

Learning Space Patterns: Bleachers and media podium

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This paper presents two patterns for designing learning spaces: MINI-BLEACHERS and MEDIA PODIUM. MINI-BLEACHERS are seating arrangements with multiple levels that are freely accessible. Students can use them for informal gatherings over extended periods of time or for short formal sessions (such as small presentations) and follow the events taking place. A MEDIA PODIUM allows instructors to select from different media, combine content on multiple projection surfaces, and switch between input sources using a media control system. This allows for the combination of presentation slides, interactive whiteboards, live images from a document camera, additional image sources, and streams. The two patterns have been mined during field visits to over 70 universities in which searched for hybrid learning spaces. They are part of a larger language with more than 50 patterns on hybrid learning spaces.

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1. INTRODUCTION

Many Learning spaces have a major influence on learning activities and should offer scope for a rich repertoire of activities and social interactions (Bligh, Brett & Ian Pearshouse, 2011). For learners and teachers, learning spaces are physical, virtual, organizational and temporal contexts in which learning activities take place (Boys, 2011).

Starting in 2020, we run a three-year research project called “Hybrid Learning Spaces”, funded by the German Federal Ministry of Education and Research. Our goal was to find good practices on how to design learning spaces that are suitable for hybrid pedagogy. In hybrid pedagogy we aim to resolve existing dichotomies in education, such as physical-digital, formal-informal, or online-offline, are resolved (Kohls, Köppe, & Nørgård, 2018). The notion of hybrid learning spaces was developed at the second Educational Pattern Languages of Programs workshop (EduPLoP) in 2016, leading to a series of patterns on hybrid pedagogy (Köppe et al, 2017). Looking through the lens of hybridity allows us to get rid of a binary world view, and depart from planning learning spaces in an either-or fashion. Rather, we encompass diversity, flexibility and ambiguity to let learners and teachers bring to life their own rich and personal learning environments. Stommel (2022) considers hybridity as a “moment of play, in which the two sides of the binary begin to dance around (and through) one another before landing in some new configuration.”

According to Benyon (2014), space can be characterized in general by its objects (ontology), the relationships between these objects (topology), the available options for action (agency), and the resulting potential for change (fluency). A hybrid learning space resolves dichotomies between different spaces and connects objects from various source spaces (physical, virtual, didactic, social, informational). This combination enables new activities and action options. For example, the activities and outcomes of an on-site session can be captured and shared using digital media. The connection and combination between various objects, media, methods, and activities should be as seamless (Wong & Looi, 2011).

In our research project we wanted to find reoccurring seamless teaching and learning formats that were enabled through hybrid learning spaces. The outcomes should enable educators, lecturers and other university staff to improve the students learning experience through the design of better learning environments, even though a lot

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of the findings can also be applied to other contexts. Besides sighting current research papers, articles and blog posts, our main approach to find the patterns was to visit as many different learning facilities as possible, perceive how they handled hybrid education and find reoccurring patterns in the new learning spaces each of them designed for this purpose. Over a timeframe of three years we visited more than 70 universities, most of them in Germany, UK and USA. In these visits we captured 4382 photos of more than 550 different spaces. Furthermore, we tested a lot of different setups in our own university building at the TH Köln, through which we got helpful insights regarding their utility, advantages and disadvantages.

In total, we identified 162 pattern candidates, based on observations, interviews, focus groups and literature study. Of these candidates, we wrote 99 patterns. 55 of these have been published in German (<https://www.e-teaching.org/praxis/hybride-lernraeume>), and another 35 have been published at *PLoP conferences (for an overview, see Kohls & Wilk, 2022). The remaining candidates require further evidence, i.e. more known uses and theoretical justification.

The two patterns in the paper are late additions to the language. We observed them in many cases, but we only started to document them at the end of the research project. Hence, they are presented somewhat isolated in this paper because we have published many other patterns on the topic in previous work. Mini-bleachers mainly address informal settings and encounters, while the media podium is more for formal settings such as lectures. Both patterns address hybridity by having a formal and informal part at the same time. MINI-BLEACHERS can make formal spaces more informal. The MEDIA PODIUM increases interaction and collaboration during a lecture and entangles formal and informal activities during a lecture.

2. MINI-BLEACHERS

Mini-bleachers are multi-tiered seating arrangements with at least two levels that are freely accessible. Students can use them for informal gatherings over longer time periods or for short formal sessions (such as small presentations) and follow the events taking place. A key feature of mini-bleachers is the quick transition between watching, observing, and actively participating in the activities.



