schurman building of the University of Utrecht is a recently designed educational building in the centre of Utrecht that showcases a university's ability to design a sustainable educational facility that respects heritage in the current era. It provides space for new forms of education and anticipates changes in group sizes. The combination of analysis, design, overview and detail highlights the importance of heritage, as reflected in the educational vision, restoration and urban integration, as well as cooperation with the municipality. In the set-up of this educational building, there is also room for experimentation during use. This is a promising development.

The building is a fine example of several educational trends identified in Chapter B2: the importance of sustainability and public values (such as heritage); more opportunities for flexibility and personalisation; and the growing importance of well-being, socialisation, inclusivity and interdisciplinarity. It also integrates blended and hybrid education through its active learning space.

Lessons from international networks and other education sectors were covered in Part C – CAMPUS ELSEWHERE. This year, contacts with British, Irish, Finnish, and German universities were intensified. In summary, their dilemmas align closely with ours, and their network organizations—like Campus NL—are used to exchange data, trends, and experiences for collective learning.

Part D – Campus LEARNING

This part of the research focuses on the dissemination and exchange of campus-related knowledge, incorporating input from Parts A, B, and C.

The analysis includes a baseline assessment of knowledge exchange practices, based on a survey distributed to nearly 200 campus management professionals. It also draws on insights from discussions and panel talks held during the second annual Campus NL conference, which reflected on the findings from Parts A, B, and C.

Key outcomes include the establishment of an annual Campus Knowledge Day, the development of an online platform for knowledge sharing, the production of infographics tailored to various university audiences, thematic workshops, and the provision of on-demand learning modules for campus staff through to 2026/2027.

D1 – An overview of Dutch Campus management networks (Jasmine Bacani)

Part D included a second survey conducted by PhD candidate Jasmine Bacani, again mapping incentives and obstacles for improving knowledge sharing. She catalogued various inter-university networks on multiple campus themes: from scheduling to safety, from energy transition to maintenance coordinators. She also evaluated how Campus NL already contributes to better knowledge sharing. The survey results (still ongoing) will appear in the next annual report.

The findings resulted in the following dilemma for campus management:

(a) Campus NL can learn much from international networks and could delegate FM/campus directors to attend their conferences and/or become members: do the benefits outweigh the costs?

(b) Private sector involvement in university networks (e.g., AUDE for the UK/Ireland) is necessary to facilitate knowledge exchange: without a “starter motor,” data/information/knowledge sharing lacks sufficient incentives for busy campus staff, resulting in limited uptake.

By comparison, AUDE employs at least 6 full-time staff plus several (research) working groups with university personnel. We can learn from foreign networks how they share knowledge and how they remain creative in turbulent times.

D2 – Findings from annual conference May 23, 2025

Based on the findings from the previous studies (Chapters A-C) dilemmas were derived and discussed in groups and panel talks during the second annual Campus NL conference. This section summarizes the findings from Chapter D2.

This discussions from the conference underscored the growing complexity of campus planning in the face of evolving educational paradigms, financial constraints, and societal expectations. Case studies (see Chapter B6) and literature (see Chapter B2-5) consistently point to the urgent need for flexibility, multifunctionality, and user-centeredness in the design of learning environments. Key approaches identified, such as active learning, hybrid formats, and the “sticky campus” concept, reflect a broader shift toward adaptable and inclusive spaces that foster student engagement, well-being, and skill development.

Despite these emerging priorities, the physical design implications often remain underspecified in practice, commonly reduced to movable walls and flexible furniture. The findings suggest this may be due to the deeply interconnected nature of space, pedagogy, and people - highlighting that spatial design alone cannot address educational challenges. Instead, a holistic and integrated approach is needed, where educational objectives, spatial strategies, and institutional processes are developed in close coordination.

Flexibility and multifunctionality are particularly crucial in light of both educational transformation and financial pressures. Campuses must support a wide range of teaching activities and be agile enough to respond to future demands, while also maximizing the use of limited space and resources. Moreover, societal and community needs increasingly call for campuses to function as shared, multipurpose environments, reinforcing their role not only in education but also in civic life. This reflects a fundamental shift in campus thinking: from static infrastructure to dynamic, adaptive ecosystems.

These findings strongly align with the 2025/2026 Campus NL theme, emphasizing the campus as a shared, flexible, and multifunctional resource. The emphasis on adaptability, community relevance, and integrated planning sets the stage for future research to explore how spatial strategies can support both academic innovation and broader societal value.

Ultimately, achieving these ambitions will require strong leadership, inclusive governance, and evidence-informed decision-making. Universities must foster a culture of shared responsibility - where users, planners, and institutional leaders collaborate to ensure campus spaces are not only fit for today's needs but are resilient and relevant in the long term.

Conclusion about learning environments

The final part of the report focuses on the possible implications of the knowledge gathered on policy and solution directions. It also suggests themes for a subsequent research year.

Selection of key dilemmas and propositions for educational spaces

These trends often reveal conflicting developments. The dilemmas address both educational space and the future campus.

- Is education (or should it be) predominantly physical and on-campus again, or should it largely take place online and off-campus?
- “Group size follows room size”: will the availability and capacity of (teaching) space increasingly determine group size and scheduling? (in an effort to use costly resources efficiently)
- Dynamic timetabling is the future: continuously adjusting schedules to actual demand.
- Should we use (vacant) office space more frequently for teaching, or do the drawbacks outweigh the benefits?

Selection of key dilemmas and proposition for campus management

- Due to hybrid working, students may be present on campus more often than staff: is this desirable?
- Can the campus become more compact and be used more intensively, or has it reached its limits?
- Can or should we share space more frequently with (public and private) partners?
- Without a sense of environmental cost among end users, “claim behavior” will persist—do we need a tool to address this?
- A portion of campus space should be “non-schedulable” / “non-reservable” to maintain daily flexibility.
- We can learn from international networks: how they share knowledge and remain creative during turbulent times.

These key propositions illustrate the complexity and range of considerations influencing campus management decision-making, driven by diverse stakeholders and evolving developments. Attempting to accommodate all demands and trends simultaneously may lead to inefficiencies or conflicting outcomes - potentially resulting in a downward spiral, as illustrated below.

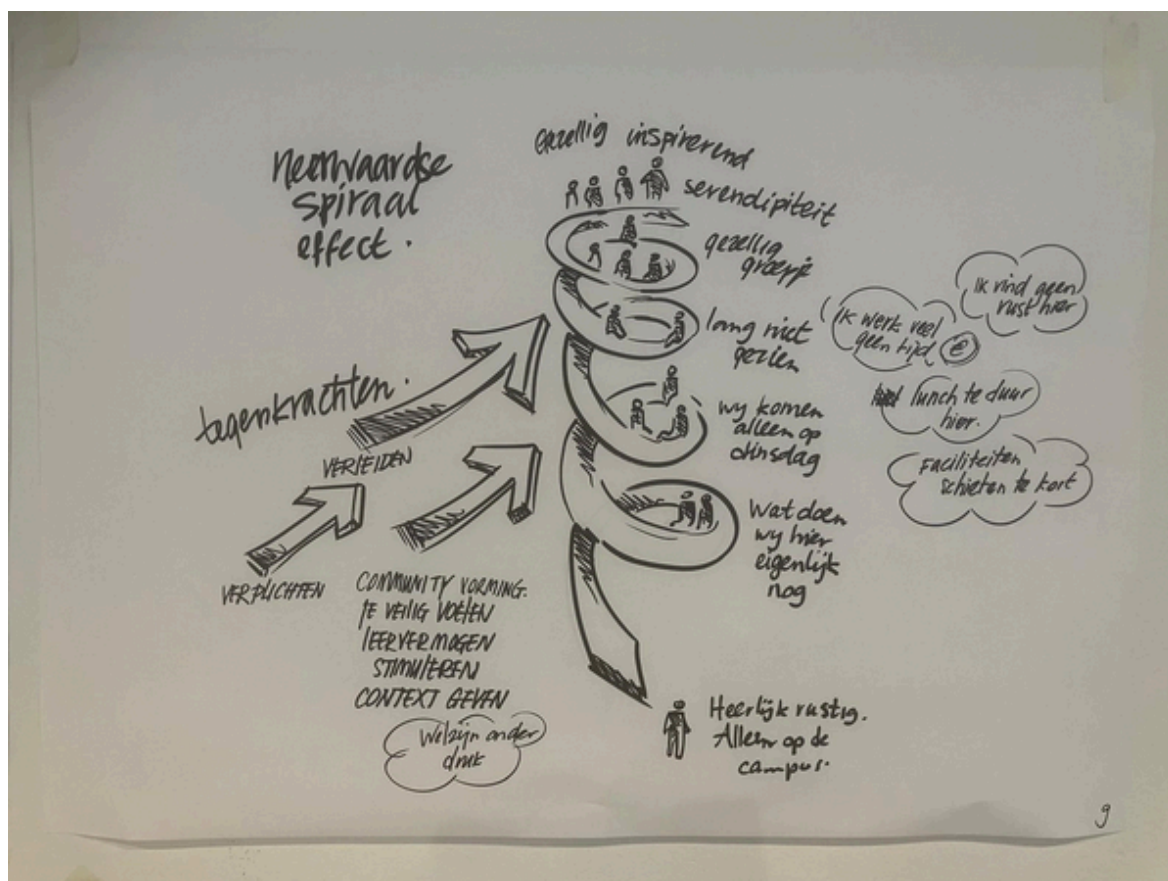


Figure 15.7: Downward spiral in higher education (illustrated by Mark van Huystee during the second annual Campus NL conference)

An important theme discussed throughout all parts is an increased flexibility and multifunctionality, which have emerged as key priorities for the future of campus development, reflecting the need for adaptive spaces that respond to shifting educational demands, financial constraints, and broader societal roles. As this theme gains prominence in 2024/2025, the theme of the upcoming year aims to explore how spatial design, governance models, and cross-sector collaboration can enable campuses to function as dynamic, shared resources for both academic and community use.

Discussion, dilemmas and strategies

Alexandra den Heijer (2025) on behalf of TU Delft's Campus Research Team

Following up on the conclusions of the previous annual report (Den Heijer et al., 2024), these new conclusions and dilemmas concerning the university learning environment begin with the key considerations surrounding hybrid work among university staff: do they work primarily on-campus or off-campus? This work location dilemma aligns with one of the central dilemmas for the future of university education:

Dilemma:

Are we an on-campus university, or do students predominantly learn off-campus?

Although studies and media reports - much like in the case of hybrid work - offer conflicting conclusions regarding the benefits and drawbacks of both the physical and digital campus, there is increasing evidence, also within universities of applied sciences, that student presence on campus is a predictor of academic success (source to follow). A survey conducted among facilities and campus directors in March 2025 also revealed that, as of 2025, education still primarily takes place on campus (indication: approximately two-thirds on-campus, one-third off-campus).

Before making decisions about the future, the following questions may be considered:

Organizational:

- Who do we want to be as a university? (organizational culture, including community vs. autonomy)
- What is essential for our core processes: education and research?
- How do we want to collaborate?

Functional/Social:

- What weighs more heavily: collective (team) goals or individual needs?
- What contributes to employee productivity and (mental) well-being?

Financial:

- What level of investment in real estate is acceptable (as a percentage of total expenditure), especially in the context of budget cuts?
- How do real estate choices impact other costs (e.g., HR, IT)?

(Energy) Technical:

- What is the strategy's impact on sustainability goals, targets, and the carbon footprint?
- And what is its societal impact, for example on mobility or residential location choices?

Dilemma: *Is it desirable for the campus to become primarily a teaching location rather than a research location (as research is increasingly conducted elsewhere or from home under a hybrid work policy or culture)? If not, does this call for a "back to campus" strategy for staff?*

As a reminder, the following hybrid work strategies were outlined in last year's annual report:

1. "We are a campus university":

This strategy focuses on encouraging staff to return to the campus more frequently, emphasizing on-campus community and teamwork. The underlying vision is that

education and research require physical presence, innovation depends on serendipitous encounters and cross-pollination, and that presence is essential for team formation, staff loyalty to the university, faculty, and teamwork.

→ Emphasis on community over individual autonomy.

2. **“Embrace the hybrid reality”:**

This approach assumes more off-campus work—at home or elsewhere—and uses it as a strategy to support individual staff members in a time of labor shortages, and in light of the fact that many employees now live further from the traditional workplace.

The premise is that education and research have evolved into more hybrid, location-independent processes since the COVID-19 pandemic (and even before). According to this vision, innovation often occurs in collaboration with parties beyond the campus. This strategy also aims to facilitate alternative work-life balances (on/off campus), enabling a broader range of individuals to work flexibly for the university.

→ Emphasis on individual needs over collective interests.

A central dilemma is whether the group or the individual should be prioritized - this also applies to education. Personalization and individualization are key trends in education policy, yet learning from one another, group work, and the social function of "individual studying together," as commonly practiced in libraries, are of great collective value and remain very popular among students. Increased presence, personalization, and individualization demand more space - or smarter ways of sharing space.

Dilemma:

Do we prioritize individual or collective needs—and what are the corresponding didactic, social, and (mental) health benefits? Equally important for deciding on appropriate educational spaces: what are the personnel, energy-related, technical, and financial costs?

- (a) *In times of budget cuts, is there still funding available to meet individual (space) needs and personalized scheduling preferences?*
- (b) *Should specialized and/or innovative educational spaces - which require substantial energy, money, and service - be more effectively shared, scheduled more intelligently, and used more intensively? (And what are the costs if they are not?)*

Because these dilemmas affect the autonomy and study/work-life balance of both students and staff, the discussion must take place in close consultation with these groups. At the same time, these stakeholders must not only be aware of their own spatial needs, but also of the broader implications for the organization (e.g., collectivity, community, capacity for innovation, peer learning), as well as the financial and sustainability consequences for both the campus and the home work environment of students and staff.

Dilemma:

Educational innovations in Campus NL buildings increasingly incorporate technical flexibility - movable walls and furniture - but the greatest efficiency gains still lie in organizational flexibility: the willingness of people to adjust their spatial needs in response to scarcity in availability (both in space and time).

- (a) *To reduce costs, m2 users must more frequently adapt to the limited supply.*
- (b) *To reduce costs, m2 users must more often shift their usage to less busy time slots.*
- (c) *"Group size follows room size": Is the available capacity of (educational) spaces increasingly determining group size and scheduling times? (efficient use of costly, scarce facilities)*

A second major driver of increasingly efficient space use is the dual use of spaces for different functions and activities at different times of the day, week, semester, or year. Educational spaces are also used as self-study areas when not occupied. Floor area inventories, including those from Campus NL (2016) and Colliers (2018, 2022, 2024), show a sharp decline in office space per employee (FTE), but sometimes a rising and then again declining education space per student. With an average of 1.9 m² of educational space per student at Campus NL in 2023, and education accounting for 20% of total campus space, it is assumed that educational activities also take place in part of the remaining 80% of the campus area. A survey among facilities and campus directors confirmed that offices (particularly meeting rooms), restaurants, espresso bars, corridors, and atria are already used on a significant scale for educational purposes. Opinions varied about the potential for further use, such as basements or outdoor spaces. The territoriality of the (academic) office—the largest share of Campus NL—was also cited as a barrier.

Dilemma:

- (a) After decades of more efficient space use, has potential been exhausted, or are there still opportunities for dual use of meeting rooms, restaurants, espresso bars, and horizontal circulation areas for educational purposes?*
- (b) If employees work more from home, can education make greater use of office space? Does this require transformation, or can it be temporary?*
- (c) During low-use office hours—quiet Mondays, Wednesday afternoons, and Fridays—can office rooms and meeting spaces be reserved for group work or silent study?*

An on-campus educational model with the ambition to provide students with study places at their faculty ("solid model"), alongside shared facilities at the campus level ("liquid model"), theoretically demands more space (an indication of >3 m² per student). However, the additional demand above the current average of 1.9 m² per student could be met through dual use of other space types, as suggested in dilemma 7.

An off-campus educational model ("gas model") can complement rather than replace this, for example to serve different learner groups for lifelong learning, MOOCs with micro-credentials, professional education, (online) summer schools, whether or not on other campuses. This model requires considerably less traditional educational space on campus but demands (expensive) studio space for video production and workspaces for a large number of individuals off-campus (possibly on scarce, expensive residential space). The ecological footprint of the campus decreases, but it could likely increase disproportionately off-campus due to the lack of economies of scale.

Alongside data on m² usage, occupancy and (capacity) utilization of educational spaces were again central to the Campus NL data collection. Both scheduled occupancy (how many hours of available opening time) and actual measured occupancy were examined. The same applies to (capacity) utilization: how many people should be seated according to the schedule, and how many are actually present?

The Campus NL team was (once again) proud of the collectively gathered data: based on 38 studies of educational space usage, conducted between 2014 and 2024, at 11 of the 14 universities, covering a total of 133 buildings. For comparison, last year the team collected office space usage data (occupancy and utilization) from 100 buildings and a total of 33,000 workstations. Together, these findings and inventories are gradually forming both a knowledge base and database for Dutch universities that can be expanded in the (near) future with additional (explanatory) data. The year 2023-2024 focused on office space, the year 2024-

205 on educational space. In the next years of Campus NL, data about more functions can be added, completing the overview of Campus NL and also exploring the opportunities for multifunctional use of space.

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Appendix 1. Campus NL eindconclusies op basis van onderzoeksresultaten 2024/2025: campusdilemma's, reflecties en vervolgstappen (korte NL samenvatting)

Alexandra den Heijer, namens TU Delft's Campus Research Team (2025)

In het eerste jaar van het vierjarige onderzoek Campus NL (2023-2027) stond het "hybride werken" centraal. Tijdens het tweede jaar (2024/2025) is nadruk gelegd op het thema "onderwijs" voor alle Campus NL onderzoeksdelen (ABCD):

- deel A - CAMPUS DATA - de stand van zaken rond de huidige onderwijsruimte;
- deel B - CAMPUS TRENDS - ontwikkelingen en innovaties in onderwijsruimte;
- deel C - CAMPUS ELSEWHERE - inzichten uit het buitenland en van andere onderwijssectoren;
- deel D - CAMPUS LEARNING - lessen en netwerken voor het verbeteren van kennisdeling.

Tegelijkertijd is er een volgende stap gemaakt voor het opbouwen van managementinformatie voor campusmanagement, gebaseerd op de collectieve data en inzichten van Nederlandse universiteiten. Over de periode van vier jaar werken we toe naar een "campus dashboard & mengpaneel": wat zijn de organisatorische, functionele, financiële en (energie)technische consequenties van campusbeslissingen? En andersom: welke context van organisatiebeleid, gebruikseisen, financiën en duurzaamheid moeten meegenomen in campusbeslissingen?

Komende jaren zal Campus NL zich ook steeds meer richten op effectieve en efficiënte communicatie van de bevindingen. Zo maken de onderzoekers niet alleen (deel)rapporten, maar ook presentaties die intern kunnen worden gebruikt en een online Campus NL platform dat deels open/gesloten zal zijn.

De stuurgroep & kerngroep Campus NL stelden in april/mei 2025 voor om op basis van de onderzoeksresultaten minstens 10 dilemma's voor te leggen aan de deelnemers van het jaarcongres. Tijdens het jaarcongres werd gevraagd hieruit een aantal dilemma's te selecteren voor de discussie in break-out rooms. Andere dilemma's werden behandeld met de hele zaal. In dit document zijn de oorspronkelijke dilemma's aangevuld met inzichten uit het congres.

Aansluitend op de conclusies vanuit het vorige jaarrapport, starten deze conclusies en dilemma's over de universitaire leeromgeving bij belangrijkste afwegingen rond het hybride werken van universitaire medewerkers: werken zij grotendeels on-campus of off-campus? Dit werklocatie-dilemma komt overeen met een van de belangrijkste dilemma's voor het universitair onderwijs van de toekomst:

Dilemma 1:
Zijn we een on-campus universiteit of leren studenten voor een aanzienlijk deel off-campus?

Hoewel de studies en mediaberichten - net als bij hybride werken - tegenstrijdige conclusies geven over de baten en lasten van zowel de fysieke als de digitale campus, zijn er - ook in het HBO - steeds meer aanwijzingen dat on-campus aanwezigheid van studenten een indicator is voor studiesucces (bron volgt). Uit een vragenronde bij facilitair en campusdirecteuren in maart 2025 bleek ook dat onderwijs anno 2025 grotendeels on-campus plaatsvindt (indicatie: 2/3 on-campus, 1/3 off-campus), zie hoofdstuk A1 en A2 van het jaarrapport voor meer achtergrondinfo.

Voorafgaand aan het keuzes voor de toekomst, kunnen de volgende vragen worden beantwoord:



organisatorisch:

- wie willen wij zijn als universiteit? (organisatiecultuur, ook community versus autonomie)
- wat is belangrijk voor onze primaire processen: onderwijs & onderzoek?
- hoe willen we samenwerken, en waar? (welke ruimtetypen hoe formeel/informeel)



functioneel/sociaal:

- wat weegt zwaarder: collectieve (team)doelen of individuele behoeften?
- wat draagt bij aan de productiviteit en (mentale) gezondheid van medewerkers?



financieel:

- wat mag huisvesting kosten (% totaal), ook in de context van bezuinigingen?
- wat is invloed huisvestingskeuzes op andere kosten (HR, ICT etc.)?



(energie)technisch:

- welke impact heeft de strategie op duurzame ambities, targets en de "carbon footprint"?
- en welke impact op de maatschappij, bijvoorbeeld op mobiliteit of woonplaatskeuze?

Dilemma 2:

Keuzes voor on-/off-campus leren kunnen niet los worden gezien van keuzes voor hybride werken van staf: succes van on-campus leren is sterk afhankelijk van een minimumaantal dagen on-campus werken. Verplicht "on-campus leren" docenten ook tot meer on-campus werken?

Hoewel studenten ook aangeven dat ze hun onderwijscontacturen liefst op een beperkt aantal werkdagen geconcentreerd hebben (bron: Aestate, zie hoofdstuk C1) om de andere dagen elders te kunnen werken en zelfstudietijd flexibel in te delen, is de "match" met de agenda's van de vele (deeltijd-)docenten en wetenschappelijke staf met een onderwijstaak steeds meer een puzzel. Als academische staf met gemiddeld 40% onderwijs, 40% onderzoekstaak en 20% managementtaak theoretisch de 40% onderwijsdagen on-campus moet zijn, dan worden de onderzoeks- en managementtaken bij een "twee dagen thuiswerken" cultuur of beleid voor een aanzienlijk deel off-campus uitgevoerd. De fysieke campus kan als gevolg daarvan meer een onderwijslocatie dan onderzoekslocatie worden.

Dilemma 3:

Is het wenselijk dat de campus steeds meer een onderwijslocatie dan een onderzoekslocatie wordt (omdat onderzoek steeds vaker op andere locaties of thuis plaatsvindt, onder invloed van een hybride werken beleid/cultuur)? En zo nee, vereist dit dan een "back to campus" strategie voor staf?

Ter herinnering volgen hieronder de hybride werken strategieën uit het vorige jaarrapport:

(1) "wij zijn een campus-universiteit" die inzet op commitment van medewerkers om weer vaker fysiek aanwezig te zijn op de campus en on-campus community en teamwork; achterliggende visie is dat onderwijs en onderzoek fysieke aanwezigheid vragen, innovatie niet kan zonder toevallige ontmoetingen/kruisbestuiving, aanwezigheid essentieel is voor teamvorming, loyaliteit van medewerkers aan universiteit, faculteit en teamwerk **à belang community boven autonomie individu**

(2) "koester de hybride werkelijkheid" die uitgaat van meer off-campus werken, thuis of elders, en dit gebruikt als strategie om de individuele medewerker meer te faciliteren in een tijd waarin personeel schaars is en verder van de traditionele werklocatie woont of is gaan wonen. Uitgangspunt is dat onderwijs en onderzoek na coronapandemie (en daarvoor ook al) veranderd zijn in hybride, plaatsonafhankelijke processen. Volgens deze visie vindt innovatie grotendeels plaats met partijen buiten de eigen campus. Daarnaast zet deze strategie in op het faciliteren van andere werk-privé-balans medewerkers (on/off-campus), wat meer doelgroepen in staat stelt om flexibel voor universiteit te werken **à belang individu boven belang groep**

Tijdens het Campus NL jaarcongres werd strategie 2 "koester de hybride werkelijkheid" ook getypeerd en gevisualiseerd als een neerwaartse spiraal voor het gebruik van de campus, in de volgende figuur geïllustreerd door Mark van Huystee. Achterliggende redenatie is dat individuele keuzevrijheid - om bijvoorbeeld op maandagen en vrijdagen thuis te werken - stap voor stap kan leiden tot een steeds legere campus: de werknemers en studenten die nog wel komen om geïnspireerd te worden door anderen of gezelligheid te zoeken, zullen steeds minder collega's vinden en een volgende week ook besluiten om niet meer naar de campus te gaan.

De neerwaartse spiraal kan eventueel worden gekeerd naar een opwaartse spiraal door het organiseren van meer (sociale of intellectuele) "community events" op de campus en het benadrukken van het belang van samenwerken (in onderwijs en onderzoek) of door strengere regels over aanwezigheid en een limiet voor het aantal thuiswerkdagen: de spreekwoordelijke "carrots and sticks" (stimuleren of verplichten) om de aanwezigheid op de campus te verhogen.

Kortom, een belangrijk dilemma is of de groep of het individu wordt gefaciliteerd¹, dit speelt ook bij onderwijs. Personalisatie en individualisering is een belangrijke trend in onderwijsbeleid, maar tegelijkertijd is het leren van elkaar, groepswork en de sociale functie van "individueel samen studeren", zoals in bibliotheken gebeurt van groot collectief belang en ook zeer populair bij studenten. Meer aanwezigheid, personalisering en individualisering vraagt meer ruimte, of slimmer ruimte delen.

¹ Een derde strategie was "niets doen", waarbij werkplekkeuzes niet expliciet gemaakt (of gehandhaafd) worden en 'de facto' een resultante zijn van individuele keuzes. Dit leidt doorgaans geleidelijk tot strategie (2).

Dilemma 4:

Faciliteren we individuele of collectieve behoeften en wat zijn daarvan de didactische, sociale en (mentale) gezondheidsbaten en - belangrijk voor de afweging voor bijbehorende onderwijsruimte - wat zijn de personele, energie technische en financiële lasten?

(a) Is er in tijden van bezuinigingen nog geld voor het voorzien in individuele

(ruimte)behoeften en individuele roosterkeuzes (of niet)?

(b) Moeten specialistische en/of innovatieve onderwijsruimten die veel energie/geld/service vragen, beter gedeeld, slimmer geroosterd en intensiever gebruikt worden (en wat kost het, als dat niet gebeurt)?

Omdat voorgenoemde dilemma's de autonomie en studie/werk-privé-balans van zowel studenten als medewerkers beïnvloeden, moet de discussie plaatsvinden in nauw overleg met hen. Tegelijkertijd dienen deze groepen zich bij deze afwegingen niet alleen bewust te zijn van hun eigen ruimtebehoeften, maar ook van de consequenties voor de organisatie (collectiviteit, community, innovatiekracht, leren van elkaar), voor de impact op financiën en de duurzaamheidsconsequenties op de campus en op de thuiswerkplek van student en medewerker.

Dilemma 5:

Voor het gezamenlijk afwegen van alternatieven voor onderwijsruimte moet de gebruiker (docent, wetenschapper en andere medewerkers) veel meer worden geconfronteerd met de (milieu)kosten van keuzes, om creatief mee te kunnen denken over effectieve, maar ook (milieu)kostenbesparende oplossingen.

(a) wat kost een collegezaal per uur?

(b) wat kost een gereserveerde, maar onbenutte conferentiezaal?
(alternatief gebruik voor onderwijs)

(c) een eigen werkplek of een veel hoger reisbudget?



NB Anno 2023 waren de gemiddelde facilitaire kosten per m2 campus 166 euro (op jaarbasis), waarvan 42 euro energiekosten en 39 euro onderhoudskosten (Colliers 2024)

Resultaten van deel A - CAMPUS DATA - beschrijven de stand van zaken rond de huidige campus in het algemeen en onderwijsruimte in het bijzonder. Deze zijn van belang voor de afwegingen rond voorgaande dilemma's. Naast facilitaire kosten (die alleen voor een gemiddelde m2 beschikbaar zijn, zie dilemma 5) zijn oppervlaktegegevens beschikbaar. Opvallend is dat de totale Campus NL nagenoeg gelijk blijft in omvang: dit schommelt al decennia (!) rond de 4,5 miljoen m2, terwijl de omvang van de studenten- en medewerkerspopulatie sterk is toegenomen. In diverse campuspublicaties werd al geduimd dat steeds intensiever ruimtegebruik, dubbelgebruik van functies en off-campus werken (zoals thuis en bij partnerorganisaties) deze efficiëncyslag verklaart. Toch blijft het een teken van organisatorische flexibiliteit dat dynamische, sterk gegroeide Nederlandse universiteiten nog steeds in hun relatief statische gebouwen passen. Tegelijkertijd zijn juist onderwijszalen de afgelopen tien jaar steeds flexibeler geworden, wat ook blijkt uit de meest recente

gebouwen: collegezalen kunnen met flexibele wanden worden gedeeld in kleinere zalen en meubilair werd steeds mobieler/verplaatsbaar.

Dilemma 6:

Onderwijsinnovaties in Campus NL gebouwen omvatten steeds vaker technische flexibiliteit - verplaatsbare wanden en meubilair - maar de grootste efficiëncyslag is nog steeds te maken met organisatorische flexibiliteit: de bereidheid van mensen om hun ruimtebehoefte aan te passen aan schaarste in beschikbaarheid (in ruimte en tijd).

- (a) om te bezuinigen moet de ruimtevrager zich vaker schikken naar het schaarse aanbod
- (b) om te bezuinigen moet de ruimtevrager vaker schuiven naar minder drukke tijdvakken
- (c) "group size follows room size": gaat de beschikbare capaciteit van (onderwijs)ruimte steeds vaker de groepsgrootte en het moment van roosteren bepalen? (spaarzaam omgaan met kostbare, schaarse voorzieningen)

Een tweede belangrijke oorzaak van steeds efficiënter ruimtegebruik is het dubbelgebruik van ruimten voor verschillende functies en activiteiten op verschillende tijdstippen van de dag, de week, het semester of het jaar. Ook wordt onderwijsruimte gebruikt als zelfstudie-ruimten als ze vrij zijn. Uit oppervlakte-inventarisaties van onder andere Campus NL (2016) en Colliers (2018, 2022, 2024) komt een sterk dalend kantooroppervlak per medewerker (in fte) naar voren, maar een soms stijgend en dan weer dalend onderwijsoppervlak per student. Met een gemiddelde van 1,9 onderwijs-m² per student op Campus NL anno 2023 en een aandeel van 20% in het totale campusoppervlak, werd al verondersteld dat onderwijsactiviteiten ook in een deel van de andere 80% ruimte plaatsvindt. Uit een vragenronde onder facilitair en campusdirecteuren bleek inderdaad dat kantoren (vooral vergaderruimte), restaurants, espressobars, wandelgangen en atria al op aanzienlijke schaal worden gebruikt voor onderwijsdoeleinden. Wisselend waren de meningen over de potentie die dit nog heeft of de kansen van bijvoorbeeld kelders of buitenruimte. De territorialiteit van het (academisch) kantoor - het grootste aandeel van Campus NL - werd hierbij ook als hindernis genoemd.

Dilemma 7:

- (a) Is de rek na decennia van efficiënter ruimtegebruik eruit of zijn er nog kansen voor dubbelgebruik voor onderwijsdoeleinden van vergaderruimte, restaurants, espressobars en horizontaal verkeersoppervlak?
- (b) Als de medewerker meer thuiswerkt, kan het onderwijs dan meer kantoorruimte gaan gebruiken? En vraagt dat transformatie of kan dat ook tijdelijk?
- (c) Kunnen op daluren in kantoorgebruik - rustige maandagen, woensdagmiddagen en vrijdagen - kantoorkamers en vergaderruimten worden gereserveerd voor groepswerk of studeren in stilte?

Een on-campus onderwijsmodel en de ambitie om de student op de faculteit een studieplek te bieden ("solid model"), naast gedeelde voorzieningen op campusniveau ("liquid model"), heeft theoretisch een hogere ruimtevraag (indicatie >3 m² per student). Maar de extra behoefte boven op het huidige gemiddelde van 1,9 m² per student zou kunnen worden opgevangen met dubbelgebruik via andere ruimtesoorten, zoals bij dilemma 7 gesuggereerd. Een off-campus onderwijsmodel ("gas model") kan aanvullend zijn en niet vervangend (volgens de onderwijstrend), bijvoorbeeld om een andere onderwijsdoelgroepen te bedienen voor 'life-long learning', MOOCs met deelcertificaten, professional education, (online) summer schools, al of niet op andere campussen. Dit model vraagt aanzienlijk minder m² traditionele onderwijsruimte op de campus, maar wel (dure) studioruimte voor productie van video's en werkruimte voor een grote groep individuen buiten de campus (al of niet op het schaarse, dure woonoppervlak). De ecologische footprint van de campus gaat omlaag, maar daarbuiten hoogstwaarschijnlijk onevenredig omhoog (door gebrek aan schaalvoordelen).

Naast de data over m² gebruik stonden wederom cijfers over de bezetting en (capaciteits)benutting van onderwijsruimte centraal in de dataverzameling van het Campus NL onderzoek. Hierbij werd zowel gekeken naar de geroosterde bezetting (hoeveel uren van de beschikbare openingstijd) als de daadwerkelijk gemeten bezetting. Hetzelfde geldt voor de (capaciteits)benutting: hoeveel personen zouden er volgens het rooster moeten zitten en hoeveel zitten er in werkelijkheid?

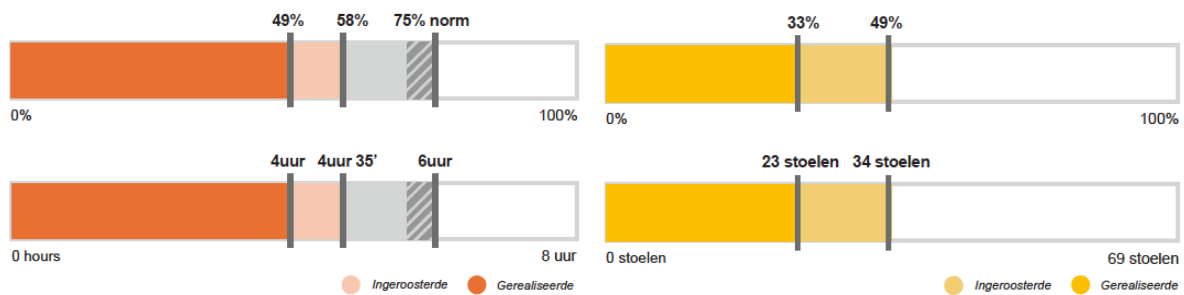
Het Campus NL team was (wederom) trots op de collectief verzamelde data: gebaseerd op 38 studies van onderwijs-ruimtegebruik, in de periode van 2014 tot en met 2024, bij 11 van de 14 universiteiten, over in totaal 133 gebouwen. Ter vergelijking: vorig jaar verzamelden we het kantoor-ruimtegebruik (bezetting en benutting) van 100 gebouwen en in totaal 33.000 plekken. Via beide inventarisaties is gezamenlijk als Nederlandse universiteiten een database opgebouwd die in de (nabije) toekomst kan worden uitgebreid met meer (verklarende) data: welke kenmerken van huisvestingsoplossingen leiden tot lage of hoge bezetting en wat kunnen we daar collectief van leren?

Dilemma 8:

Bijna de helft van de in de database opgenomen universiteiten heeft een bezettingsnorm (streefwaarde voor urenbezetting t.o.v. maximaal beschikbare) variërend van 70-75%. Campus NL heeft een betere bezetting dan (capaciteits)benutting.

- (a) moeten we roostering baseren op piekmomenten of op de gemiddelde bezetting, en bij pieken vragen of ruimtevragers met hun eisen kunnen schuiven?
- (b) zijn de cijfers aanleiding om roosteringsprocessen te wijzigen?
- (c) zijn de cijfers aanleiding om de ruimtenormen te verlagen? (aantal m² onderwijsruimte / student)
- (d) of moeten we andere norm hanteren voor piekmomenten dan voor minder drukke momenten?

Binnen de huidige ruimtenorm blijkt het onderwijs goed roosterbaar en zalen nog overcapaciteit te hebben en universiteiten die expliciet ruimtenormen hanteren lijken onderwijsruimte beter te gebruiken.



Figuur 17.1 Average frequency of educational spaces at Campus NL relative to a 70-75% target norm: that is 6 hours out of 8 available hours per day; (right) average occupancy of space capacity.:

Figuur: (links) gemiddelde bezetting van onderwijsruimte op Campus NL, ten opzichte van een 70-75% streefnorm: dat is 6 uur van beschikbare 8 uur per dag en (rechts) gemiddelde benutting van de capaciteit van ruimte.

In de volgende figuur zijn de bezettings- en (capaciteits)benuttingspercentages van verschillende typen onderwijsruimte te vinden, zowel geroosterd (vooraf geboekt) als daadwerkelijk gemeten.

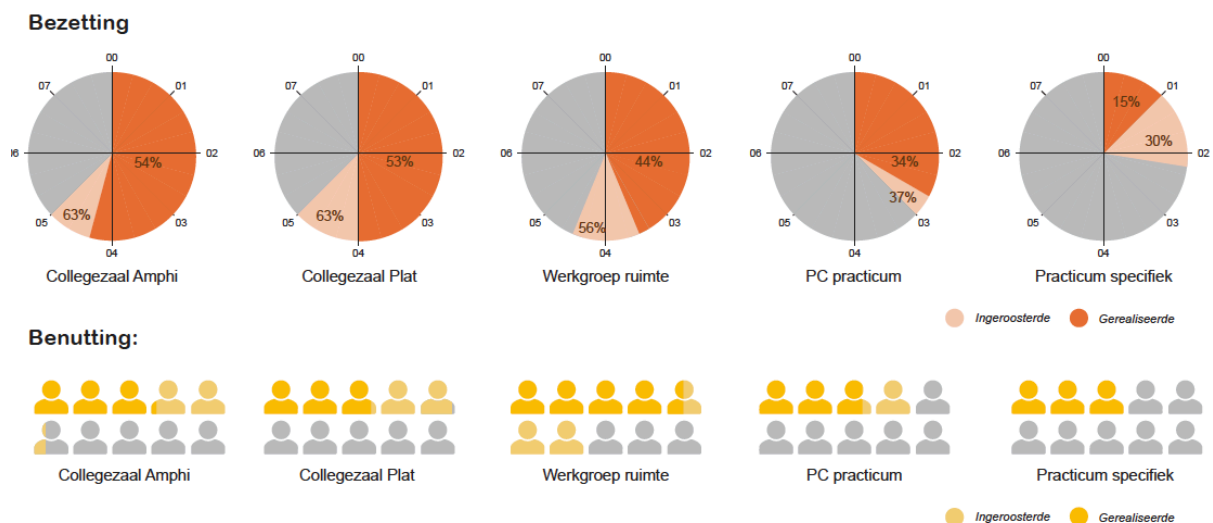


Figure 17.2: Frequency and (capacity) occupancy percentages for different types of educational spaces

Dilemma 9:

De grootste collegezalen blijken het best te worden gebruikt (hoogste gerealiseerde bezetting). In vrijwel alle onderwijsruimtesoorten is de daadwerkelijke capaciteit aanzienlijk onderbenut; dat geldt zelfs voor de vooraf geroosterde capaciteitsbenutting (op basis van ingeschreven studenten voor vak).

(a) De groepsmaatte verdubbelen - bijvoorbeeld in het kader van bezuinigingen - zou geen probleem moeten zijn, gezien de benuttingsgraad van 33% gemiddeld in Campus NL voor alle ruimten en ook niet voor werkgroep ruimten die een benutting hebben van 45%.

(b) De universiteiten zouden ruimten kunnen "overboeken" qua capaciteit, gezien het "no show" percentage tot tientallen procentpunten. Maar durft de universiteit de kans op

overvolle ruimte aan, bijvoorbeeld bij aanvang van vakken? Is dit reden om ruimte-capaciteit af te schalen tijdens een vak?

De compositie van onderwijsruimte is doorgaans een beperkt aantal zeer grote zalen en een groot aantal middelgrote of kleinere zalen. Hiervan is data van een aantal universiteiten bekend. Hebben de grootste (amfi-)collegezalen een relatief hoge bezetting/benutting, omdat ze ook het meest schaars zijn? Passen roosteraars of ruimtevragers hun behoefte door schaarste aan, en schuiven ze makkelijker naar andere dan hun voorkeursdagdelen of -tijdstippen? Het lijkt er wel op.

De grootste zalen zijn ook vaker op universiteitsniveau gedeelde voorzieningen (in generieke gebouwen) en kleine zalen zijn vaker ook ruimschoots in faculteitsgebouwen aanwezig. Dat maakt ze voor roostering ook territorialer (en exclusiever voor bepaalde gebruikersgroepen), wat de bezetting en benutting niet altijd ten goede komt.

Bezetting (voldoende beschikbaarheid in de tijd) wordt door universiteiten belangrijker geacht dan capaciteitsbenutting, te meer omdat aanwezigheidsplicht bij colleges doorgaans niet van toepassing is. De trend om active & blended learning effectiever te accommoderen met speciale onderwijsvoorzieningen vraagt ook om ruimte delen om de kosten te delen of er meer baten uit te halen.

Dilemma 10:

Een deel van de ruimte zou 'niet-roosterbaar' / 'niet-reserveerbaar' moeten zijn voor de dagelijkse flexibiliteit: nog "last-minute" te boeken.

Resultaten van deel B - CAMPUS TRENDS - beschrijven ontwikkelingen in het hoger onderwijs, de inhoud van onderwijsvisies, inzichten uit de literatuur en innovaties in onderwijsruimte. Deze zijn van belang voor de afwegingen rond alle voorgaande dilemma's. Met name de kans op krimp in studentenaantallen na decennialange groei wordt als "game changer" beschouwd voor de campus van de toekomst.

Dilemma 11:

(a) Bij krimp van studentaantallen wordt het nog belangrijker om ruimte te delen om kosten te delen of meer baten te kunnen halen uit kostbare voorzieningen als "active & blended learning environments" (een van de onderwijstrends, zie ook een volgend dilemma)

(b) Delen van voorzieningen van en met derden (hogescholen, ziekenhuizen / medische faculteiten, bioscopen, theaters, congrescentra, culturele voorzieningen) gebeurt al, maar kan nog worden verruimd naar andere eigenaren van publieke gebouwen die de kosten alleen niet meer kunnen dragen en zoeken naar "nieuwe businessmodellen".

Scenario's voor de verre toekomst zijn doorgaans gebaseerd op de grote onzekerheden in (internationale) instroom en (publieke of private) financiering. SURF (zie figuur hieronder) voegt daaraan ook scenariovariabelen toe voor de invloed van ICT, digitalisering op de campus, met inachtnaam van (al of niet) flexibilisering en personalisering. Andere scenariovariabelen of dilemma's voor bestuurders hebben te maken met middelenschaarste: personeel, energie, ruimte, geld. Dit beïnvloedt zowel voor primaire proces (onderwijs,

onderzoek) als voor secundaire proces (huisvesting, ICT, ruimtenormen, striktere duurzaamheidseisen en ambities).



Figuur 17.3: Scenario's voor de campus in 2024 (SURF, 2024, ook via Aestate bijdrage in deel C)

Dilemma 12:

Wat zijn de risico's van het anticiperen op een scenario dat niet uitkomt, hoe kan een campusstrategie rekening houden met onzekerheden? Welke vormen van flexibiliteit zijn het meest effectief? (zie ook de afweging tussen flexibiliteit in gebouw en inrichting en flexibiliteit in de organisatie, zoals bij een vorig dilemma)

Hoewel er diverse scenariovariabelen zijn voor universiteit van de toekomst, zijn naast de algemene onderwijsrends die in onderwijsvisies te vinden waren (flexibilisering, digitalisering, personalisering, individualisering) ook een aantal contra-trends te vinden: socialisering (belang van groepen en collectiviteit, ook voor tegengaan eenzaamheid en uitstelgedrag) en verantwoording (naar milieudoelen en andere SDGs / sustainable development goals). Vaak genoemd in onderwijsvisies en literatuur is de ontwikkeling van "active & blended learning", wat een campusdilemma waard is, omdat de vraag is op welke schaal deze trends nu al zichtbaar is en nog moet worden geïmplementeerd.

Stellingen / dilemma 13:

- (a) Blended learning: we weten hoe we goede "blended learning" ruimtes moeten maken
- (b) Blended learning: er zijn "one-of experiments" (pilots), maar we zijn (nog) niet aan het opschalen
- (c) Blended learning: ruimten worden niet altijd gebruikt zoals bedoeld
- (d) Blended learning: het heeft een hogere footprint per student
- (e) Blended learning: kunnen we ruimten zo roosteren dat een beperkt aantal de hele universiteit faciliteert?

Toch was er zowel in de onderwijsvisies en literatuur ook een kloof tussen onderwijsrends en de vertaling naar eisen aan onderwijsruimte. Ook de financiële consequenties van steeds gedifferentieerder en gepersonaliseerde onderwijs werden weinig besproken. Het meest

concreet waren de vraag naar een diverse onderwijsruimtesoorten en ruimte voor ontmoeting, tussen student-docent en studenten onderling. Nieuwe gebouwen leken extra ruimte voor sociale interactie te hebben en een diversiteit aan ruimtegroottes en -types met flexibel meubilair. De digitalisering lijkt kostenverhogend te zijn, ook qua energieverbruik. Het gebruik van generatieve AI-tools op de digitale campus lijkt een vele malen hoger energieverbruik te hebben dan 'traditioneel' onderwijs met nog analoge elementen (groepswork, discussies zonder laptop). Dit laatste werd benadrukt op een netwerkbijeenkomst van Britse universiteiten: de fysieke campus is wellicht (veel) energiezuiniger dan de digitale 'virtuele' campus, wellicht niet voor de universiteit, maar wel voor de samenleving.

Dilemma 14:

Een duurzame campus is wellicht eerder een fysieke campus dan een digitale 'virtuele' campus.

(a) wellicht niet voor de universiteit, maar wel voor de samenleving;

(b) ook door het onderschatte energieverbruik van videobellen, data-opslag en generatieve AI-tools

Wat er van buitenlandse netwerken en andere onderwijssectoren te leren is, was onderdeel van deel C - CAMPUS ELSEWHERE. Dit jaar intensiverden we de contacten met de Britse, Ierse, Finse en Duitse universiteiten. Samengevat kunnen we melden dat hun dilemma's overeenkomen en dat hun netwerkorganisaties - net als Campus NL - gebruikt worden om data, trends en ervaringen uit te wisselen om collectief te leren.

Dilemma 15:

(a) Campus NL kan veel leren van buitenlandse netwerken en zou FM/campusdirecteuren kunnen afvaardigen om hun congressen bij te wonen en/of lid te worden: de baten overstijgen de kosten?

(b) Private inbreng in universiteitsnetwerken (voorbeeld AUDE voor UK/Ierland) is nodig om de kennisuitwisseling te faciliteren: zonder "startmotor" heeft data/informatie/kennisuitwisseling te weinig "incentive" voor drukke campusmedewerkers en wordt er te weinig geogost. Ter vergelijking: AUDE heeft minstens 6 fte medewerkers + diverse (onderzoeks)werkgroepen met universiteitsstaf. We kunnen leren van buitenlandse netwerken: hoe zij kennisdelen, hoe zij creatief zijn in roerige tijden.

Onder deel D - CAMPUS LEARNING - inventariseerde promovenda Jasmine Bacani via een tweede survey wederom de stimulansen en obstakels voor het verbeteren van kennisdeling. Zij bracht de diverse inter-universitaire netwerken op verschillende campusthema's in kaart: van roostering tot veiligheid, van energietransitie tot onderhoud-coördinatoren. Ook evalueerde zij hoe Campus NL al bijdraagt aan betere kennisdeling. De resultaten van de survey (die nog tot eind september 2025 kunnen binnenkomen) verschijnen in het volgende jaarrapport 2025-2026.

Appendix 2. Campus NL onderzoeksteam, stuurgroep, kerngroep, campuscontacten en auteurs jaarrapport

Team Campus NL bestaat uit een onderzoeksteam - TU Delft's Campus Research Team - en campuscontacten bij elk van de 14 Nederlandse universiteiten. Daarnaast wordt het onderzoek begeleid door een stuurgroep en kerngroep met vertegenwoordigers van een aantal universiteiten en UNL (Universiteiten van Nederland). In deze bijlage zijn de personen en organisaties die in 2024/2025 betrokken waren bij project Campus NL en/of bij dit jaarrapport in een aantal tabellen vermeld.