Figure 1: Bleachers in a public maker space (TH Köln, Campus Gummersbach).

2.1 Context

In hybrid learning environments, different learning activities and space types intertwine. There is a more frequent and rapid shift between presenting, working, and reflecting phases. This applies to both formal settings, such as organized project events, and informal spaces, such as campus time between classes. Students switch between active learning and working phases and passive phases of watching and listening. This includes presentations as well as observing the learning and project activities of other students.

2.2 Problem

Meeting other students and join their learning activities is important for social learning and collaboration but engaging with others can often be difficult. If students have to join activities right away they might keep away (or sit somewhere distant – such as the last row in a lecture hall) because the stakes are high at the beginning: some students may not feel confident enough to join. They often want to observe learning activities or presentations first. At the same time there needs to be low threshold to engage. If students cannot become part of the learning activities easily, they will feel uncomfortable and not stay long in the learning space.

2.3 Forces

Encounter: The campus is a place of encounters. But if students are spread amongst many different places and rooms, there are few opportunities for chance encounters. Students should see as many other students as possible and have the opportunity to meet, connect, and exchange ideas. People enjoy sitting in cafes or on promenades to watch the hustle and bustle of others. The same applies to students who like to observe the learning activities of their peers and the campus life.

Vantage point: In areas where learning activities and campus life take place, the most inviting seat is one that is high enough to provide an overview but also low and close enough to allow participation in the activities (see also STAIR SEATS in *A Pattern Language*, Alexander et al. 1977). The higher the seat, the more one can see, but the harder it becomes to be part of the learning activities.

Listening, Watching, Participating: In different phases of a class, students want to follow a short presentation together or simply observe the overall learning process. On the other hand, they want to be part of the activities or quickly join in.

Transition time between learning phases: If the transition between active participation and active/passive listening or observing takes too much time or effort, learning phases become too disconnected. Students often remain in a passive role if they cannot quickly engage in the activities.

2.4 Solution

Provide open tier-structured seats for medium and large sized learning spaces. Such mini-bleachers can ensure that students can efficiently follow the events in a learning space from multiple levels. The learning space offers learning and working areas for active work with media, allowing students to switch between active and passive phases without disconnecting from the overall activity.



Figure 2. Mini-bleachers give a vantage for presentation situations.
At the same time students can seamlessly engage and join activities (Innovation Hub BergischesRheinland, Gummersbach).

2.5 Details

Interaction with the environment: Mini-bleachers are often part of learning landscapes, learning centers, libraries, cafes, cafeterias, and entrance areas. The mini-bleacher provides seating for listeners. Unlike a rising lecture hall, the seats are only for small groups and short stays. They are used, for example, during project-oriented phases when an input or result presentation is given. Presentation media, such as displays or projectors, should be nearby.

Seamless switch between activities: Besides integrating informal, self-directed activities (e.g., group work) and more formal, organized phases (e.g., result presentations), bleachers also enable rest and relaxation zones to follow the campus events ("people-watching" like in a cafe). Students thus have their individual learning space and can still observe the events in the learning space and quickly participate.

Vantage: Students sit with their mobile devices on the bleacher, being in their private learning and working world when looking at their device screens, yet they can always overview the larger learning space and quickly engage in the activities happening there, such as at an interactive display. The seating steps of the mini-bleacher

should be slightly elevated but easily accessible to everyone: for students passing by or transitioning from an active phase to a receptive phase. The transition between sitting on the bleacher and participating or encountering others in the rest of the learning area should be very easy. Hence, the bleacher should not be too high.

Number of levels: Mini-bleacher usually consists of a maximum of two to three height levels (seating steps) and are easily accessible for students. The ceiling must be high enough, otherwise students feel uncomfortable or could even harm themselves when getting up (and knock their heads to the ceilings or to lamps). Another variant is bleachers made of flexible elements. These can be stacked and configured differently like building blocks. It is crucial to ensure a comfortable seat height. If the bleachers are too low, students sit very uncomfortably. In high ceiled and very busy areas of the university, such as central foyers, more than three levels can be used. However, it must be ensured that students have something to watch—active campus life rather than a view of a blank wall or bookshelves.

2.6 Obstacles

Safety: When implementing learning bleachers, safety must be considered. Higher seating areas must be secured with railings. In rooms with low ceilings, it must be ensured that tall people do not hit the ceiling or lighting when standing up, risking injury or loss of balance. For bleachers made of flexible block elements, it is essential to avoid finger pinching. Adjustments should be supervised, and campus members without safety training should not build the bleachers too high.