TU Delft, Campus Research Team

- prof. dr. ir. Alexandra den Heijer, principal investigator Campus NL, professor of Public Real Estate, specialisation campus management
- dr. ir. Monique Arkesteijn MBA, associate professor of Real Estate Management, specialisation decision-support information & tools
- dr. ing. Thomas Vogl, research manager Campus NL, postdoctoral researcher of Real Estate Management, specialisation workplace and corporate real estate management
- ir. Jasmine Bacani, PhD researcher Campus NL, focus inter-university knowledge sharing
- ir. Sophie Schuller, research manager Campus NL
- ir. Sanjana John, PhD researcher, focus “co-creating smart campuses”
- ir. Menno in 't Veld, MBE MSc student
- ir. Martin Lejewaan, MBE MSc student
- ir. Julie Tazelaar, MBE MSc student
- ir. Bauke Meijer, MBE MSc student
- ir. Julia Kudła, student assistant, data management and graphic design
- ing. Jet Hagedoorn, student assistant
- ir. Mark van Huystee, visualiser and illustrator



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Professor



Monique Arkesteijn
Associate Professor



Thomas Vogl
Post-doc researcher



Jasmine Bacani
PhD Researcher



Sajana John
Researcher



Menno in 't Veld
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Julie Tazelaar
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Bauke Meijer
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Julia Kudła
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Authors Chapter C2

ir. Saskia Knoop, VKZ
ir. Bauke Meijer, VKZ
ir. Richelle de Jong, DP6
ing. Paul Drewes, Universiteit Utrecht (UU)
ir. Bram Lobeek, ir. Jan-Willem Moerkerk, UU

Campus NL-steering group (stuurgroep)

NAME	FUNCTION	UNIVERSITY	NETWORK
JAN LINTSEN	Vice-voorzitter College van Bestuur	Universiteit van Amsterdam	SBF (voorzitter)
RENS BUCHWALDT	Lid van de Raad van Bestuur	Wageningen Universiteit	SBF
ERIK BOELS (ONLY 2024)	Financieel directeur	Universiteit van Amsterdam	CFA
MONIQUE THOMAS	Financieel directeur	TU Delft	CFA
ERIK RAETS	Bestuur en Bestuursstaf	Universiteit van Amsterdam	Institutional Research
GERBEN SMIT	Directeur Radboud Services	Radboud Universiteit	DFB
FRANC VAN NUNEN	Directeur Operations Huisvesting	Vrije Universiteit Amsterdam	HOI
BOUDEWIJN PETERS	Domeinleider Financiën	-	UNL

Campus NL core team (kerngroep)

NAME	FUNCTION	UNIVERSITY	NETWORK
BOUDEWIJN PETERS	Domeinleider Financiën	-	UNL
MANSUR KARADAVUT (ONLY 2024)	Beleidsadviseur	-	UNL
LUNA AMELSBEEK	Beleidsadviseur	-	UNL
FRANC VAN NUNEN	Directeur Operations Huisvesting	Vrije Universiteit Amsterdam	HOI
GERBEN SMIT	Directeur Radboud Services	Radboud Universiteit	DFB
MARIJKE WEUSTINK - VAN DITZHUIJZEN	Real Estate Service Director	Erasmus Universiteit Rotterdam	DFB

Campus NL campus contacts

NAME	UNIVERSITY
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DANA IBRAHIM	Leiden Universiteit
ANJA BIEHL	Leiden Universiteit
RONALD WILMES	Maastricht Universiteit
HENK VAN DER WAL	Open Universiteit
JULIE HORNIX	Radboud Universiteit
MARJOLEIN MEIJER	Rijksuniversiteit Groningen
MARLOES PEETERS	Tilburg Universiteit
MAURICE PAAS	Tilburg Universiteit
ANNE VAN DORTMONT	TU Eindhoven
NICO-TOM PEN	Twente Universiteit
JET BIERMAN	Universiteit van Amsterdam
LAURENS DE LANGE	Utrecht Universiteit
MIJKE KROMDIJK-PEETERS	Utrecht Universiteit
STEFAN TITUS	Vrije Universiteit Amsterdam
ROLF HELING	Wageningen Universiteit
CEES ADMIRAAL	Open Universiteit
EMMA BOERSMA	TU Delft
YINYIN AU	TU Delft
SAM NEIJMAN	Erasmus Universiteit Rotterdam
SILVY LEIJH	Tilburg Universiteit
FEMKE KAMP	Universiteit van Amsterdam
ARNOUD DE JONG	Erasmus Universiteit Rotterdam
JUDITH VROEMEN	TU Eindhoven
RENE HAGELS	Radboud Universiteit

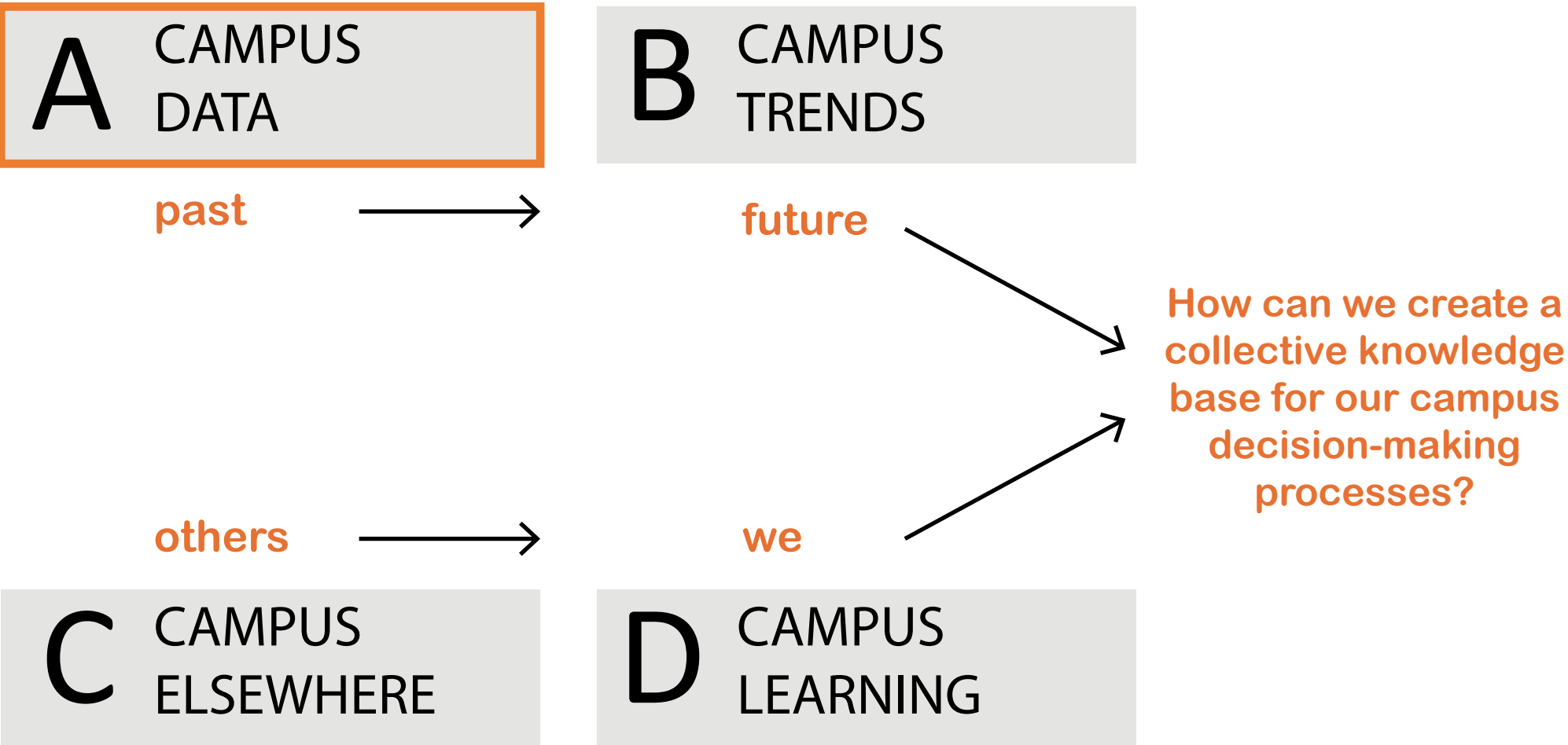
SIMON WITTEMAN	Utrecht Universiteit
JANNY DE KNEGHT	Tilburg Universiteit
MARLOUS VAN DE KOPPEL	Vrije Universiteit Amsterdam
LAURA DE ROOIJ	Erasmus Universiteit Rotterdam

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Het verzamelen van campusgegevens vormt de basis van de Campus NL-studie. Het tweede jaar (2024-2025) richtte zich op het verkennen en analyseren van het thema onderwijsruimtes, het identificeren van trends en verschillen tussen campusgebruik vóór en na covid.

Deel A van het Campus NL-onderzoek gaat over de campus en specifiek het gebruik van informatie uit het verleden om trends en beslissingen voor het heden en de toekomst te informeren. We kijken daarbij naar de gegevens over onderwijsruimten zoals collegezalen, werkgroepruimten en practicaruimten op universiteitscampussen, met name de bezettingsgraad en benuttingsgraad in relatie tot het roostersysteem.



133 gebouwen van 11 universiteiten!

We ontvingen 38 metingen: 15 metingen van vóór 2020 en 23 metingen (beschouwd als post-covid) van na 2021.



38 studies naar ruimtegebruik



11 universiteiten

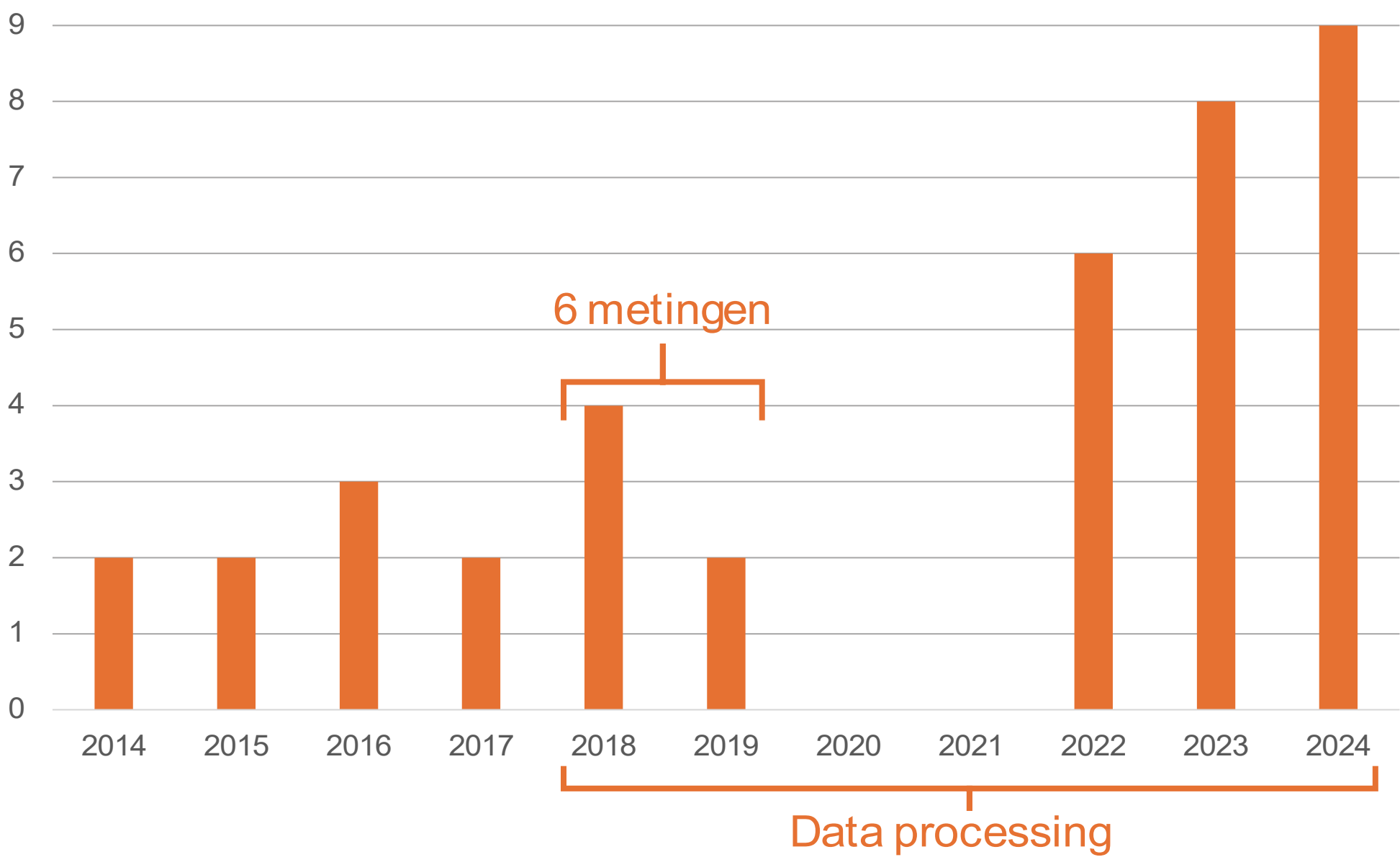
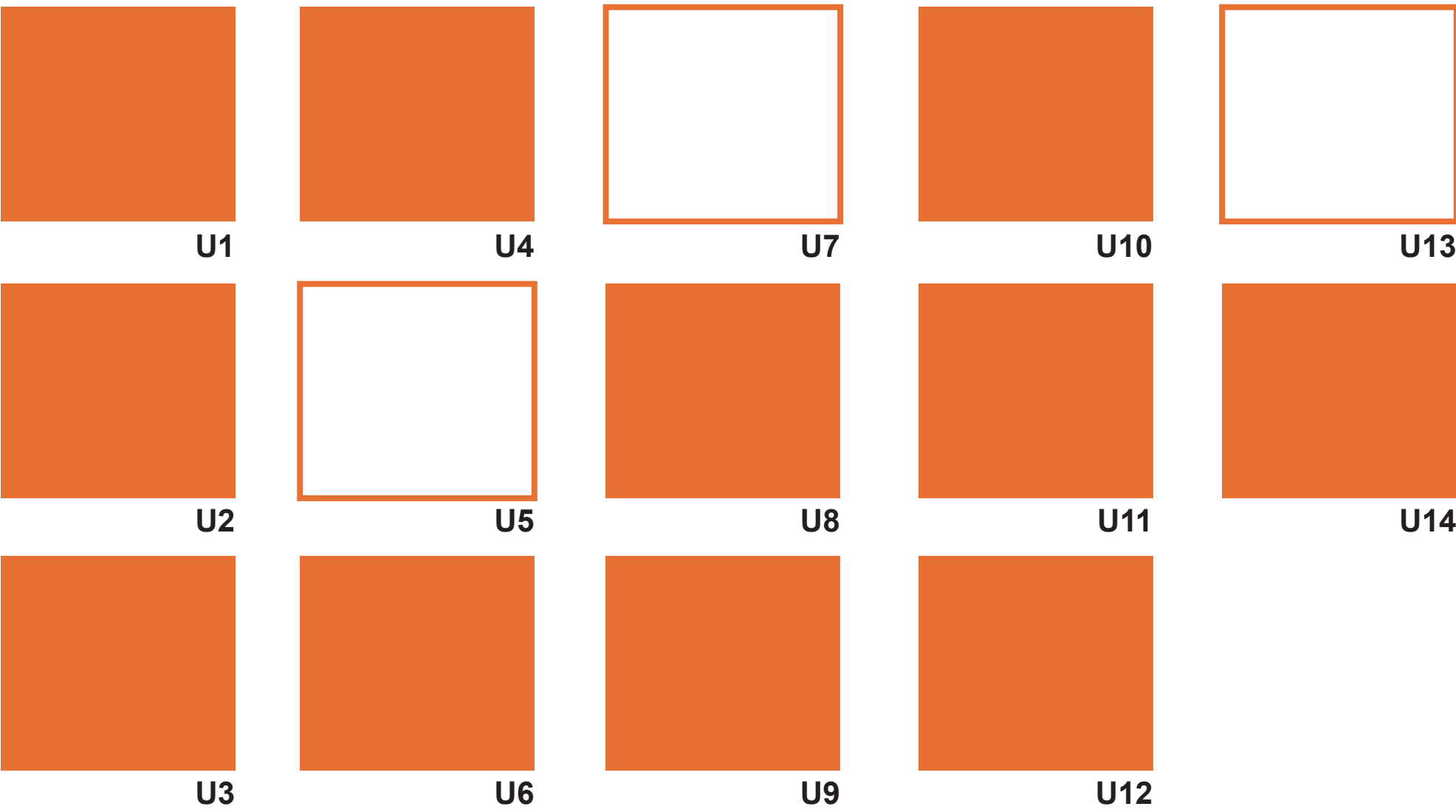


133 gebouwen



Data van 2014-2024

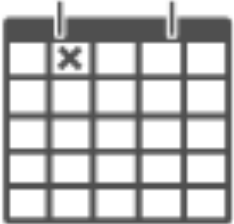
Voor deze studie hebben we alleen metingen vanaf 2018 verwerkt, wat resulteerde in een database met 29 meetstudies.



Definities

We hebben definities gebruikt uit het proefschrift ‘Smart Campus Tools’ van Bart Valks en zijn uitgegaan van een basislijn van 8 onderwijsuren per dag, of 40 onderwijsuren per week, om een zekere mate van vergelijkbaarheid tussen universiteiten te garanderen.

Ingeroosterde Gerealiseerd



Bezetting



100% = 40 onderwijsuren per week

Benutting



100% = maximaal aantal stoelen in de collegezaal

1	2
3	4

1. Ingeroosterde bezetting/ Scheduled frequency: Hoeveel van de beschikbare onderwijsruimtes/vergaderruimtes zijn geboekt vóór de meting?
2. Gerealiseerde bezetting/ Actual frequency: Hoeveel van de beschikbare onderwijs-/vergaderruimtes waren bezet tijdens de meting? De ruimte wordt als bezet beschouwd, zelfs als er maar één persoon in de ruimte aanwezig is.
3. Ingeroosterde benutting/ Scheduled occupancy: Hoeveel van de beschikbare stoelen in de zalen zijn gereserveerd vóór de meting?
4. Gerealiseerde benutting/ Actual occupancy: Hoeveel van de beschikbare stoelen in de onderzochte ruimtes waren bezet tijdens de meting?

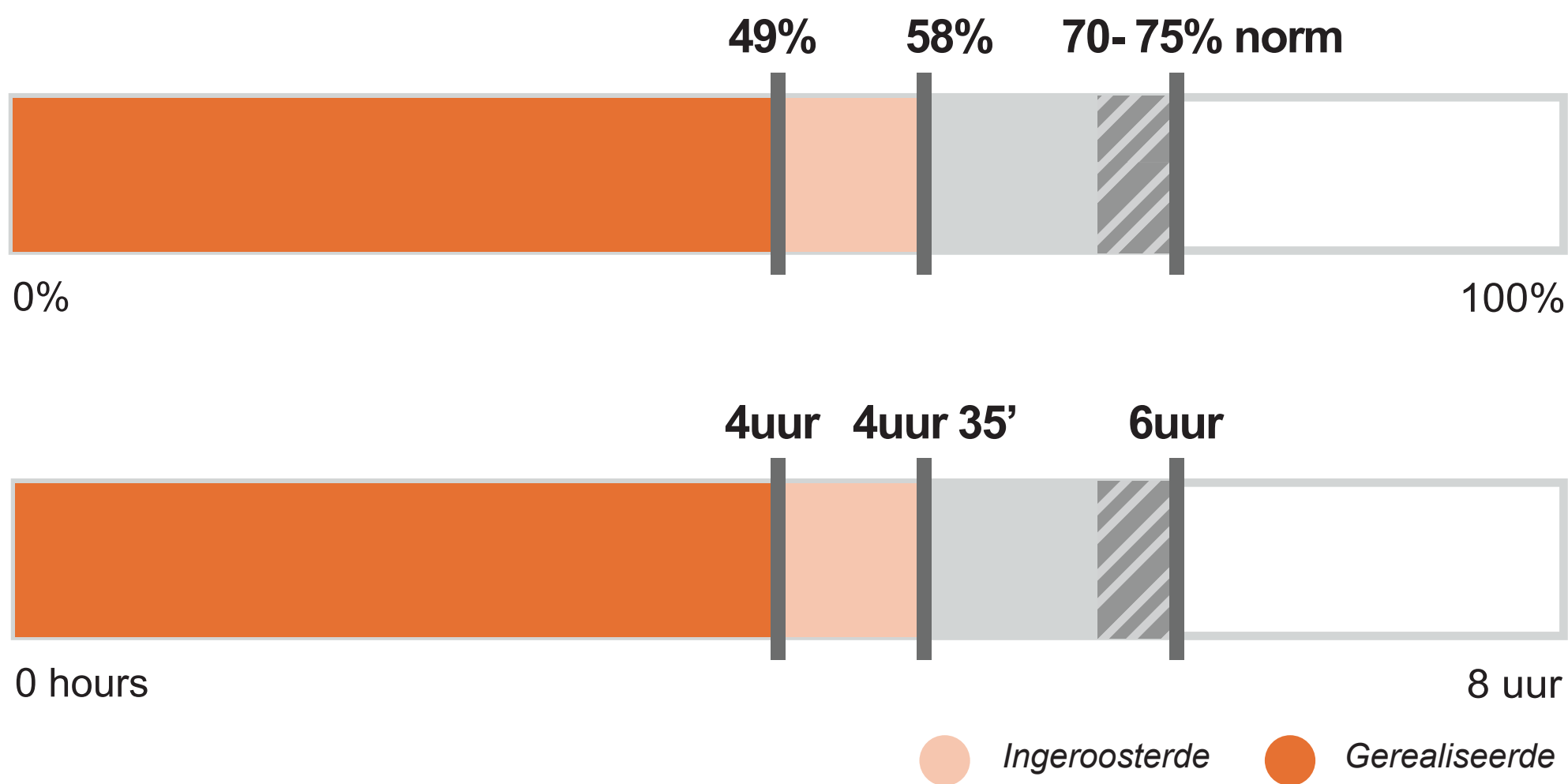
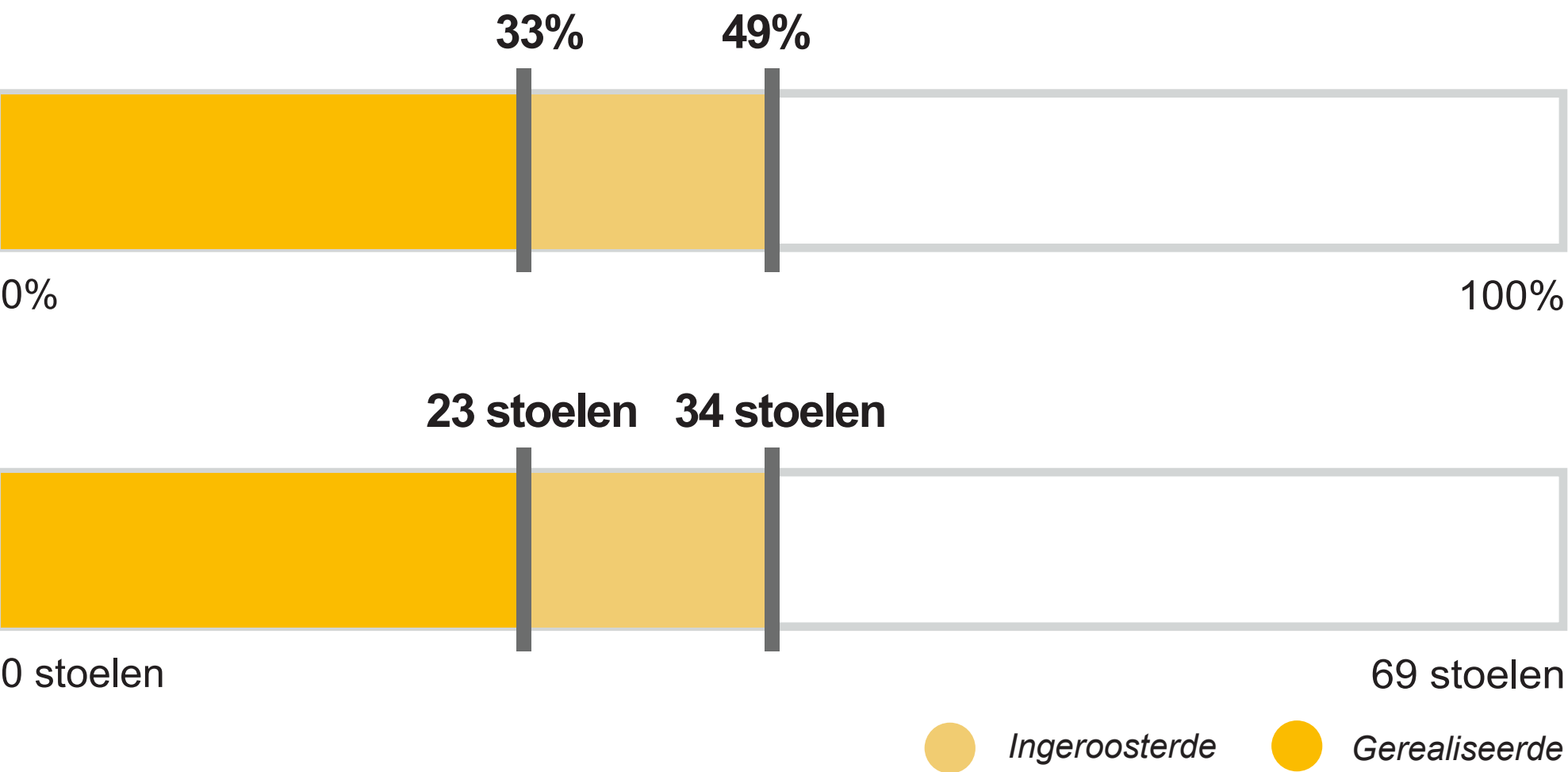
Deze conclusies zijn gebaseerd op 133 unieke gebouwen verdeeld over 29 meetstudies.

Bezetting

Bijna de helft van de 11 universiteiten heeft een bezettingsnorm variërend van 70-75%.

De ingeroosterde bezetting van de Campus NL gebouwen ligt gemiddeld 12-17%- procentpunt lager dan deze normen.

De gerealiseerde bezetting van de Campus NL gebouwen ligt gemiddeld 21-26%-procentpunt lager dan deze normen.



Benutting

De gemiddelde Campus NL zaal heeft 69 zitplaatsen.

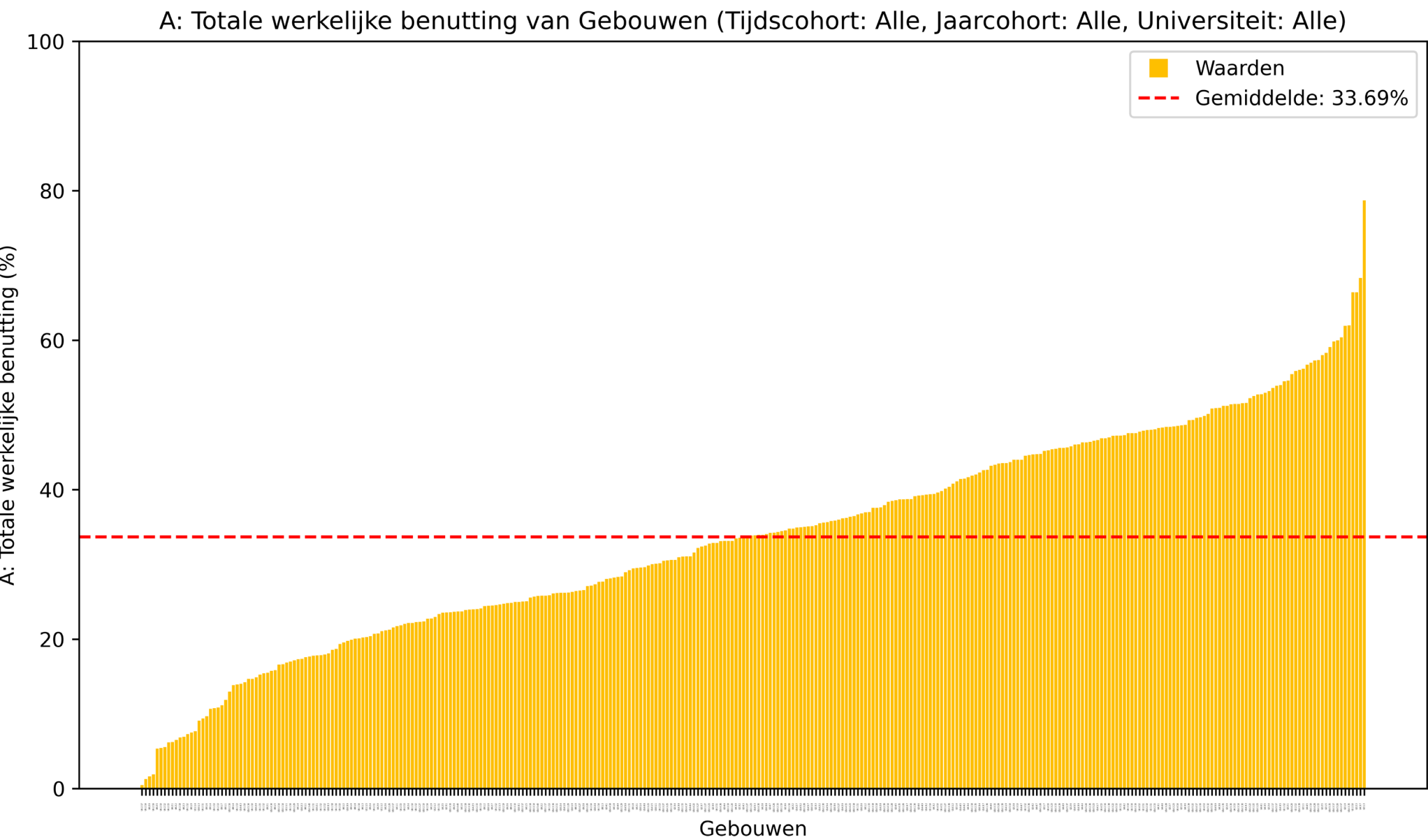
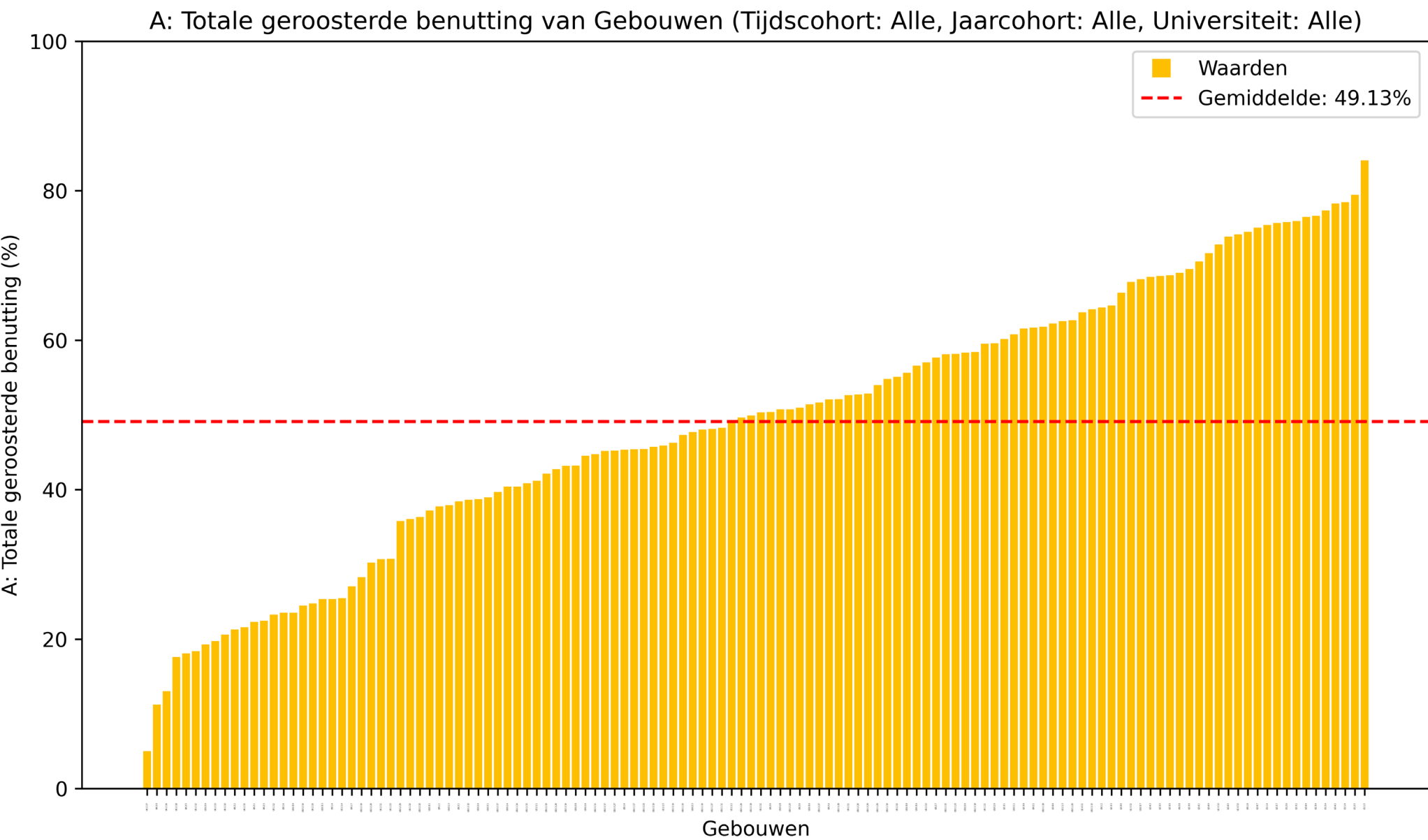
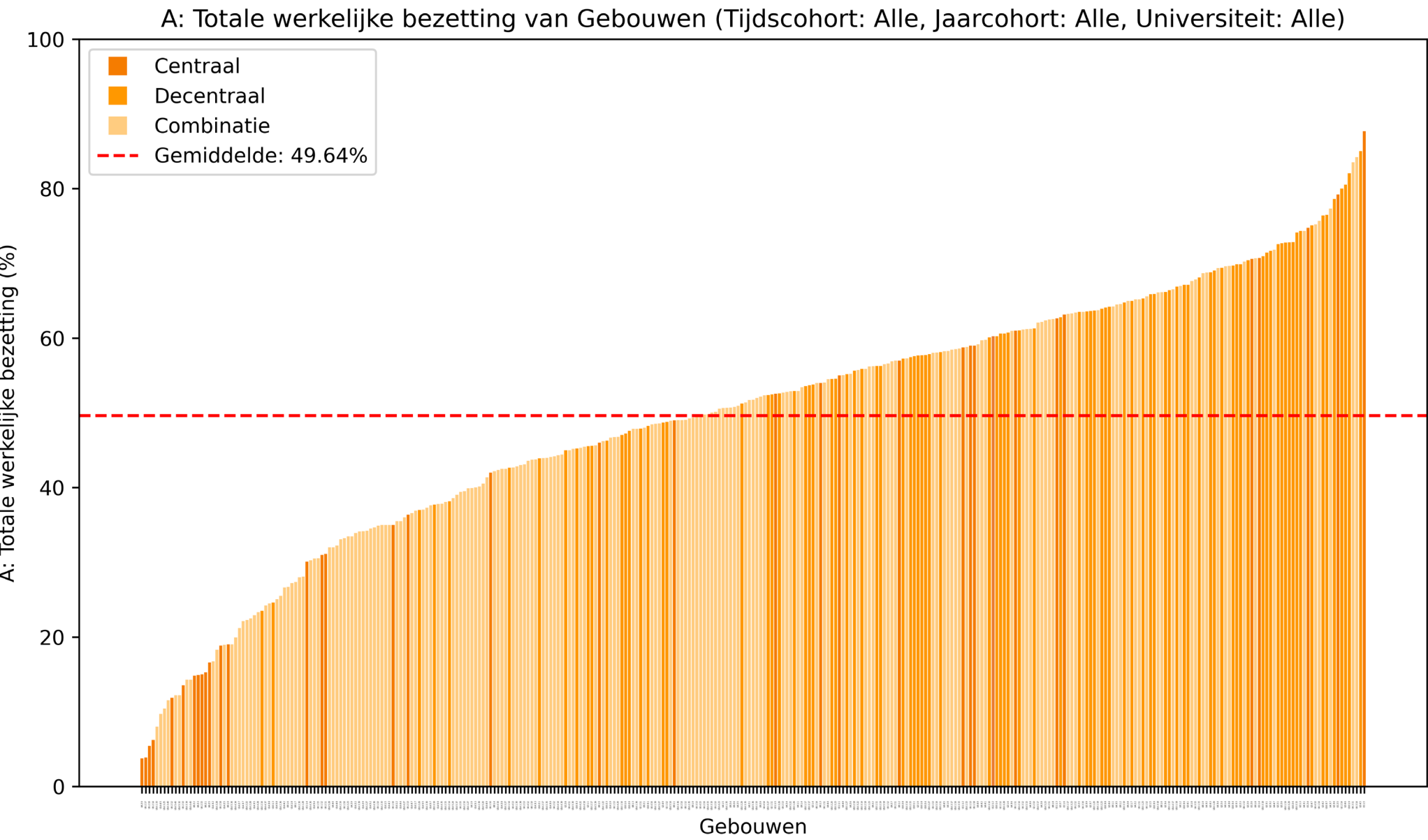
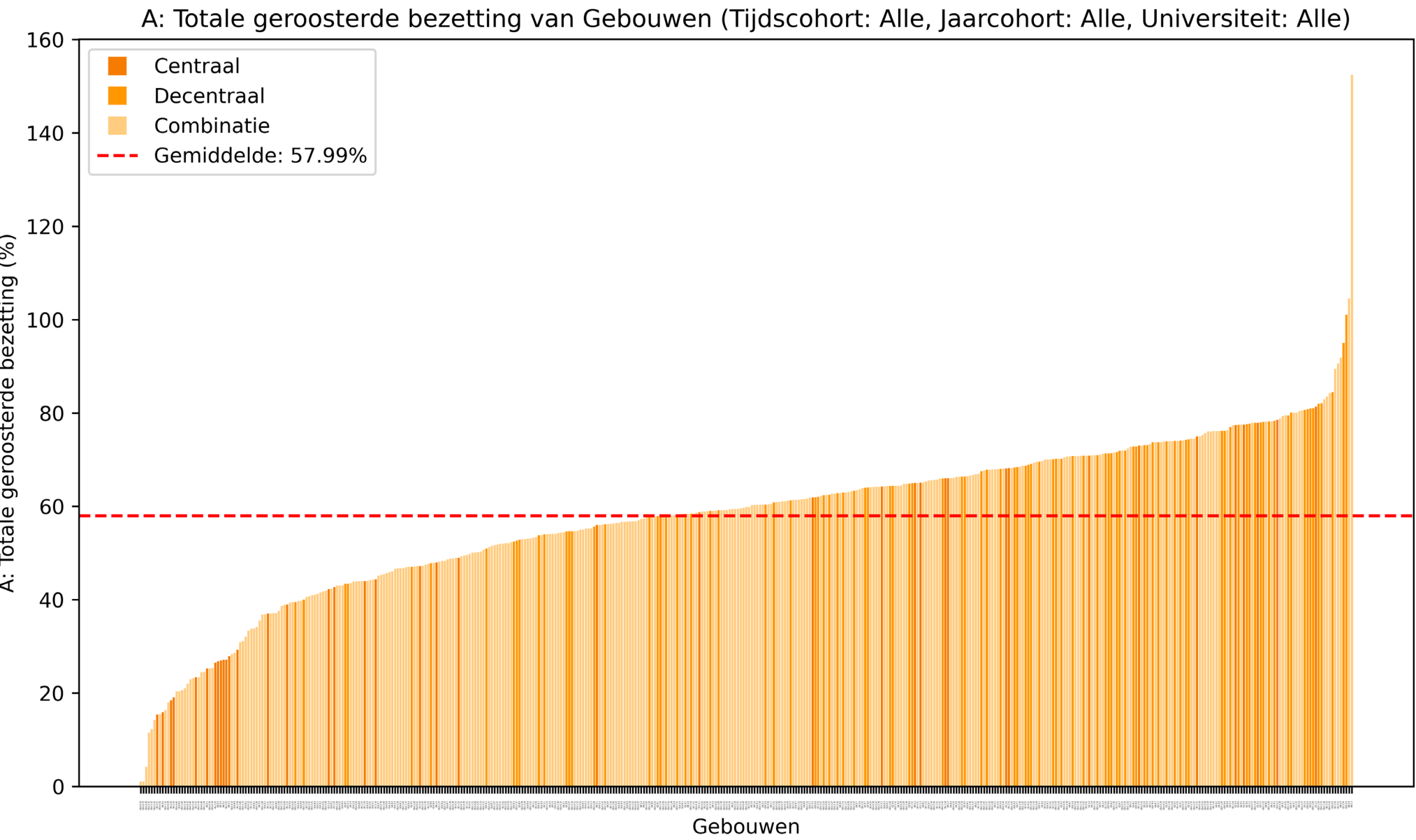
Er worden gemiddeld 34 van de 69 zitplaatsen ingeroosterd, terwijl er 23 daadwerkelijk bezet zijn.

Afhankelijk van de onderwijsvisie en financiële doelstellingen van elke universiteit is er ruimte voor verbetering. Hoeveel verbetering mogelijk is verschilt per universiteit en per gebouw.

De campuscontacten gaven aan dat het van belang is te kijken naar de bezetting op gebouwniveau. Als we kijken naar de gemiddelden op gebouwniveau, is er een factor 22 verschil tussen de laagste en hoogste gerealiseerde bezetting.

Terwijl slechts 10% van de gebouwen de doelnorm haalde, namelijk 70-75%, heeft bijna de helft van de dataset een gerealiseerde bezetting van meer dan 50%. Slechts 13% had een bezettingsgraad van minder dan 30%. Er is dus ruimte voor verbetering maar dat verschilt per gebouw.

Er is zeker ook ruimte voor verbetering op het gebied van benuttingpercentages, maar zolang er geen plannen zijn om te veranderen, is het niet belangrijk om hier aandacht aan te besteden.



De HESMG-beoordelingstool is een systeem met 7 niveaus dat wordt toegepast op algemene leerruimtes in hogeronderwijsinstellingen in het Verenigd Koninkrijk om hun ‘utilisation rate’ te benchmarken en te evalueren. Het gebruikpercentage (in het Engels: utilisation rate) is een product van de bezetting (% van het aantal gebruikte uren ten opzichte van het aantal beschikbare uren) en de benutting (% van het aantal aanwezigen ten opzichte van de opgegeven capaciteit van een ruimte).

Waarom een beoordelingssysteem?

Terwijl het benuttingspercentage voorheen werd uitgedrukt in %, heeft de overstap naar een beoordelingssysteem geleid tot een visueel hulpmiddel voor de ‘utilisation rate’, waarbij kleuren worden gebruikt voor maximale impact en leesbaarheid.

$$\text{gebruik (utilisation)} = \text{bezetting} \times \text{benutting}$$
$$\text{utilisation} = \text{frequency} \times \text{occupancy}$$

Implicaties voor de Campus NL-database

Gebouwen in het beoordelingssysteem		Universiteiten in het beoordelingssysteem	
A+	1,8%	A+	
A	1,3%	A	
B	4%	B	
C	6,7%	C	U2
D	14%	D	U4
E	17%	E	U10, U12*, U14*
F	55%	F	U6*, U8*, U9, U11

* meting tijdens minder drukke periode

Campus NL scoort niet goed op de UK tool!

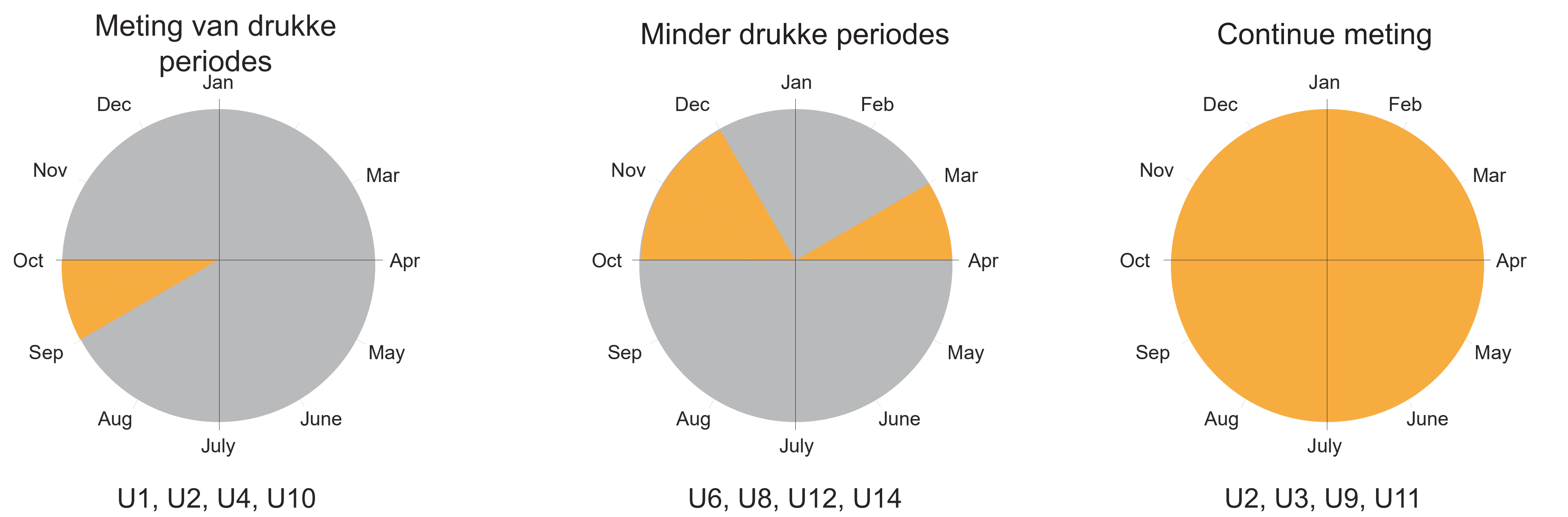
Op Campus NL hebben de zalen een **overcapaciteit**, waardoor deze ‘utilisation rate’ lager is. Campus NL scoort **beter op bezetting dan de benutting** waarschijnlijk door de overcapaciteit in de zalen.

Utilisation rate		Narrative description, suggesting potential interpretation
A+	38% and above	Individual rooms able to attain such high levels, but would not expect a traditional estate to exhibit utilisation as high as this without significant issues.
A	Between 35% and 37,99%	HE estates should aim for this when at ‘steady state’. Likely o be experiencing operational timetable issues if already at this level and still growing.
B	Between 31% and 34,99%	Target range for growing institutions, Learning spaces likely to be found over a range of utilisations. New build might be currently outstripping growth, lowering utilisation.
C	Between 26% and 30,99%	Whilst some rooms may be ‘fair’, an estate with a C rating should seek to identify improvements in terms of either frequency and/ or occupancy.
D	Between 20% and 25,99%	Some, or all, of the learning stock needs to be reviewed to identify opportunities to improve utilisations.
E	Between 13% and 19,99%	Action needed. Individual rooms might be unfit for purpose impacting on NSS. Consider removing from learning spaces of thorough refurbishment.
F	12,99% and below	Immediate action needed. Individual rooms might be unfit for purpose, impacting on NSS. Consider which spaces to remove from learning spaces.

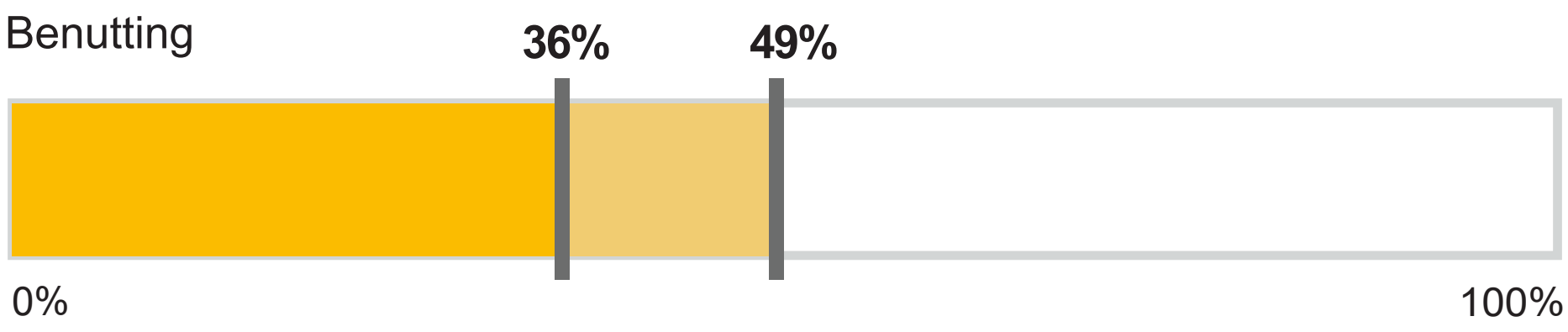
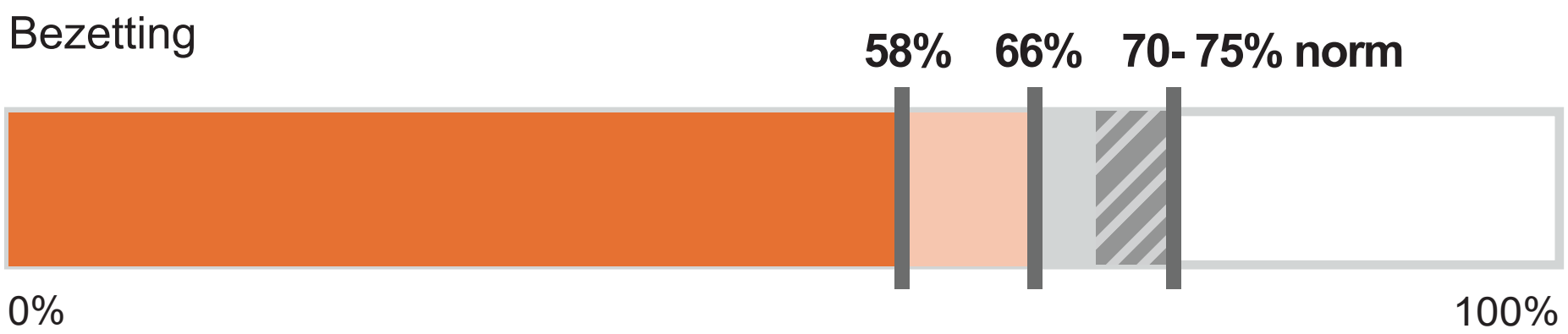
Figuur: HESMG beoordelingssysteem (HESMG, 2020)

In de literatuur worden verschillende doelen voor bezetting en benutting (70% tot 80%) genoemd, zonder duidelijke uitleg of het om gepland gebruik gaat. Valks (2021) stelt dat de geschiktheid van doelen afhangt van de specifieke organisatorische context.