Cleaning: Additional resources should be planned for cleaning the bleachers. For larger bleachers, seating and foot areas should be clearly marked, for example, by using different materials or seat cushions.

Ergonomics: Bleachers provide an informal setting and enable the transition between active and passive phases. However, if the stay on the bleacher is too long (e.g., 90-minute lecture), it quickly becomes uncomfortable. Bleachers are more suitable for short phases. Back rests, cushions and good seating height (40-60 cm per level) improve the seating comfort. Seat cushions allow for adjustments of seating height. However, cushions increase the required space for each level: as people need to put their feet somewhere, providing cushions requires additional space where no feet are put down (putting feet on pillows makes them dirty quickly). Also, cushions and back rests might be in conflict. By providing cushions, the seating area to the next level needs to be larger. Thus, one can no longer use the next level to rest one's back.

Something interesting to see: The orientation of the bleachers and the view play a crucial role in its acceptance. If students sit down but do not see interesting activities—perhaps just a wall or bookshelves—the usage frequency will be very low. This is observed in some universities where high-quality bleachers are installed as part of stairways but are rarely used due to a lack of reasons to sit there. The height and number of steps also matter: if students sit too far from the events, the seats become unattractive, uncomfortable, and often lonely.

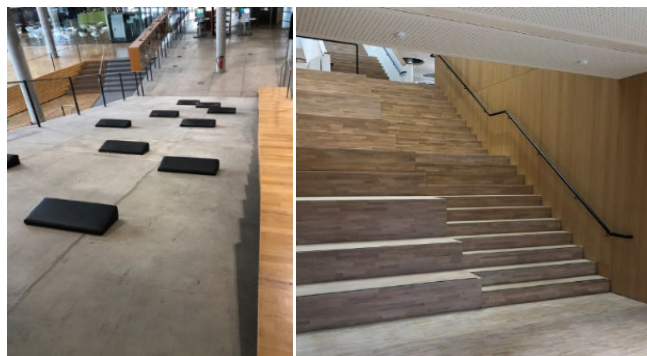


Figure 3: Left: The seats are far away from the lower ground and face to a column. Students view an area of low-frequency use, making it boring to sit there. Right: The bleachers are set aside to a stair that connects to floors. As the ceiling of the second floor begins at the end of the stairs, students who sit on the bleachers will only see a wall.

2.7 Consequences

Advantages:

- Mini-bleachers create an informal character on campus. They create spaces for use between events.
- Presenters and listeners are at eye level.
- Seating steps that provide an overview of activities in a place or learning area are natural attractions and are frequently used by students.
- Students can quickly switch roles between active and passive learning participants.
- Integrates presentational activities (short lectures, impulses, result presentations) into very active project work phases instead of the other way around.
- Students can actively become part of the events at any time, for example, when they see friends or interesting activities.
- Equipping larger rooms with mini-bleachers often improves the overall aesthetic appearance of a space.

Disadvantages:

- Bleachers are difficult to clean and should be planned with building management before implementation.
- For bleachers with multiple levels, enough space for students' feet must be planned. If seating and foot areas overlap, students quickly sit on dirty surfaces.
- Mini-bleachers are only suitable for smaller groups of about 20 people in formal settings.
- Mini-bleachers are not suitable for longer seating periods as they become uncomfortable, especially if there are no backrests, such as on the top level or if the seating area is too far from the next step.

2.8 Examples

The examples are based on our field trip to universities.

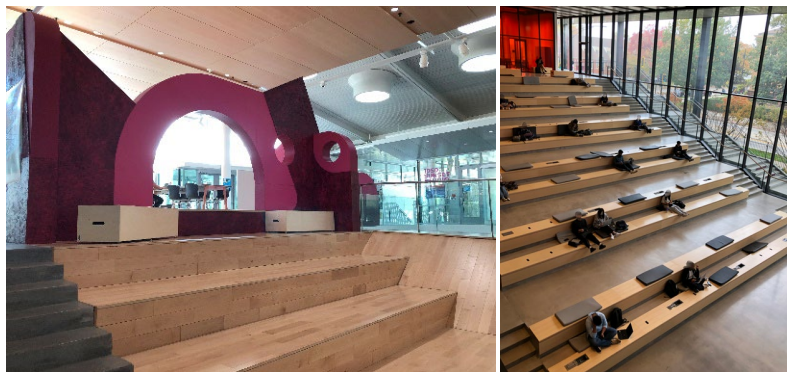


Figure 4. Left: Bleachers with two levels allow informal setups.
Right: Bleachers with many levels in entrance hall (University of Illinois, Champaign).