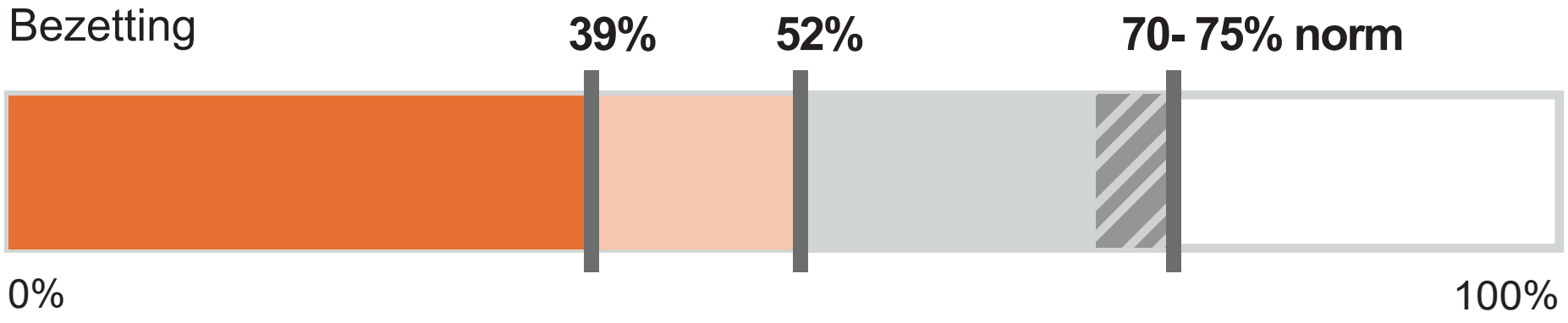
3 meetperioden



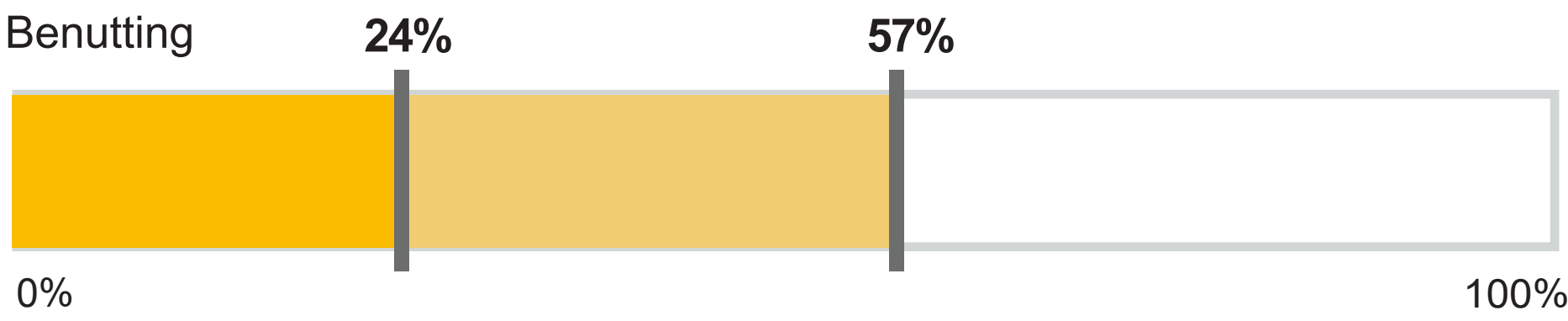
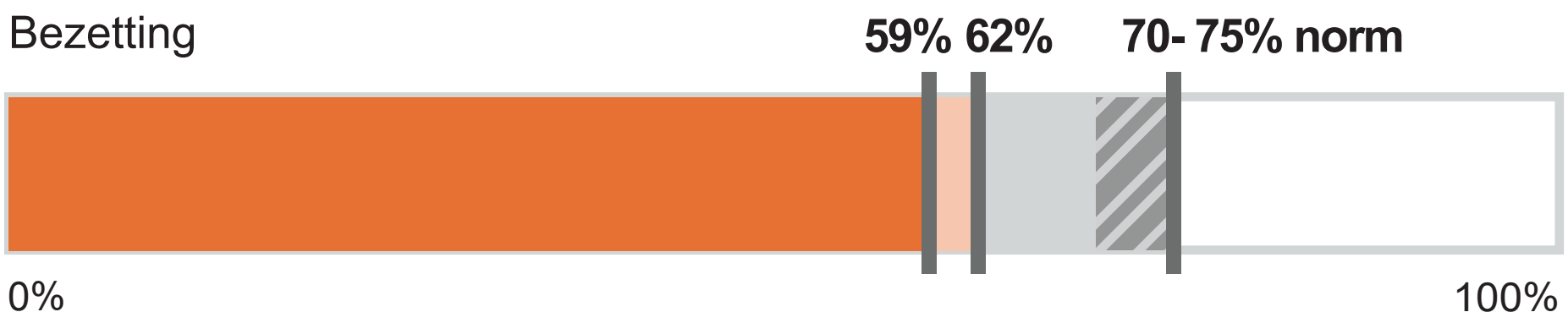
Drukke periode



Minder drukke periodes



Continue meting



Ingeroosterde

Gerealiseerde

Ingeroosterde

Gerealiseerde



(Illustratie: Mark van Huystee)

Universiteiten zouden bewust verschillende strategieën voor meetmomenten kunnen overwegen – ofwel gedurende het jaar ofwel 20% voor/na de herfstvakantie – om een evenwichtig en nauwkeurigere basis te krijgen voor hun toekomstige strategieën en beleid.

De vraag voor universiteiten is of zij willen sturen op de drukke of minder drukke periode?

De meetperiode is van belang!

Er is een hogere bezettings- en benuttingsgraad in de drukke periode zoals we verwachten. Dit blijkt ook uit de benuttingsresultaten van de minder drukke periodes, die veel lager zijn dan die van de andere twee meetperioden.

Metingen gedurende enkele weken van het jaar zijn echter slechts indicatief, een interpretatie van een korte periode en niet representatief voor het hele academische jaar. Uit ervaring weten we dat de bezettingsgraad doorgaans hoger is aan het begin van elk semester en geleidelijk afneemt naarmate het semester vordert.



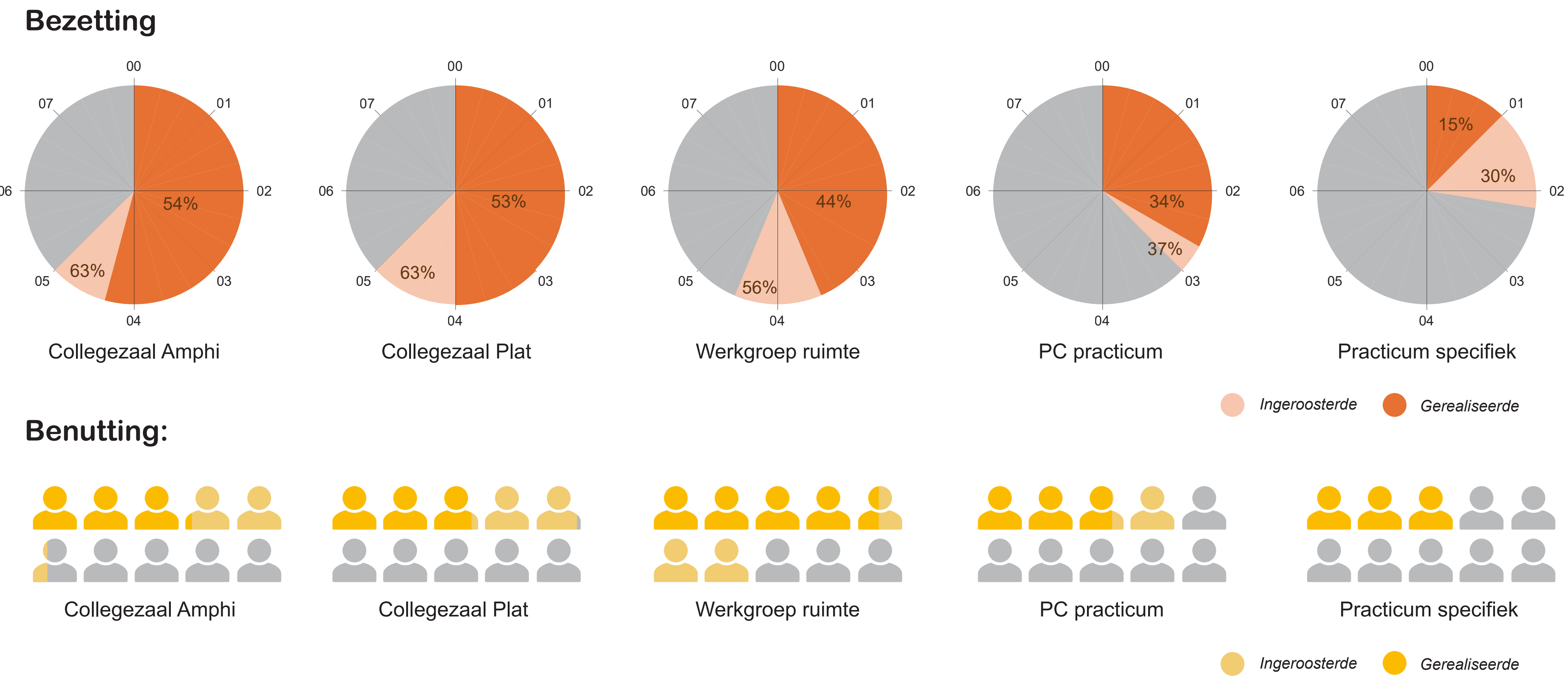
(Illustratie: Mark van Huystee)

Maakt het ruimte-type uit?

5 ruimtetypes, uit de Uniforme indeling Ruimte Categorie, UnivNL



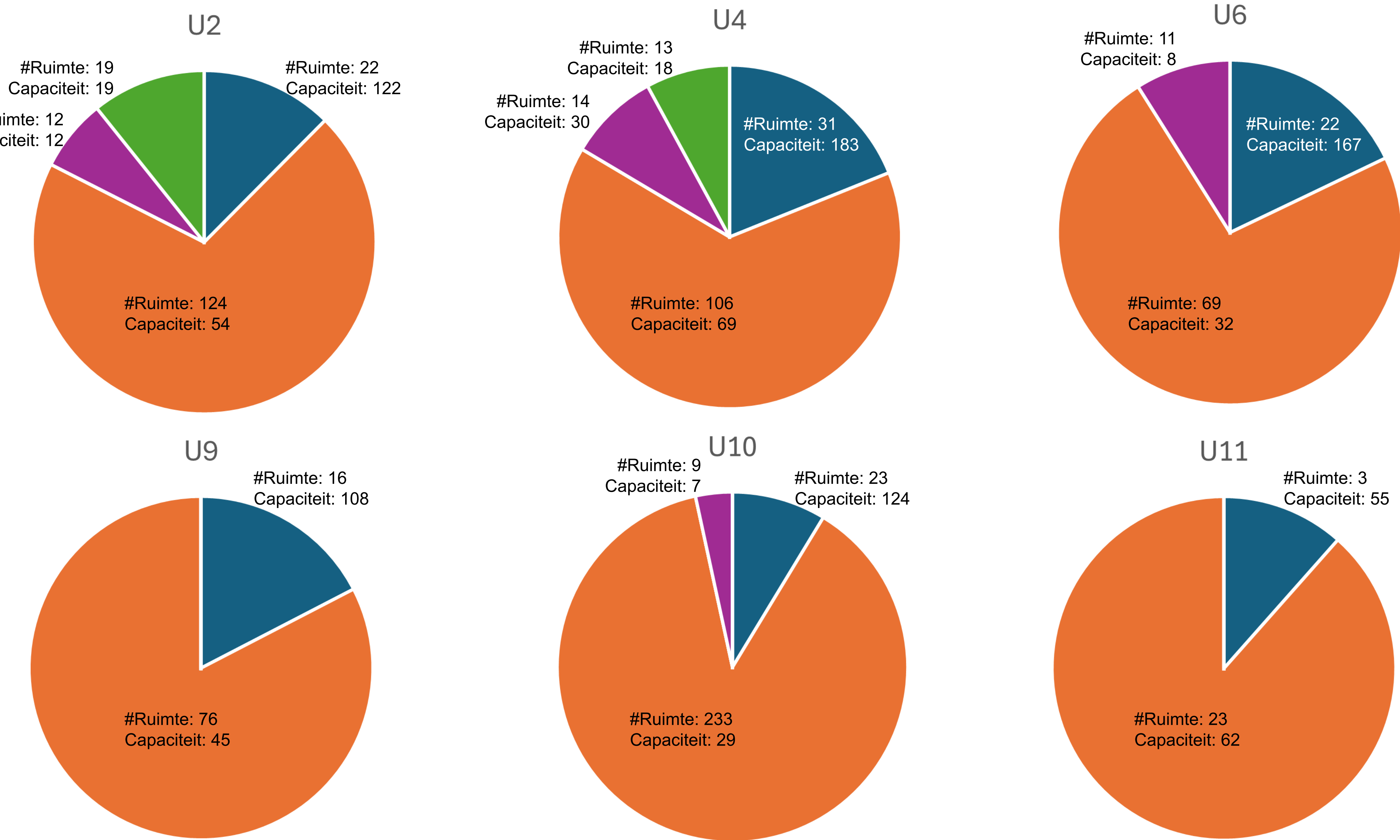
Figuur: Voorbeelden van verschillende soorten onderwijsruimten, (Valks, 2021)



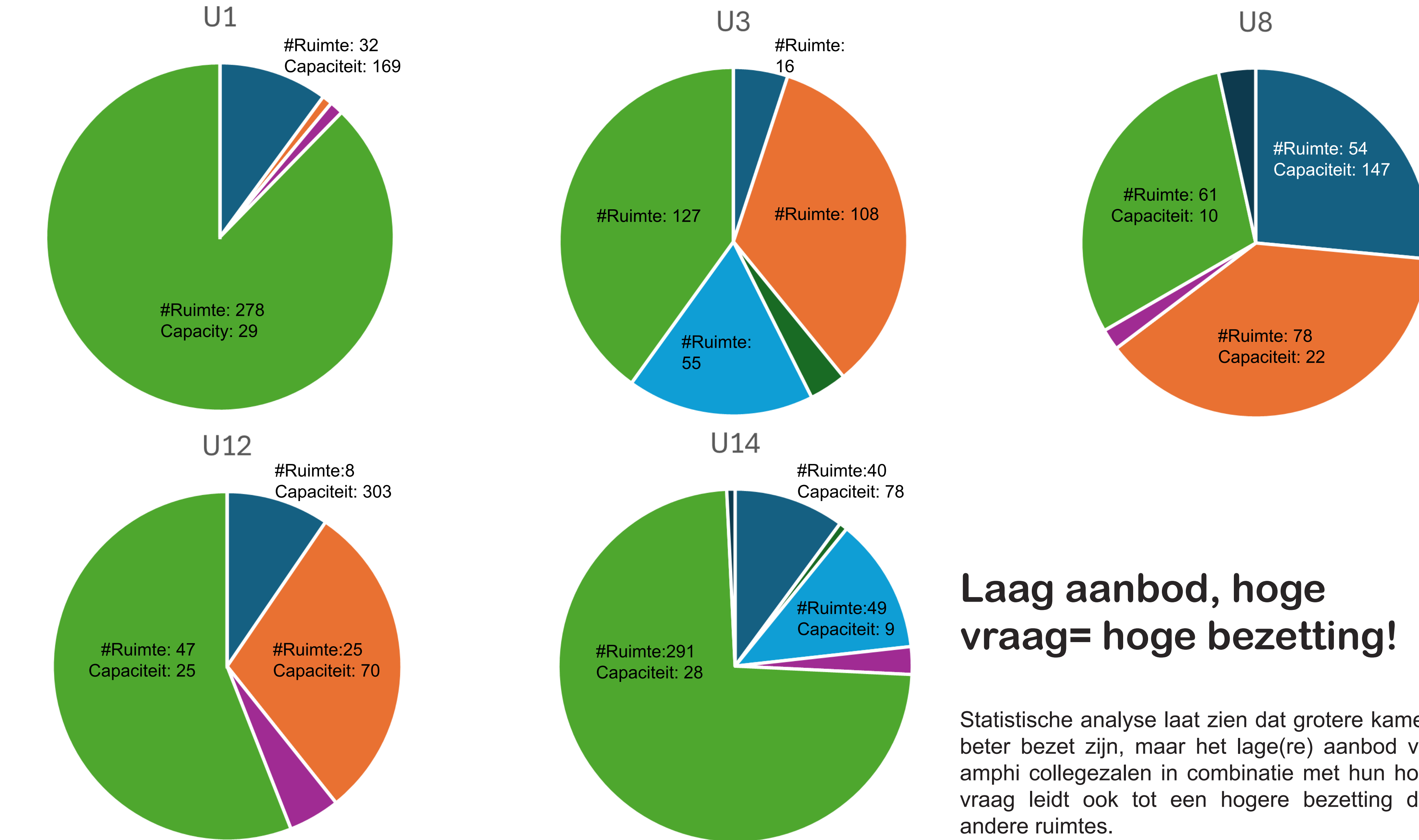
Grotere kamers, betere bezet?

We zien dat amphi zalen de hoogste bezetting hebben. Als we de verdeling van zalen per universiteit bekijken, zien we dat de meeste universiteiten een groot aandeel platte collegezalen of werkgroepzalen hebben.

Hoog aandeel vlakke collegezalen



Hoog aandeel werkgroepruimten

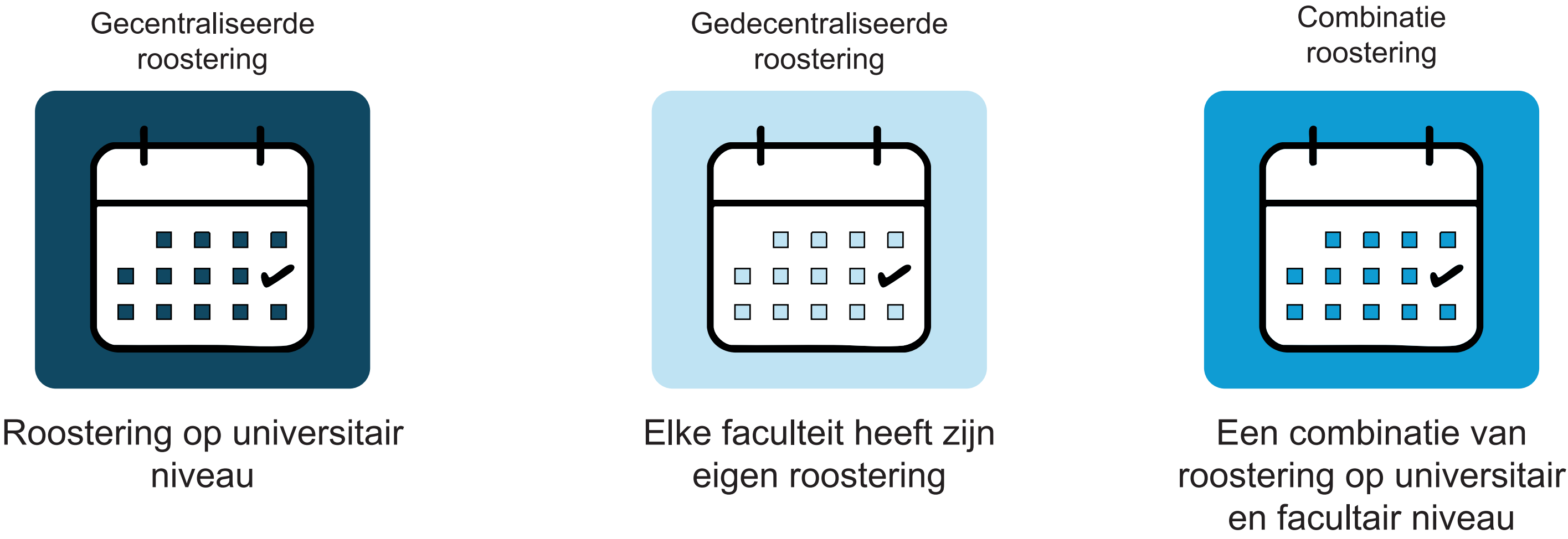


Laag aanbod, hoge vraag= hoge bezetting!

Statistische analyse laat zien dat grotere kamers beter bezet zijn, maar het lage(re) aanbod van amphi collegezalen in combinatie met hun hoge vraag leidt ook tot een hogere bezetting dan andere ruimtes.

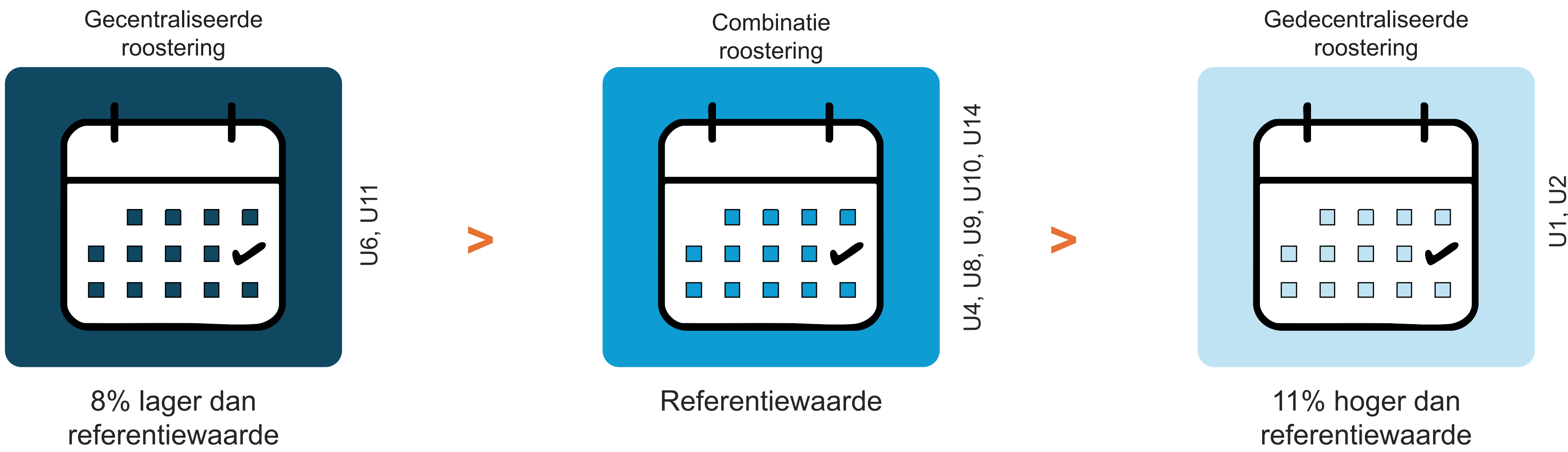
Heeft (de)centrale planning invloed op de bezetting?

3 roostersysteem categorieën

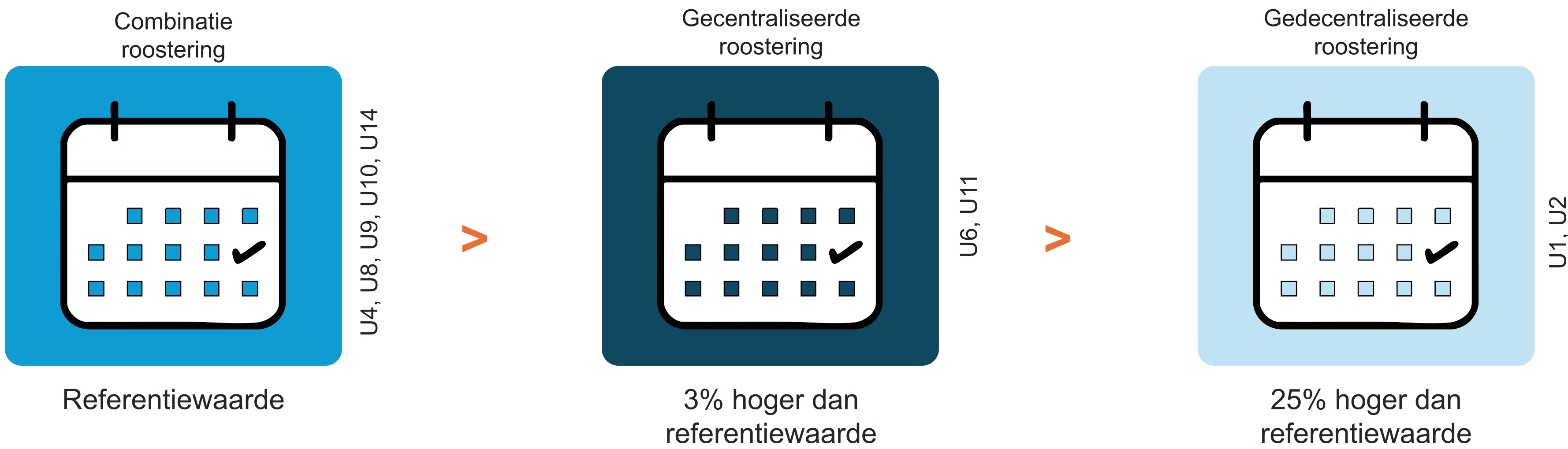


Mogelijke verklaring: als er decentraal geroosterd wordt, zijn er meer lessen in de eigen faculteit en komen er dus meer studenten naar de les.