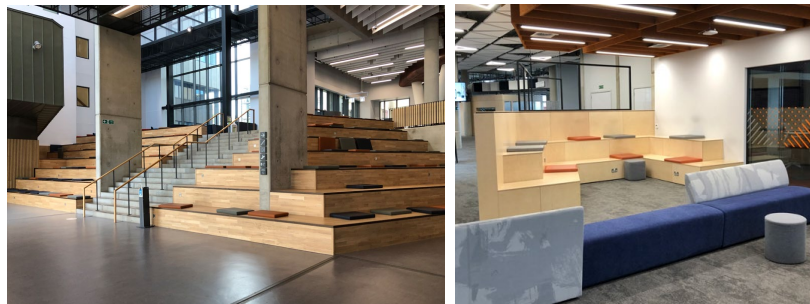


Figure 5. Left: Bleacher give vantage to activities in the entrance hall of the learning center of the University of Glasgow.
On several floors students find bleachers for resting and group activities. (University of Glasgow)



Figure 6. In this example, each bleacher is a building block and can be rearranged for different setups. UAS Münster.

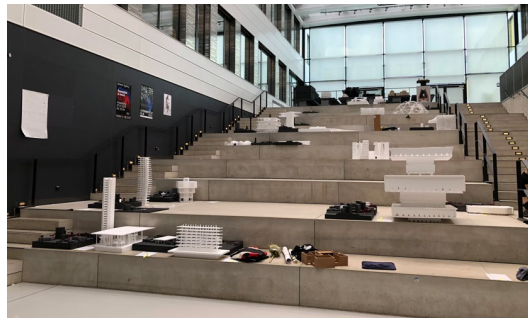


Figure 7. Bleachers in large halls can also be used for exhibitions of student projects (UAS Düsseldorf)



Figure 8. A learning center with a “Speaker’s Corner” for student presentations. (University of Strathclyd).

3. MEDIA PODIUM

For a dynamic and interactive design of lecture formats in the auditorium, multiple presentation and display media are provided on a podium. A podium is a small platform on which a person stands, e.g. to deliver talks or lectures. A media podium is equipped with multimedia devices for media rich presentations. Instructors select the appropriate medium, combine content on multiple projection surfaces, and switch between input sources using a media control system. This allows for the combination of presentation slides, interactive whiteboards, live images from a document camera, additional image sources, and streams.



Figure 9. Lecture hall with media podium.
Devices from left to right: document camera, control panel, screen 1, interactive touch panel for writing, and screen 2.
(University of Glasgow).

3.1 Context

In modern lecture halls, the need for dynamic and interactive teaching formats has increased. Students grow up with media that enable an abundance of visual representations. One of the best ways to engage students is to make them curious and let them influence what happens during a learning session.

3.2 Problem

Instructors face challenges in effectively engaging students during lectures using a single presentation medium. The lack of dynamic and interactive elements can lead to decreased student attention and participation. Instructors need a way to seamlessly integrate various media and sources to enhance the teaching and learning experience.

3.3 Forces

Engagement: Students are more engaged when multiple media are used, providing visual, auditory, and interactive stimuli.

Flexibility: Instructors need to quickly switch between different types of media and sources to respond to the flow of the lecture and student needs.

Complexity: Managing multiple media sources can be complex and may require a user-friendly control system to ensure smooth transitions and combinations.

Space and Equipment: The lecture hall must be equipped with the necessary technology and space to accommodate multiple media sources and projection surfaces.

3.4 Solution

For a dynamic and interactive design of lecture formats in the auditorium, multiple presentation and display media are provided on a podium. Instructors select the appropriate medium, combine content on multiple projection surfaces, and switch between input sources using a media control system. This allows for the combination of presentation slides, interactive whiteboards, live images from a document camera, additional image sources, and streams.

3.5 Details

Easy control: The podium is equipped with controls and interfaces for various media sources, such as laptops, document cameras, and interactive whiteboards. The various input signals can be controlled via a touch panel. Very often a touch display shows symbols to select the various input sources.