Ingeroosterde bezetting



Gerealiseerde bezetting

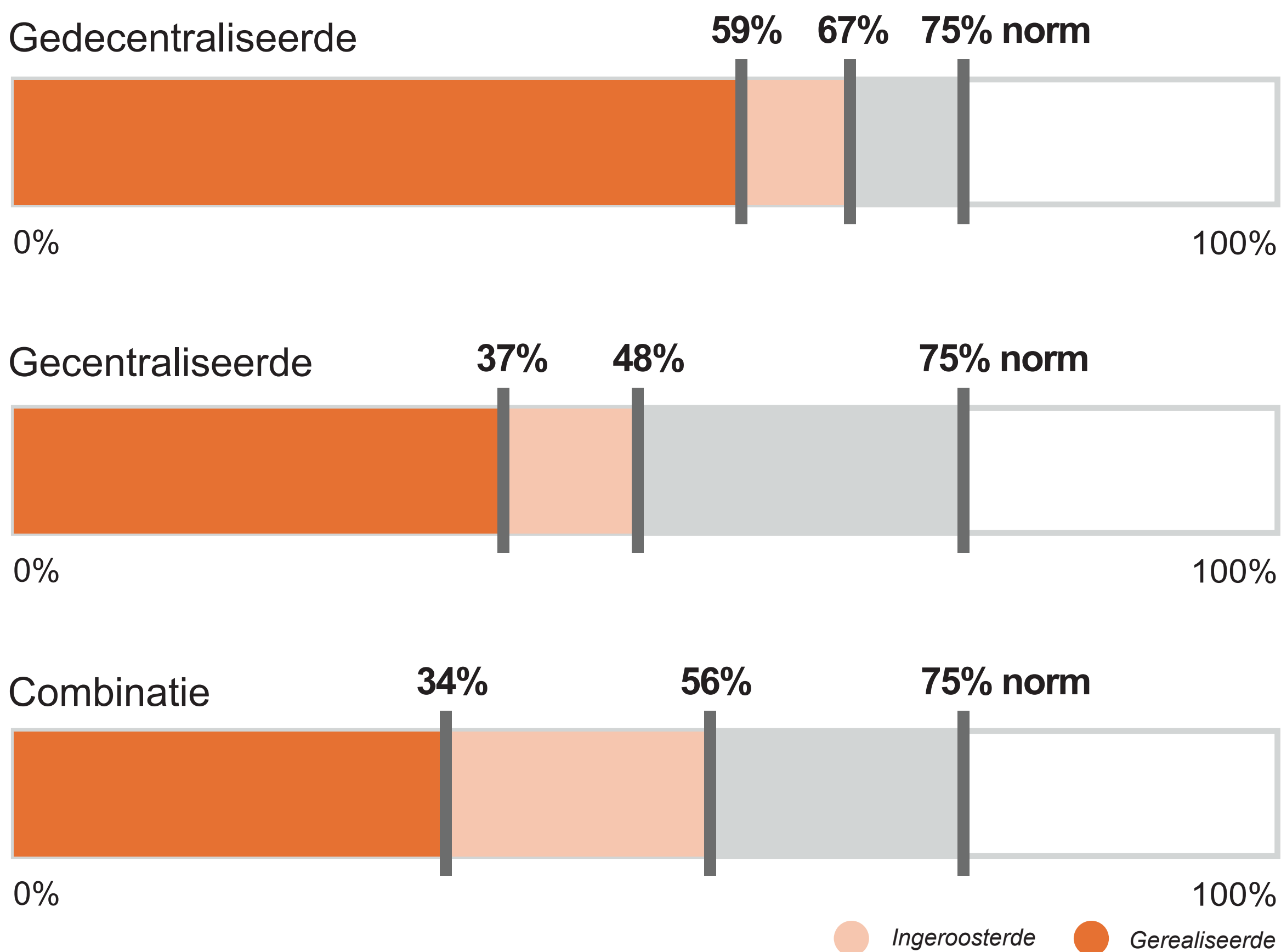


Universiteiten overwegen bepaalde maatregelen voor het roosterproces

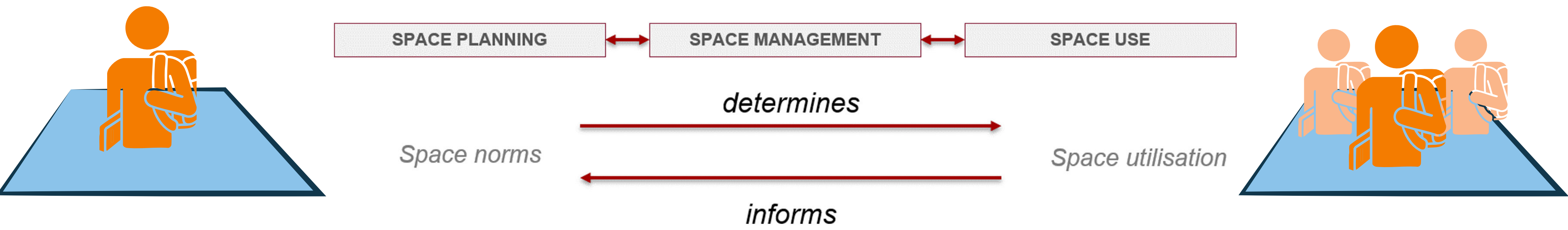
Roosterindeling is belangrijk. Omdat ook andere factoren invloed hebben op de bezetting en benutting, kunnen we **niet concluderen of een roostersysteem beter functioneert** of niet wat betreft bezetting.

Enkele manieren waarop deze waarden in alle systemen kunnen worden verhoogd, zijn onder andere:

- Het implementeren van een feedbacksysteem tussen benutting en roostermakers, of het intensiever gebruiken ervan.
- Overboeking als strategie (ondanks de risico's).
- Experimenteren met dynamische planning (grotere ruimtes aan het begin van het kwartaal of semester en kleinere ruimtes gedurende het kwartaal of semester).
- De periode tussen planning en realisatie verkorten tot minder dan 6 maanden.
- Docenten betrekken bij het planningsproces.
- Roosterproces anders inrichten en zowel vraag- als aanbodgericht maken.



Zijn de bezettingsgraden reden om de ruimtenormen (m2/ student) te herzien?



Figuur: Relatie tussen ruimteplanning en ruimtegebruik; Bron: Valks et al (2021, p443, fig 1)

Slechts enkele universiteiten hanteren ruimtenormen!

Slechts enkele universiteiten hanteren ruimtenormen (uitgedrukt in m²/ student): U2 en U10.

De onderwijsruimte per student die door universiteiten wordt beheerd, is de afgelopen jaren afgenomen, zoals bleek uit het Colliers rapport (2024). Recente trends wijzen er echter op dat deze nog verder kan worden verlaagd.

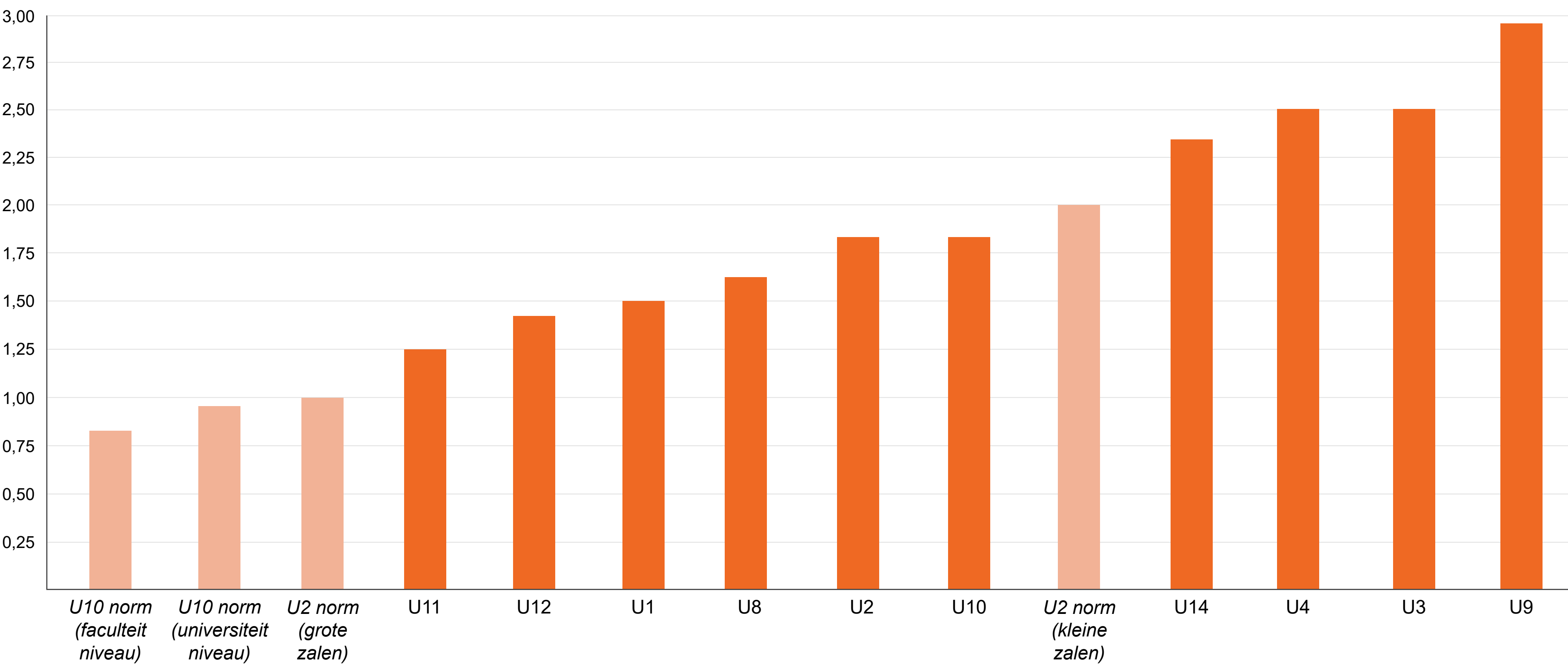


Figure: Gerealiseerde onderwijsruimte sq m. per student (Colliers, 2024; Den Heijer et al., 2016; Campus NL, 2025) en Normen voor onderwijsruimte per m2 per student van Campus NL

De bezettingsgraad bepaalt de ruimtenormen:

Uit regressieanalyse blijkt dat de gerealiseerde bezetting afneemt naarmate het aantal vierkante meters per student toeneemt: De bezetting neemt toe met 26% met 1 m²/student. In onderstaande figuur kun je ook zien welk roostersysteem de universiteit heeft en in welke tijdsperiode is gemeten.

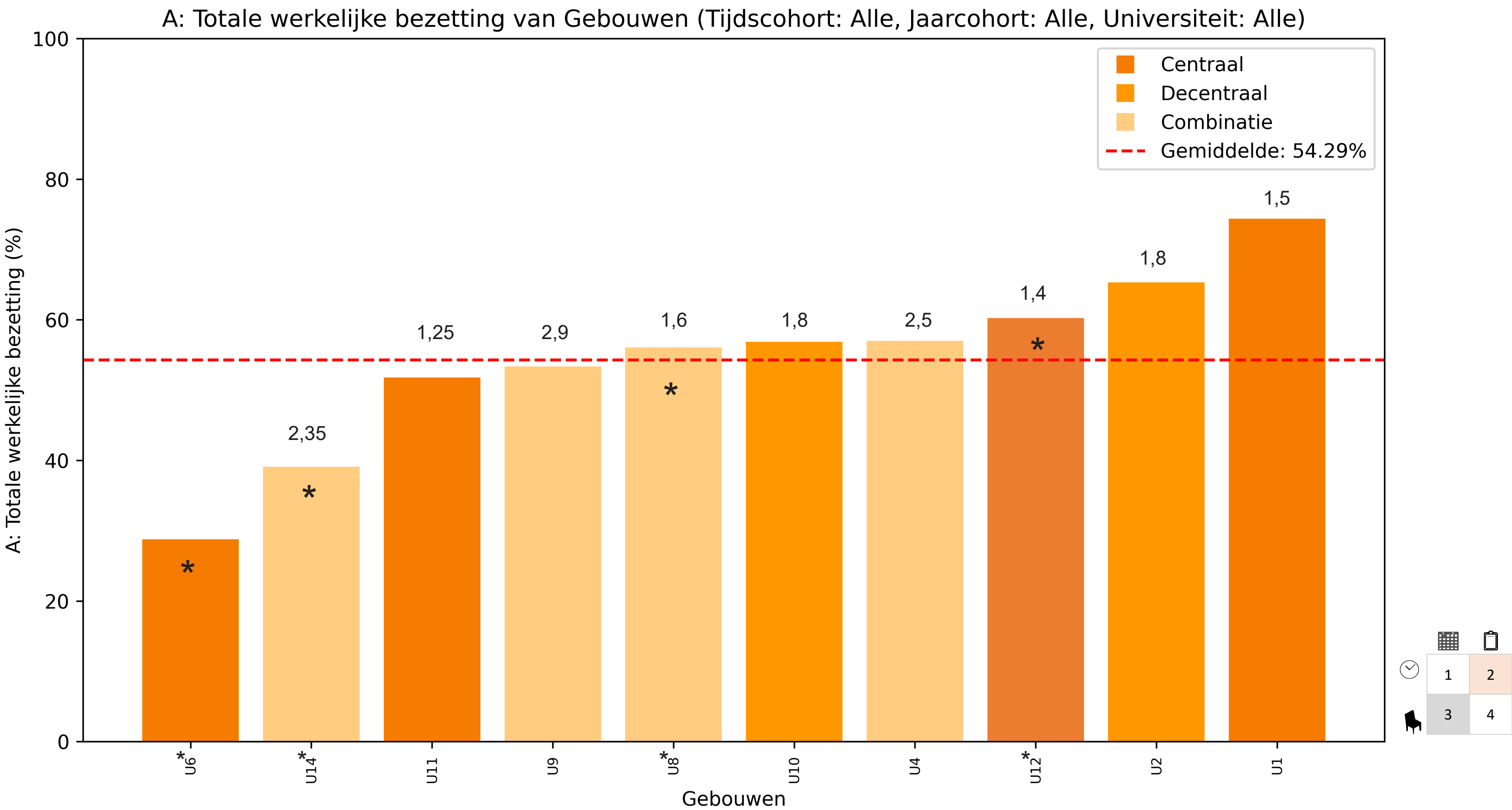
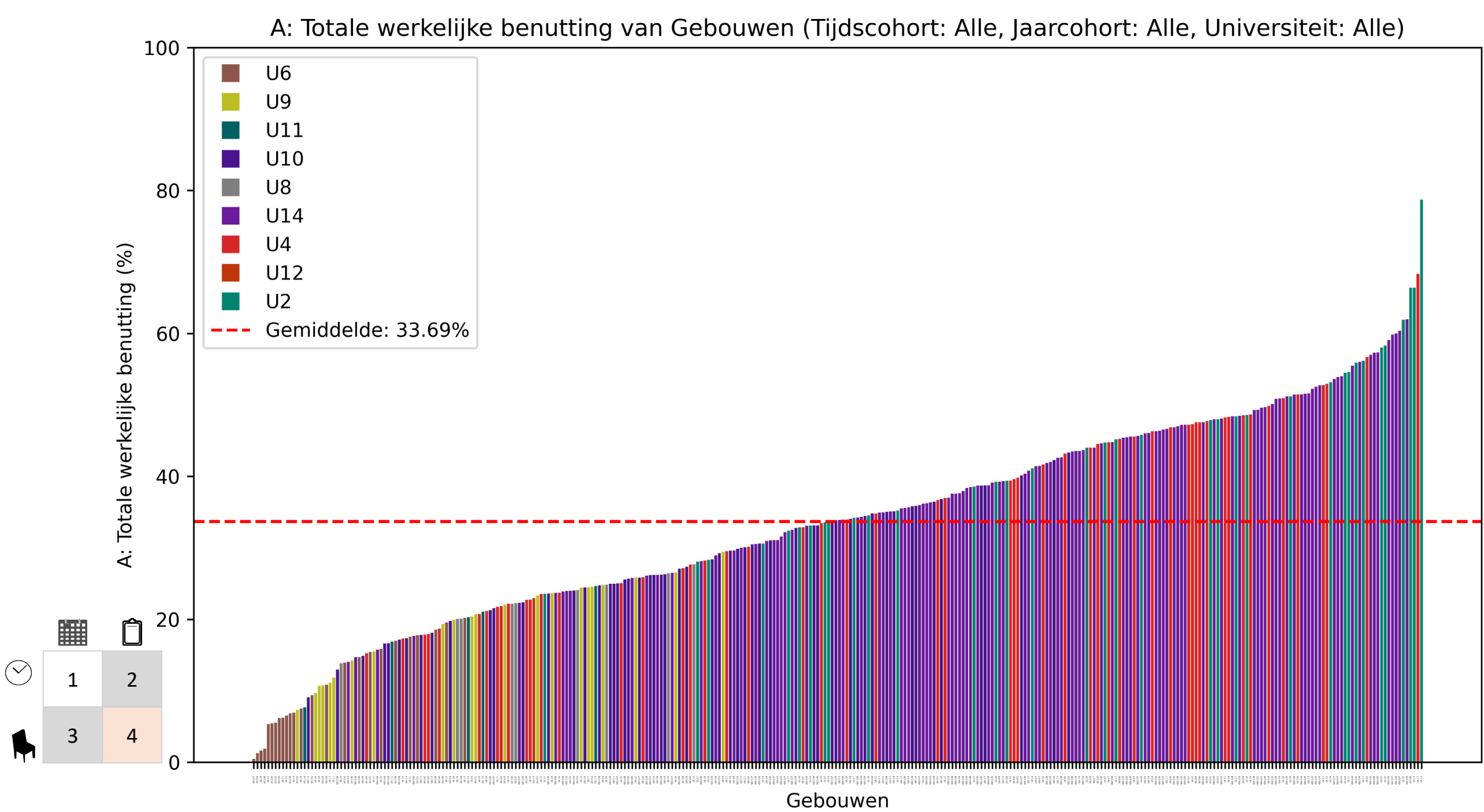
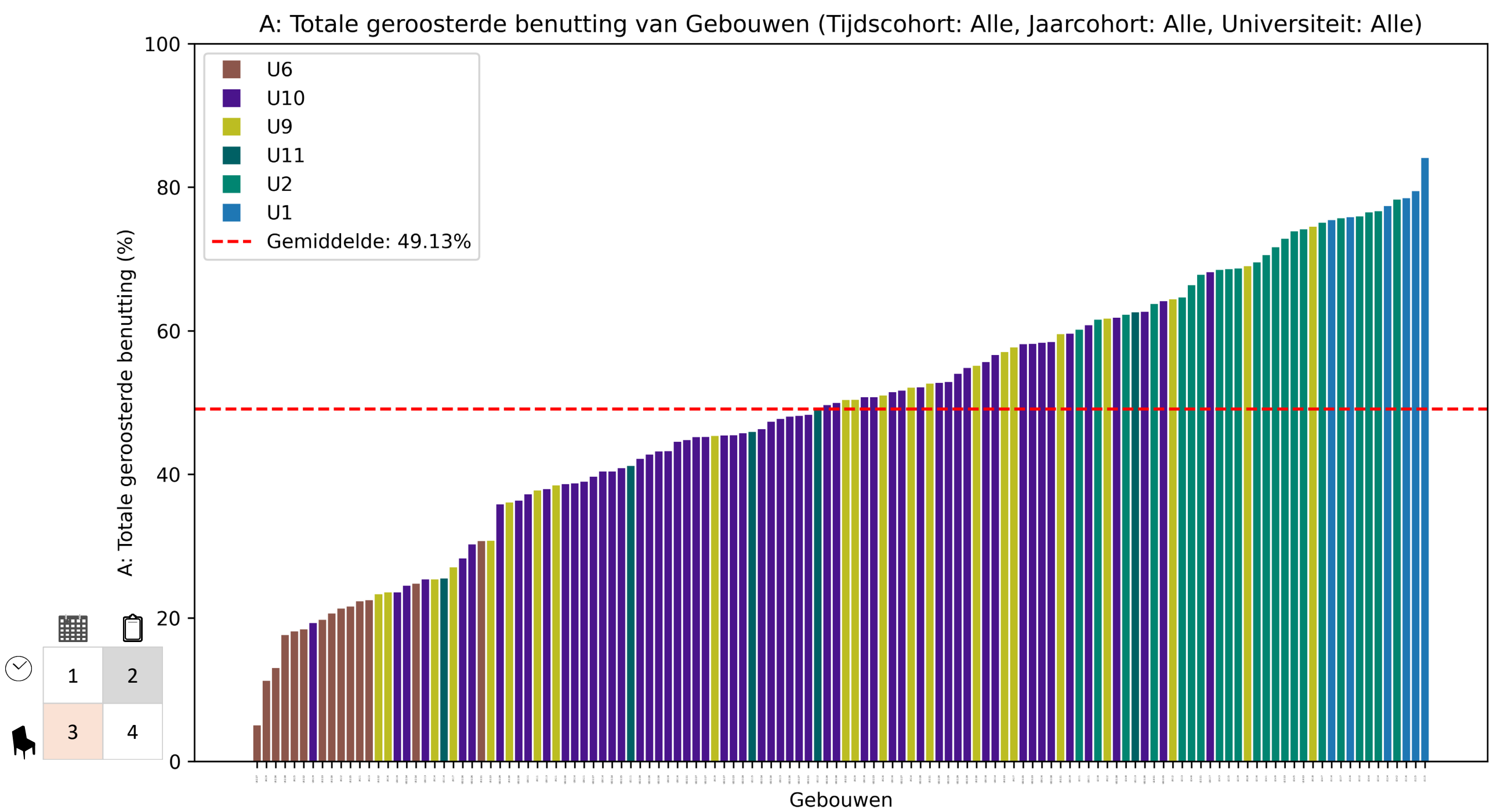
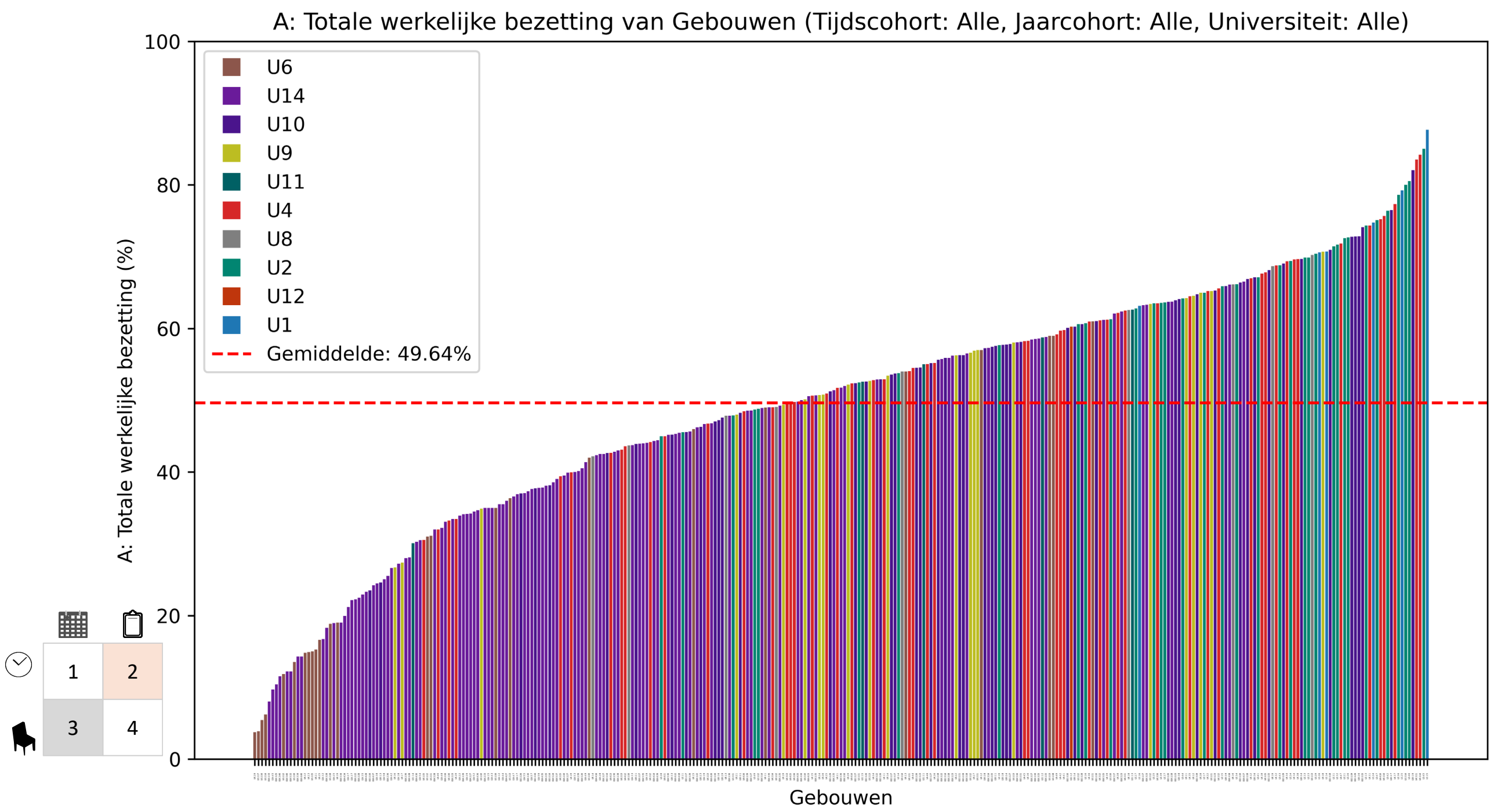
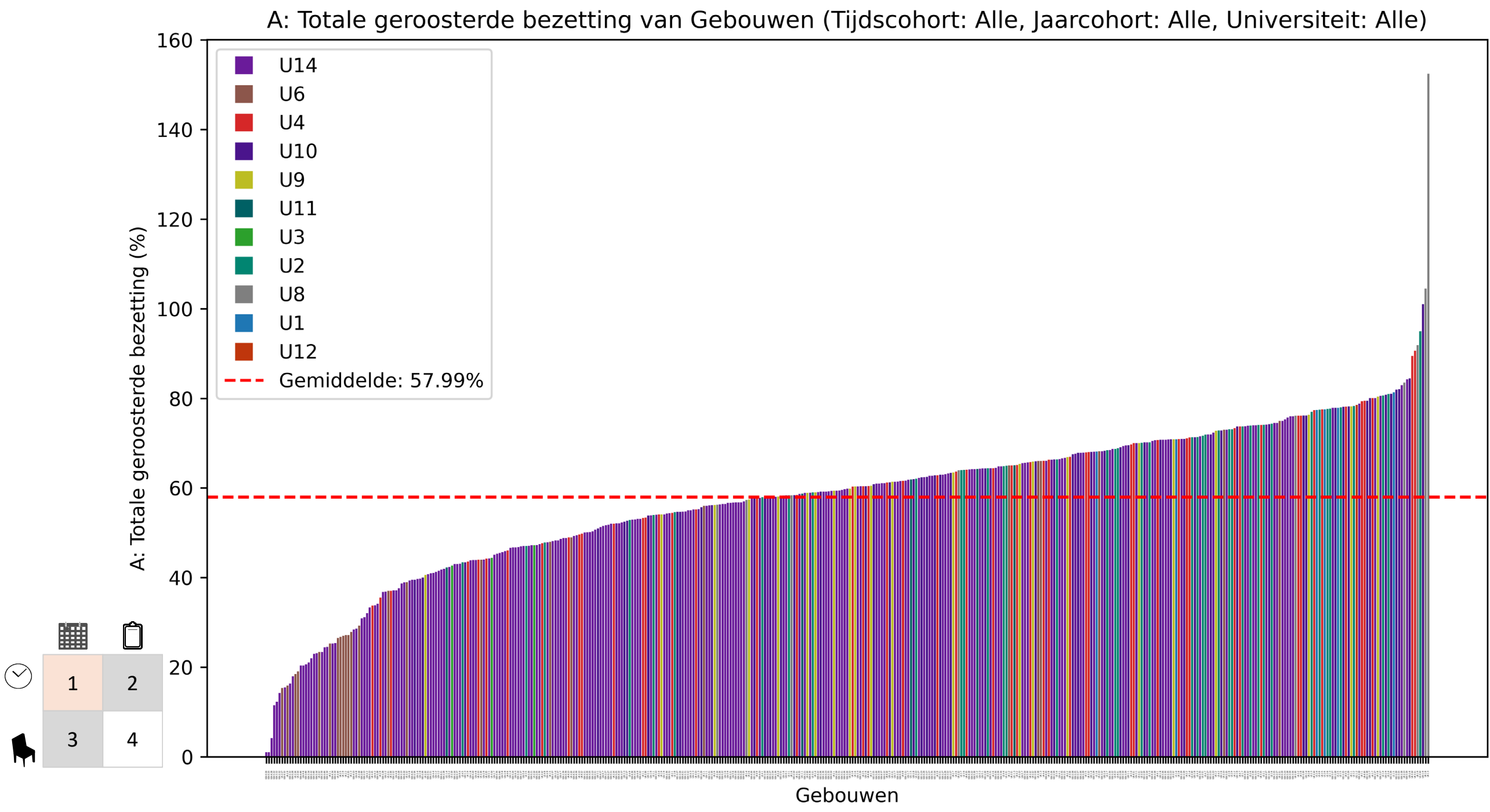


Figure: Gemiddelde van gerealiseerde bezetting over universiteiten met m2/student (uit het Colliers-rapport) voor elke universiteit aangegeven boven elke kolom en een sterretje voor metingen tijdens minder drukke periode

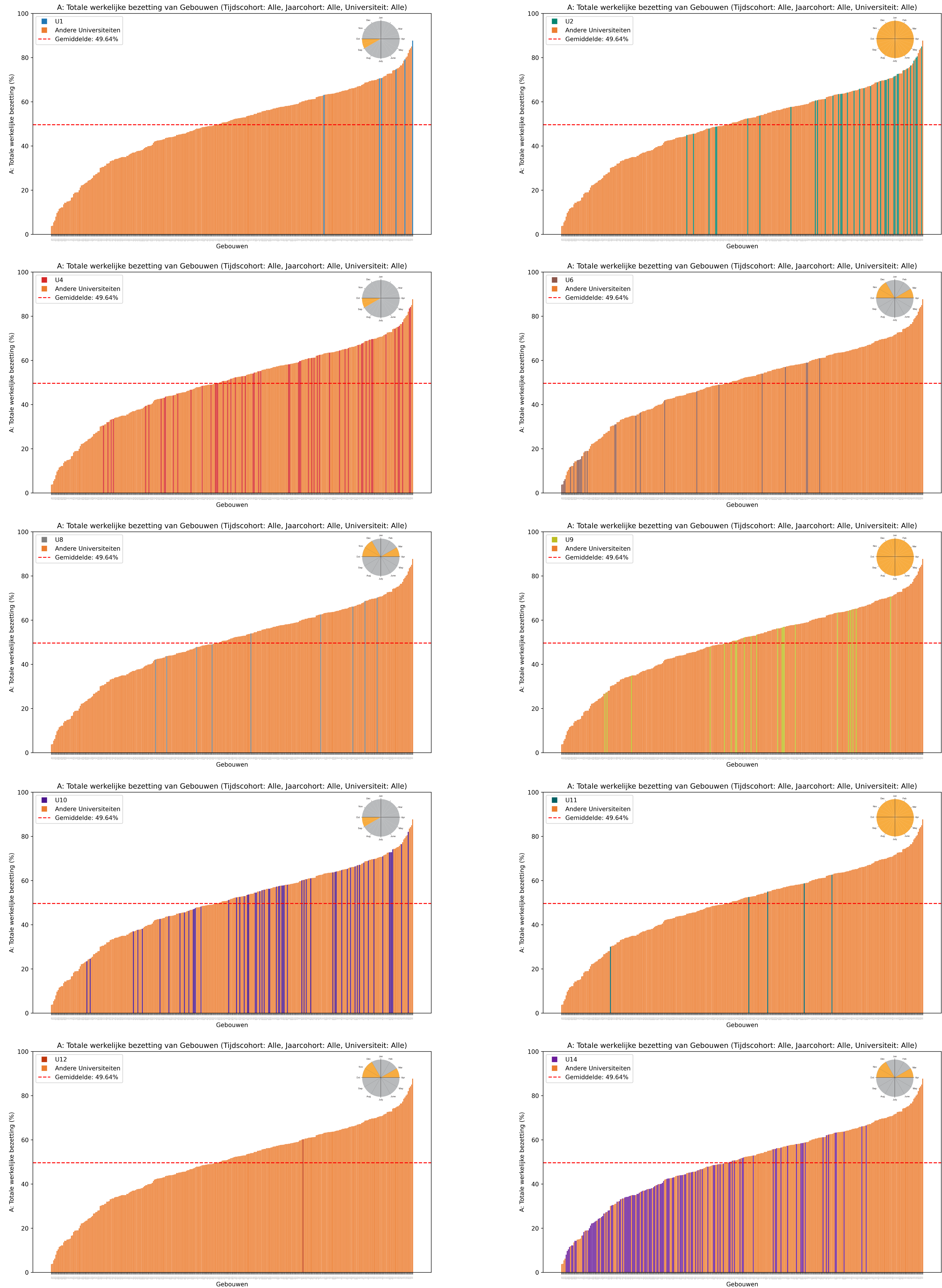
Resultaten op universitair niveau



Met 133 gebouwen in de dataset is het lastiger om het overzicht te behouden, de resultaten te vergelijken en je eigen universiteit te herkennen. Daarom hebben we verschillende maatregelen genomen.

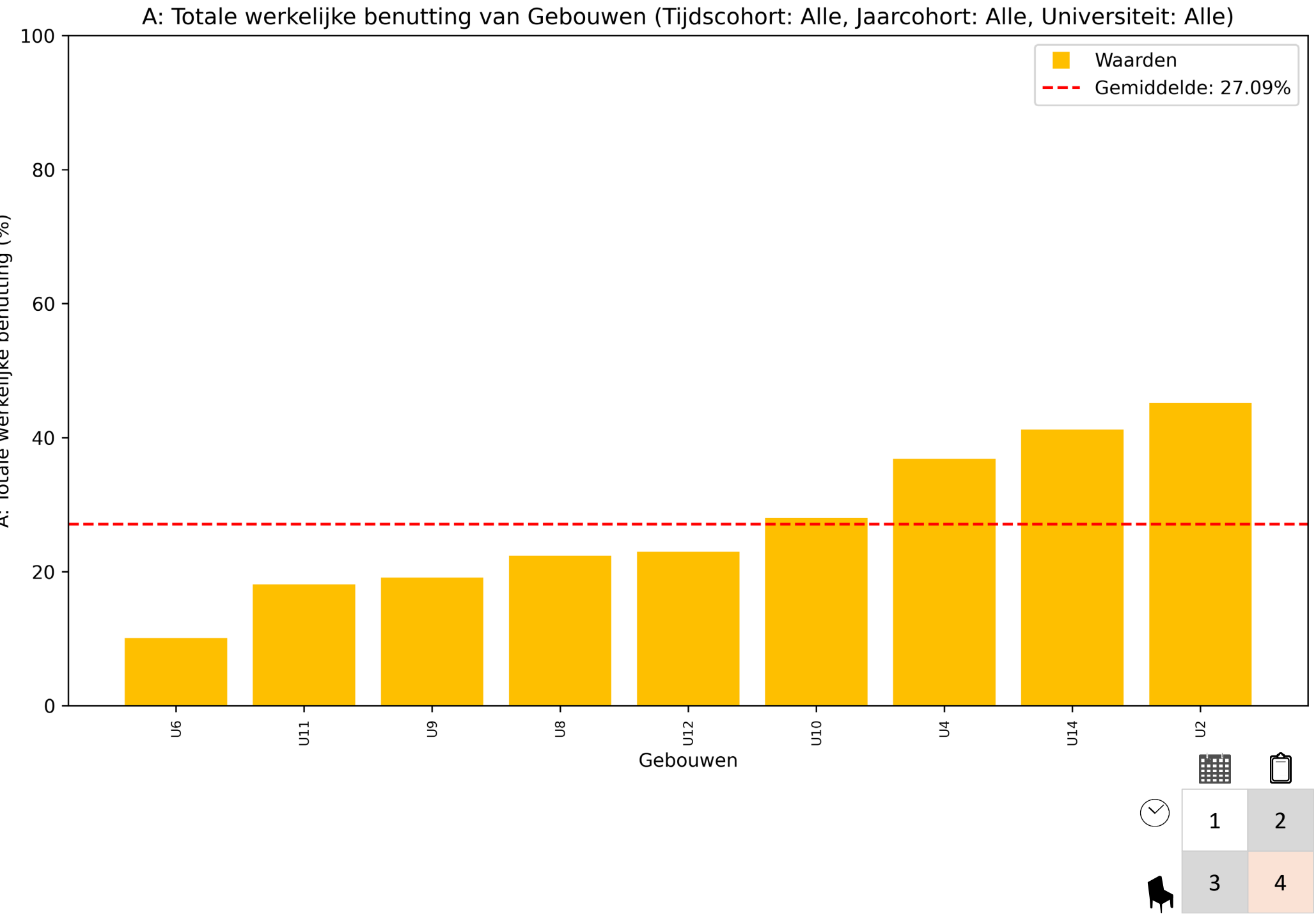
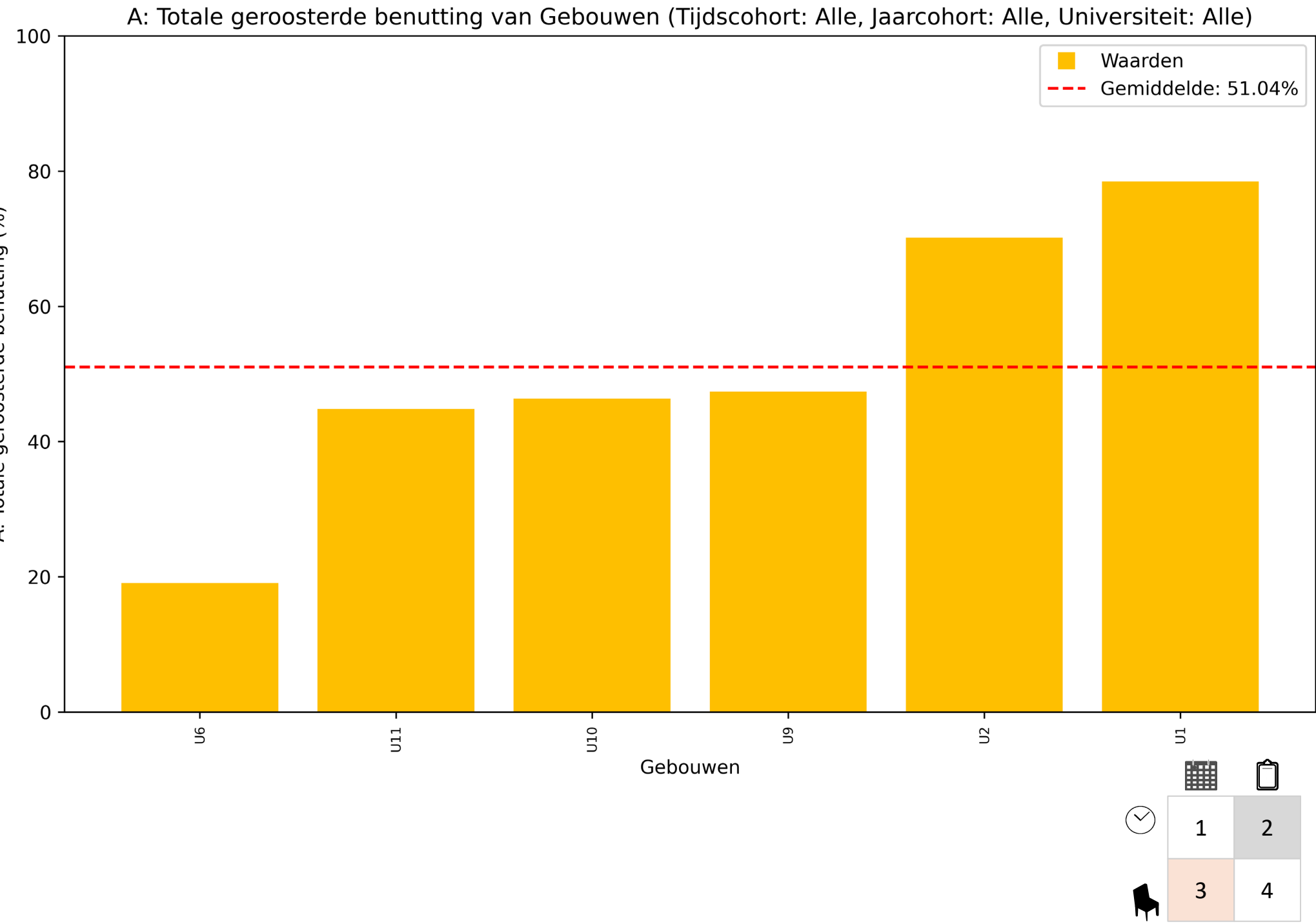
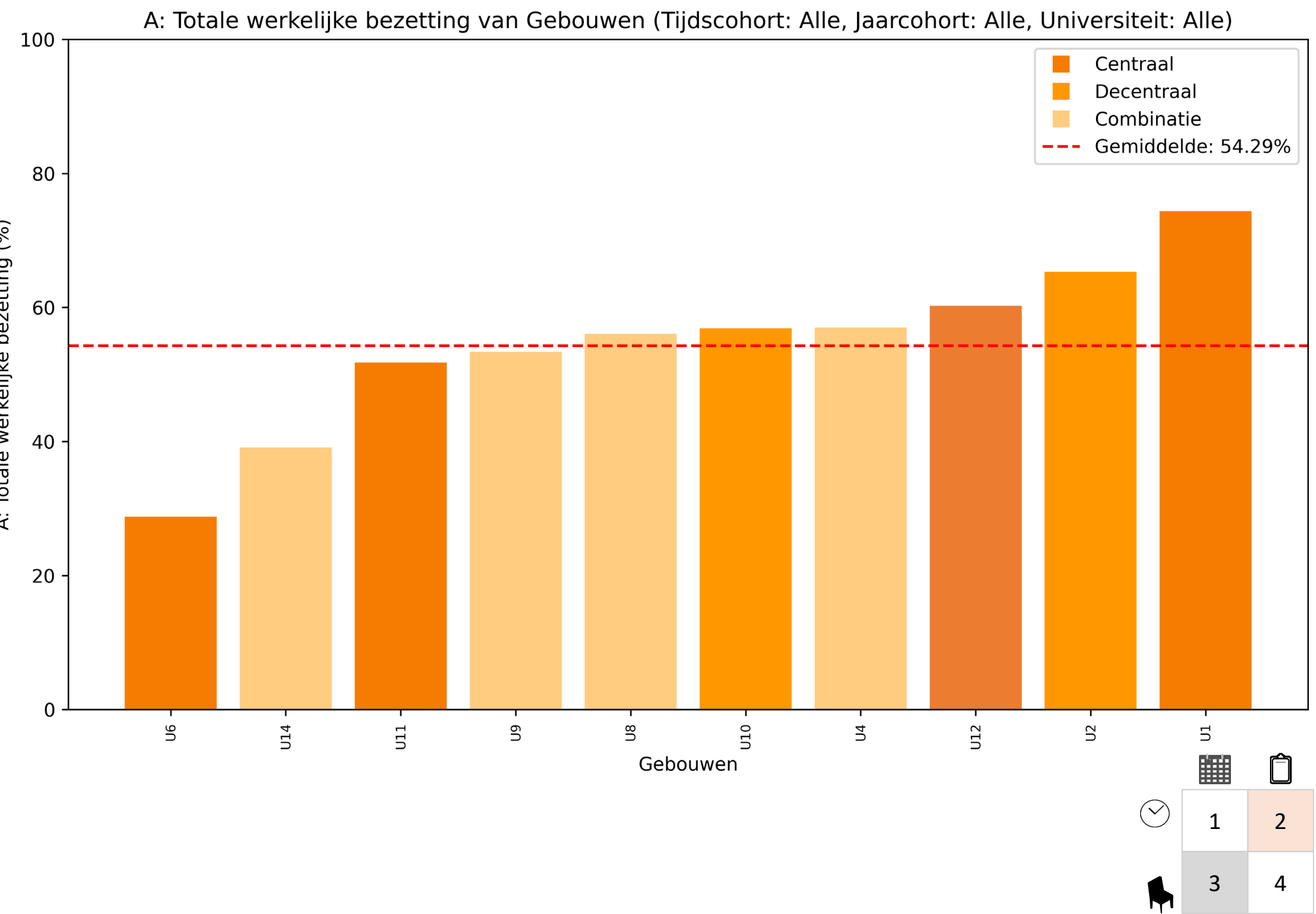
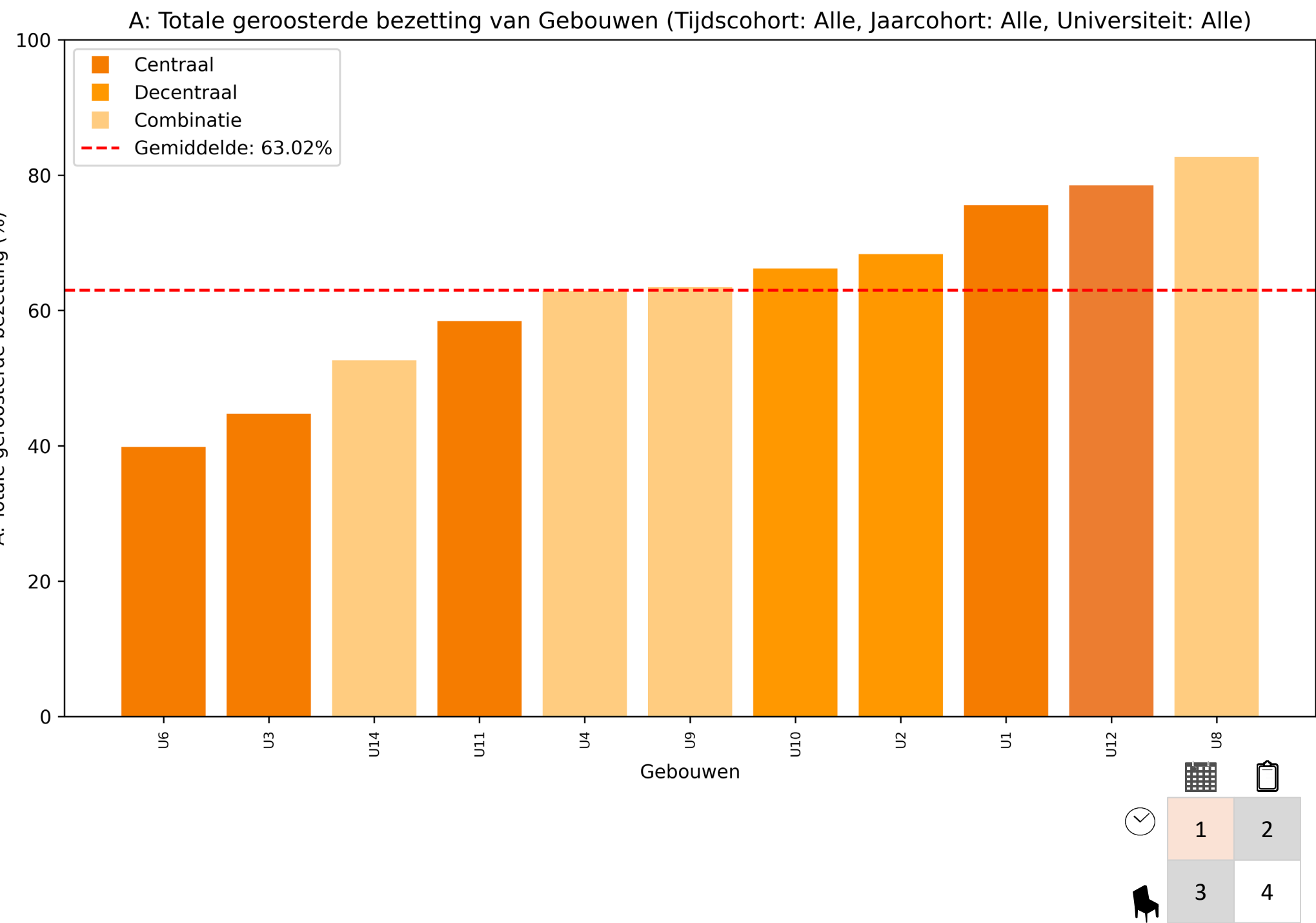
In de gebouwresultaten heeft elke universiteit een kleurcode, zodat je eigen gebouwen herkenbaar zijn. De onderstaande grafieken zijn zeer kleurrijk. Daarom hebben we ook grafieken met actuele frequenties afgedrukt, waarbij per grafiek slechts één universiteit is gemarkeerd (Poster gerealiseerde bezetting over Campus NL gebouwen).