Handwritten digital content: Typically, the lecturer connects their own laptop to display slides or software. For the visualization of concepts, at least one digital writing tablet should be available. By developing diagrams, formulas, and definitions by hand, students can better understand the connections, as the content is created step by step.



Figure 10. Podium with document camera, touch screen for drawings, and touch panels for controlling the sources. (University Halle).

Two projections: Ideally, there should be two projection surfaces available so that students can see multiple pieces of content simultaneously, such as a presentation and a visualization or an experiment and the corresponding formulas. If a lecturer switches too frequently between input sources, there could be a split-attention effect (Chandler & Sweller, 1992). Hence, showing two sources at the same time makes it easier to show and explain.

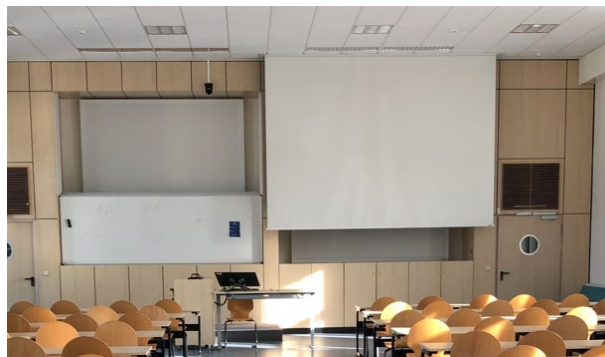


Figure 11. Two large projection screens in lecture hall for different media output (University Magdeburg).

Live image: A document camera is very well suited for displaying physical objects or experimental setups. It captures a live image of the table or a defined area and projects it in an enlarged form. Integrating multiple devices from the lecturer is also a good option. For instance, lecturers sometimes bring their own tablet to write on. Additional image sources and streams can be integrated, such as live feeds, online resources, and recorded videos.

3.6 Obstacles

Training materials: Provide training materials and one-page explanations for all technologies.

Professional training: Deliver training for instructors on how to use the media control system and integrate various media sources effectively.

Technical support: Ensure technical support is available to address any issues that may arise during lectures.

Complexity: Cables to all the devices may reduce the aesthetical appearance and increase the complexity of the setup. Instructors could be overwhelmed and struggle with cognitive overload, i.e. paying more attention to the provided technology instead of focusing on social interaction and content delivery. Therefore, hide cables and let users control the inputs via a digital control panel.

3.7 Consequences

Advantages:

- Multiple media sources provide varied stimuli, keeping students engaged and attentive.
- Instructors can adapt their presentations dynamically, responding to student questions in real-time.
- Interactive elements allow for real-time writing and drawing, facilitating active learning and participation.

Disadvantages:

- Managing multiple media sources can be complex and may require additional training and support.
- Equipping a lecture hall with the necessary technology can be expensive. Moreover, maintenance increases.
- The reliance on technology increases the risk of technical issues that could disrupt the lecture.

3.8 Examples

The examples are based on our field trip to universities.



Figure 12. Audimax with large screen for docents (University Saarland)

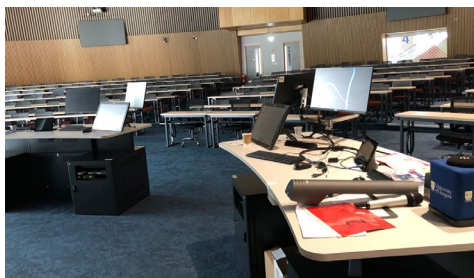


Figure 13. Media podium with many options, including document camera, multiple screens, interactive touchpad, and a microphone cube that can be thrown into the audience to let students contribute. (University of Glasgow).



Figure 13. Podium with touch screen, control panel and inputs for own laptop. (UAS Saarland).

4. CONCLUSIONS

In our research project we focused on hybrid learning spaces at universities. But we also discovered many learning spaces that do not rely on digital media. They are hybrid as they enable a seamless blend of learning activities. Hybridity is not limited to physical-digital but can also mean a hybrid of formal-informal, individual-group etc. Our next iteration of the pattern language will include more patterns that are hybrid but do not necessarily require digital media.

As we present our work to the public and university administrations, we get many questions about size of the rooms (square meters), the demand for a specific type of spaces (i.e., how many spaces should have bleachers?) and estimated costs. In future work we try to integrate this information based on empirical data and normative standards. However, it is very difficult to get official numbers such as the required project rooms per 1000 students. But we can calculate such numbers based on curricula and the actual needs of students. We believe that such information can help to implement the patterns in more places.

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