Gerealiseerde bezetting over Campus NL gebouwen

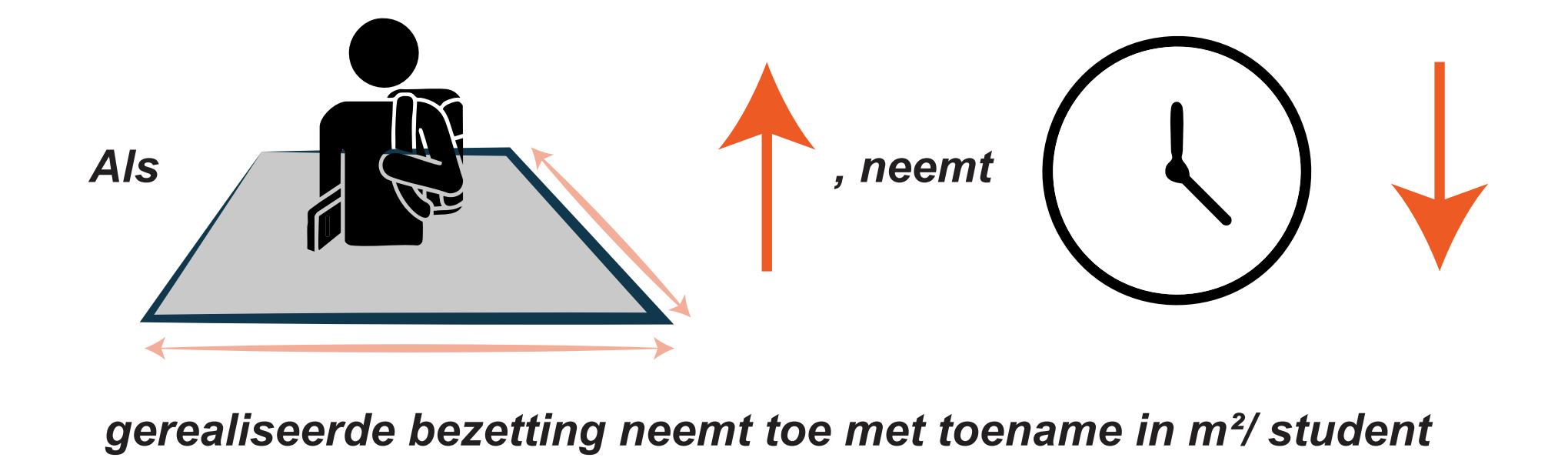


Resultaten op universitair niveau en correlaties

We zien verschillen tussen universiteiten als we kijken naar de gemiddelde resultaten per universiteit. Het verschil tussen de laagste en hoogste universiteit is een factor 2, maar daar zijn logische redenen voor en die zijn geïdentificeerd en gevalideerd door een statistische analyse van de data.

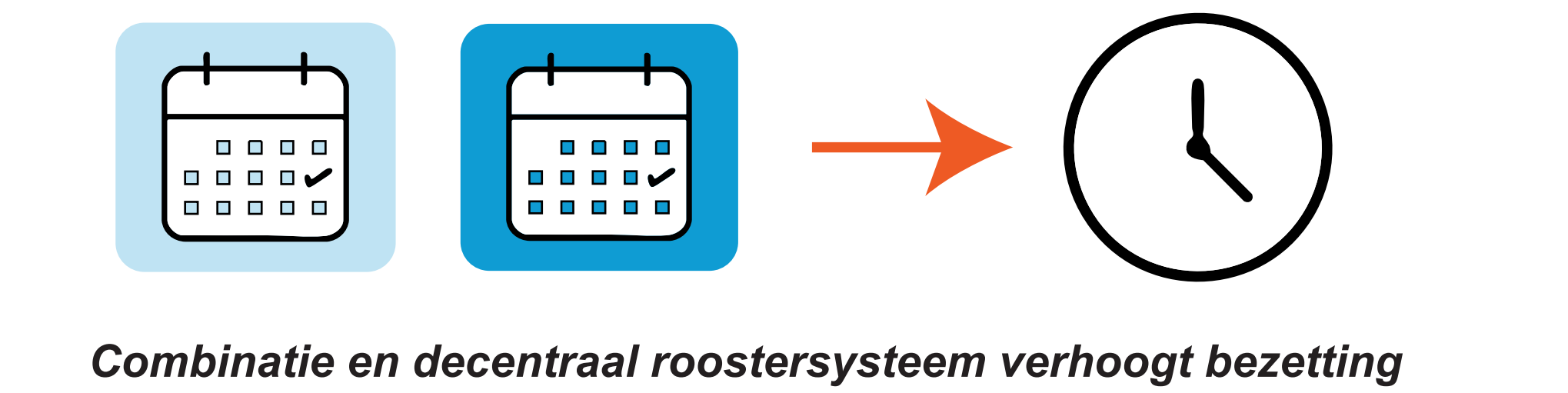


Invloed van m² / student:



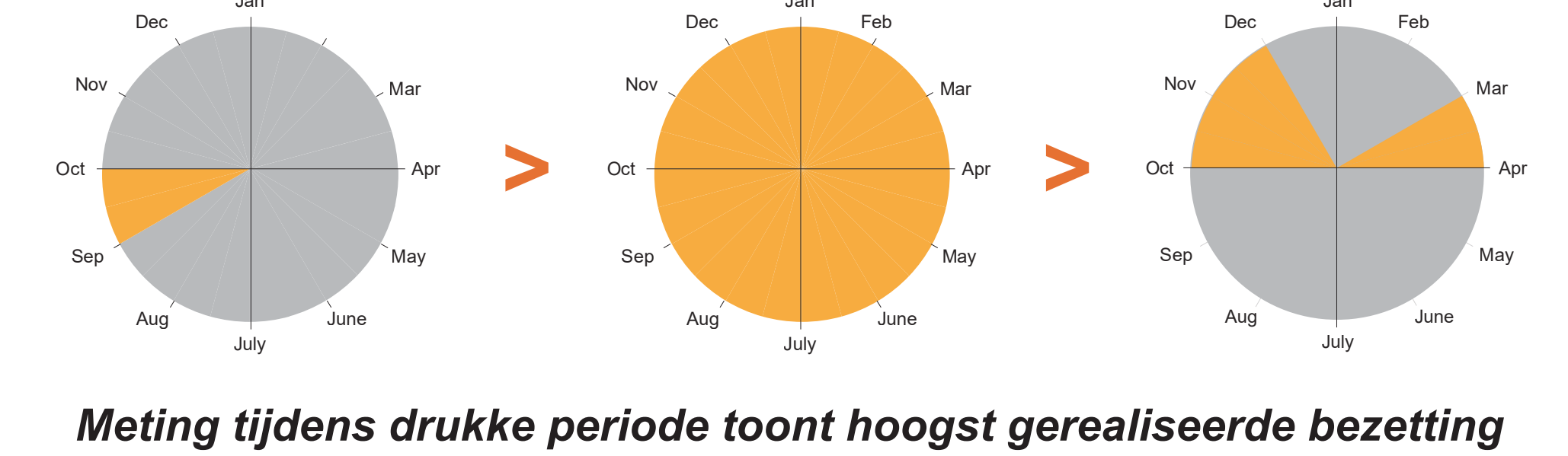
De gerealiseerde bezetting neemt af met een factor 0,26 naarmate het aantal m²/student toeneemt (d.w.z. bij een toename van 1 m²/student neemt de gerealiseerde bezetting af met 0,26 of 26%)

Invloed van het roostersysteem:



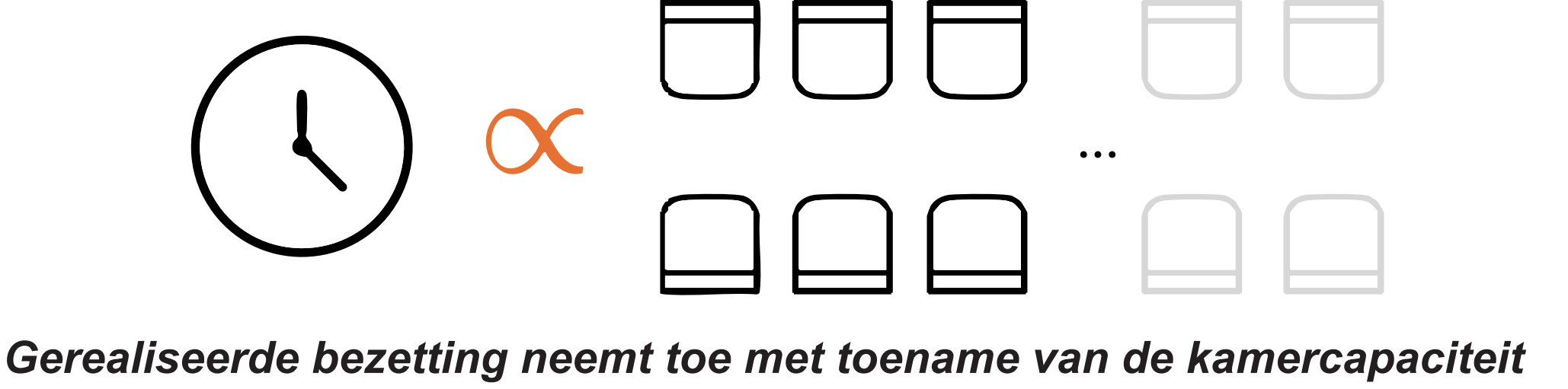
De gerealiseerde bezetting blijkt toe te nemen als een combinatie roostersysteem of een decentraal roostersysteem wordt gebruikt in plaats van een gecentraliseerd roostersysteem. Vergeleken met het gecentraliseerde roostersysteem verhoogde het gecombineerde systeem de gerealiseerde bezetting met een factor 0,37, terwijl het gedecentraliseerde systeem de bezetting met een factor 0,17 verhoogde.

Invloed van de meetperiode:



Universiteiten die hun metingen uitvoeren tijdens de drukke periodes van het jaar laten de hoogste gerealiseerde bezetting zien. Vergeleken met de drukke periode nemen de metingen in de minder drukke periode af met een factor 0,38.

Invloed van de capaciteit van de ruimte:



De gerealiseerde bezetting neemt toe met een factor 0,00032 naarmate de gemiddelde kamercapaciteit per gebouw toeneemt (d.w.z. als de gemiddelde kamercapaciteit met 1 toeneemt, neemt de werkelijke frequentie toe met 0,00032 of 0,032%).

Als de gemiddelde zaalcapaciteit met 100 stoelen toeneemt, stijgt de gerealiseerde bezetting met 3%. Grotere kamers zijn dus beter bezet dan kleinere kamers.

Strategieën en aanbevelingen

Elke universiteit is anders

Het is ook belangrijk om rekening te houden met verschillen tussen universiteiten die de resultaten kunnen beïnvloeden.

U14 gebruikt bijvoorbeeld een timeslotmodel, dat volgens hen een dempend effect kan hebben op de resultaten.

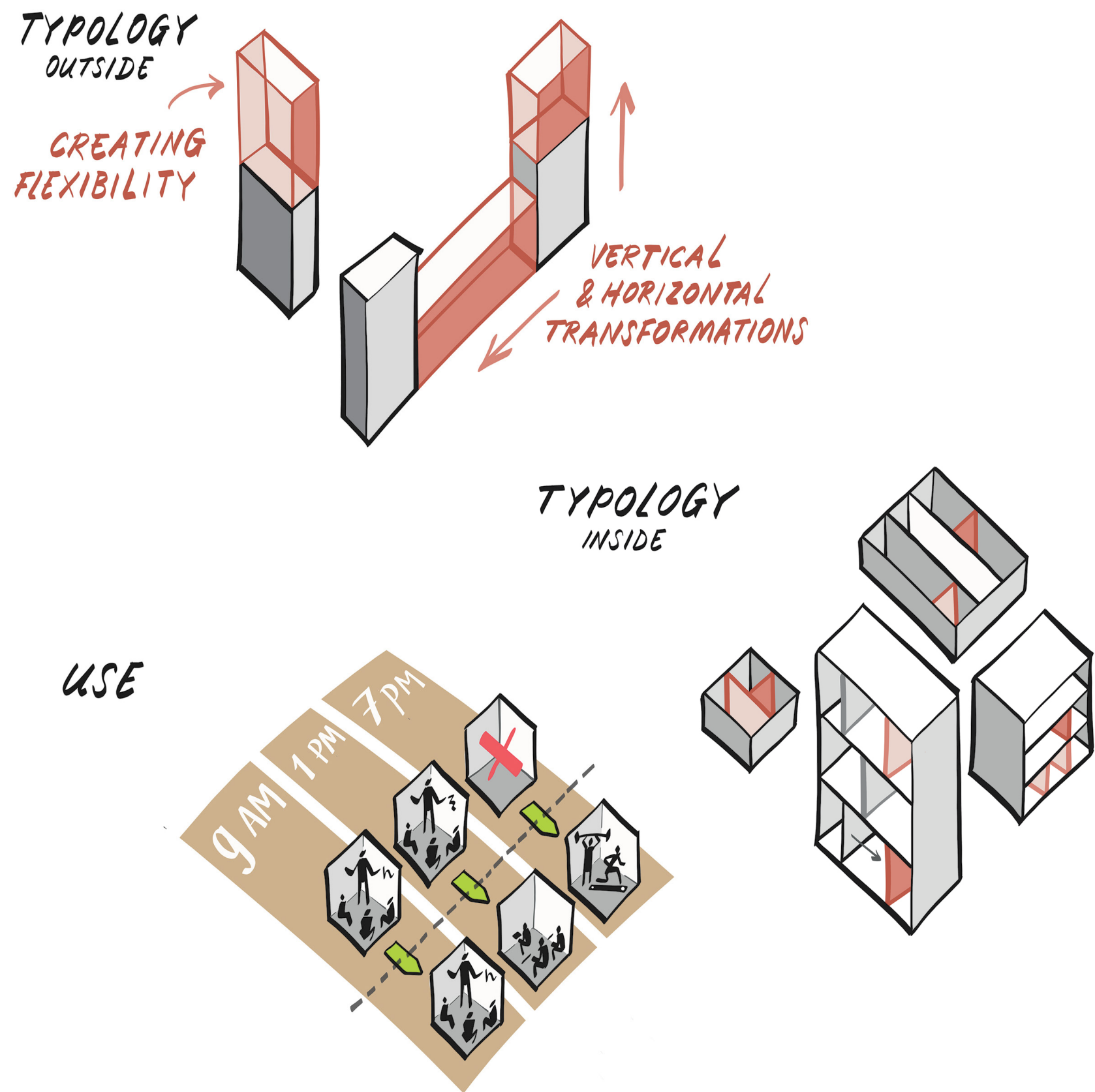
U4 erkent dat metingen tijdens de eerste paar weken van het jaar niet representatief zijn voor het gehele jaar.

U6 gebruikt geen standaarden of doelstellingen voor bezetting en ruimte. In plaats daarvan reageren ze op signalen die ze krijgen en handelen daarnaar, vaak via studentenvertegenwoordiging in de Universiteitsraad.

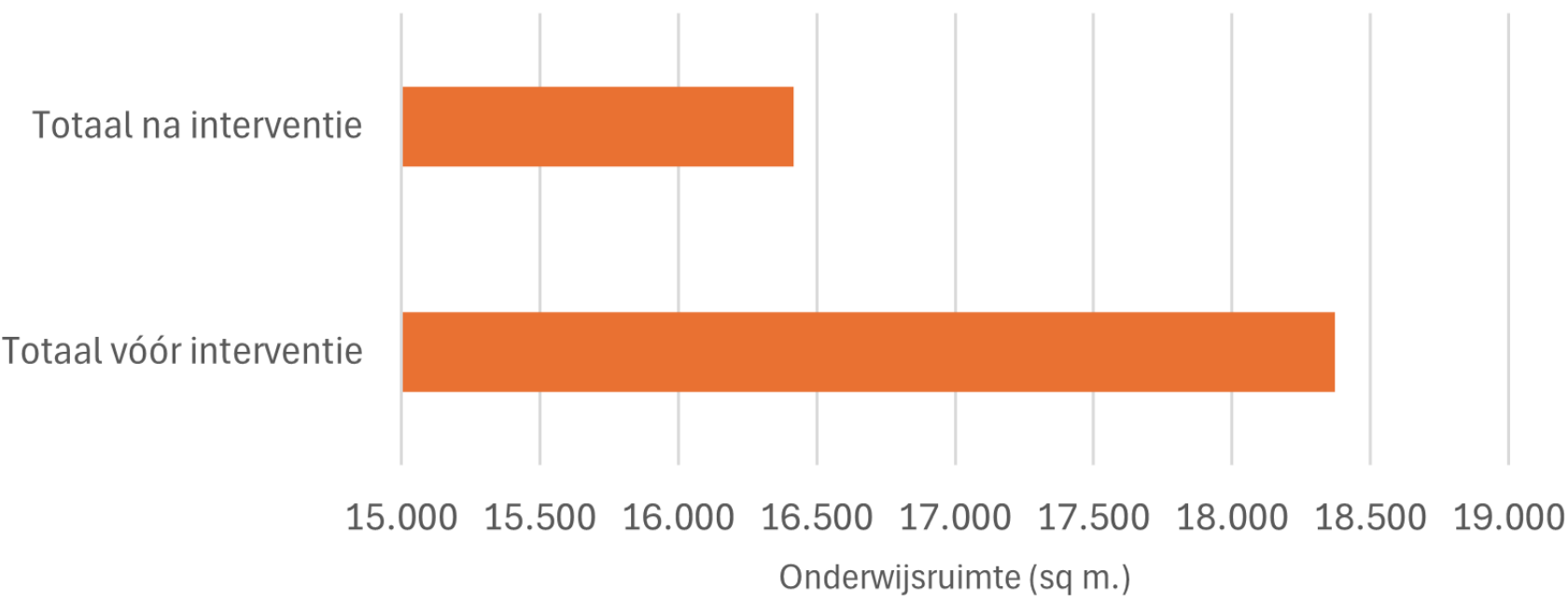
Maar wat doen we met deze gegevens?

Data bepalen beslissingen!

De gegevens kunnen worden gebruikt om beslissingen over veranderingen in het vastgoed (sloop, herschikking en renovatie) te beïnvloeden en kunnen nuttig zijn om te sturen in de richting van een efficiëntere capaciteitsplanning.



Figuur: Oplossingen op ruimtelijk niveau (Illustratie: Mark van Huystee)



Figuur: Door U6 gewijzigd in portfolio onderwijsruimte

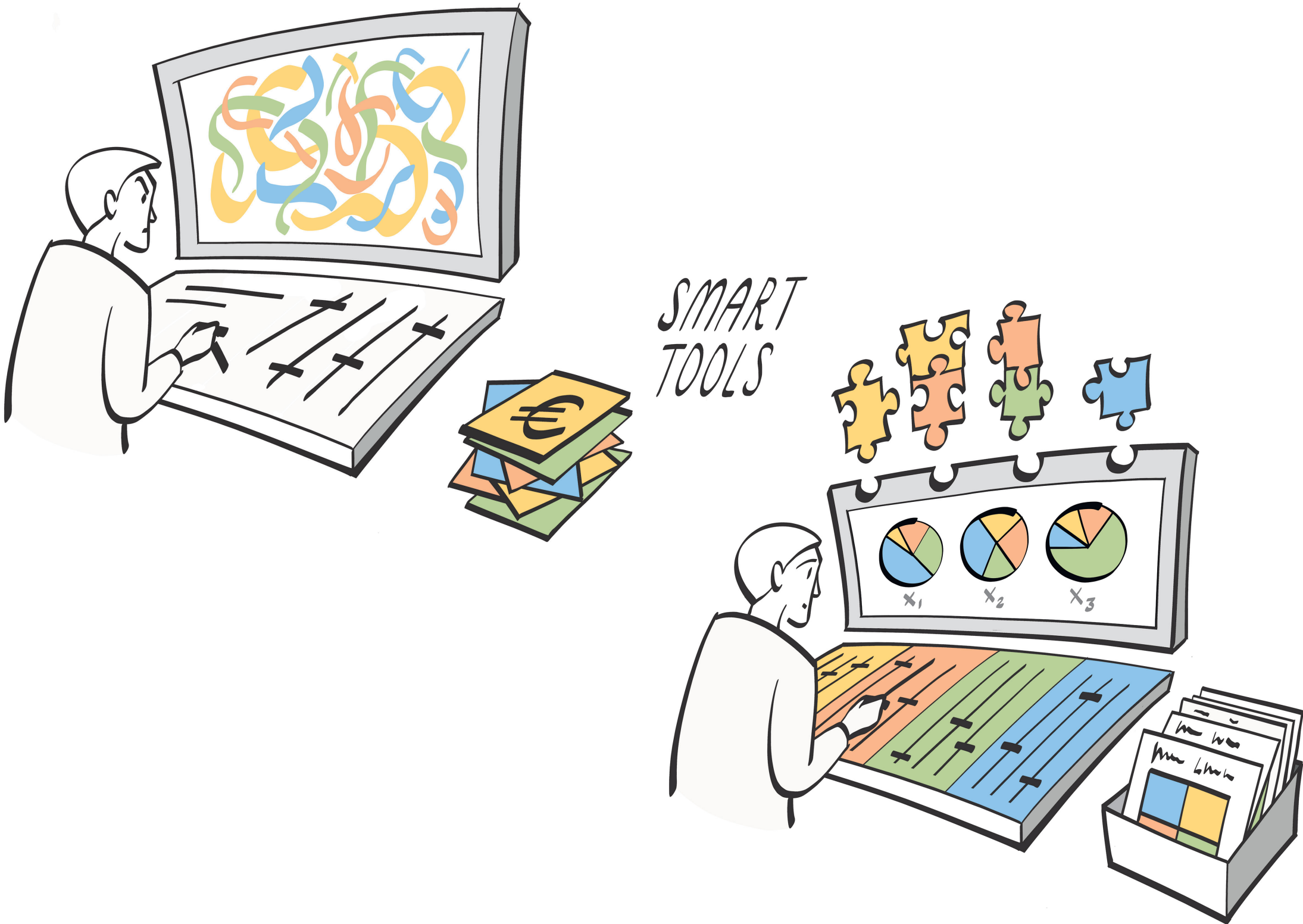
Samenwerking is de sleutel!

Oplossingen zijn alleen mogelijk in samenwerking met en/of met ondersteuning van de CVB, roosteraars en vastgoedbeheerders.

Het is ook belangrijk om de docenten te betrekken bij dit proces en bij evaluaties voor verbetering.

Ook kan het helpen als gebruikers zich bewust zijn van de kosten en verschillen tussen de planning en de voltooiing van de roosters en de verschillende variabelen waarmee rekening moet worden gehouden.

TOOLS



Figuur: Gegevensgestuurde besluitvorming (Illustratie: Mark van Huystee)

Wat kunnen we doen?

Enkele oplossingen op ruimtelijk niveau die tijdens een campuscontact bijeenkomst zijn besproken:

- Flexibiliteit van ruimte:
 - met behulp van tijdelijke onderwijsgebouwen;
 - aanpasbare ruimtecapaciteit - door middel van verplaatsbare tussenschotten - waarmee de grootte van ruimtes naar behoefte kan worden vergroot/verkleind) als een manier om te reageren op trends die sneller gaan dan de ontwikkeling van onroerend goed.
- Overschakelen naar kleinere ruimtes na het begin van het semester per vak, afhankelijk van de werkelijke aanwezigheid van studenten (normaal gesproken krijgt een vak dezelfde ruimte gedurende het hele semester);
- Onderwijsruimtes verkleinen: Het kan de moeite waard zijn om het risico te nemen om het aantal onderwijsruimtes te verminderen, aangezien het aantal studenten de komende jaren naar verwachting zal dalen. Dit kan door sloop, renovatie of herindeling;
- Openingen combineren;
- Bepaal de capaciteit van onderwijsruimten op piekweek of op gemiddelde weken en huur alleen extra ruimten in piekweken;
- Minder praktijklokalen: aangezien de trend van praktijk naar simulatie is, zijn er minder praktijklokalen nodig.

Strategieën voor het planningssysteem zijn te vinden op de andere poster.

Universiteiten brengen al veranderingen aan!

U6 heeft al plannen om 3 gebouwen uit hun portfolio te verwijderen en het verlies van studie-/projectgroepruimten die studenten kunnen reserveren te compenseren door kantoorruimten om te vormen tot studie-/projectgroepruimten, de zogenaamde "omkatten".



Figuur: Samenwerking tussen belanghebbenden (Illustratie: Mark van Huystee)