A Pattern for Team Workplaces with Displays

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Abstract

This design pattern addresses the need for collaborative workspaces with displays, enhancing communication and collaboration among students working on projects.

Students gather on the campus to learn and work on projects together. While they often bring their own mobile devices for accessing documents and tools, larger displays are required for collaborative viewing, allowing all group members to see the content. Interactive displays further enable interaction with the content and the creation of digital sketches. These displays transform spaces into hybrid learning areas.

1 Introduction

Over the last three years we have run a research project called “Hybrid Learning Spaces”. Our goal was to find good practices on how to design hybrid learning spaces, so that they support hybrid scenarios. Hybrid scenarios resolve dichotomies, such as physical-digital, formal-informal, or online-offline (Kohls, Köppe, & Nørgård, 2018). 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).

In our research project, which was planned before COVID-19, we wanted to find reoccurring teaching and learning formats that were enabled through these new learning space concepts. The outcomes were mostly supposed to enable educators, lecturers and other university staff to improve the students learning experience through the design of better learning environments, even though a lot of the findings can also be applied to a lot of 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 the last three years more than 70 universities have been visited, 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 a an overview, see Kohls & Wil,

2022). The remaining candidates require further evidence, i.e. more known uses and theoretical justification.

We will first present the pattern TEAM WORKPLACES WITH DISPLAYS in detail, followed by an overview of related patterns that are referred to in the pattern description. While there is not enough space in a single paper to summarize all of our collected patterns, we hope to give an idea of the most related patterns. The TEAM WORKPLACES WITH DISPLAYS can be part of a LEARNING LANDSCAPE. Also, it can be put into a LEARNING BOX or LEARNING ALCOVE. It enables MOBILE VIDEOCONFERENCING and the use of ONLINE-WHITEBOARDS ON CAMPUS. It can be combined with FLEXIBLE FURNITURE. A good implementation also improves the quality by HIDING TECHNOLOGY and providing POWER SUPPLY.

After the sections with the detailed pattern description and the summaries of related patterns, we will provide examples how the patterns can be used in design workshops.

2 TEAM WORKPLACES WITH DISPLAYS

Context

In project-oriented teaching scenarios, students frequently work over an extended period on a specific question. Regular project meetings occur both online and on the university campus. During project collaboration, students often work in parallel, utilizing digital documents such as texts, data collections, photos, graphics, or code. For discussing partial results in person, students need accessible workstations on the campus to collaboratively review and develop their findings undisturbed.

Problem

When students present their work results on the small screen of their laptops, other project participants struggle to discern details and have limited options for pointing out and discussing individual elements. The discussion and collaboration potentials of physical presence are not fully utilized.

Forces

Synchronization of Work Results: Students want to keep each other updated on their work results during the project. This requires the quick and clear presentation of digital documents visible to all.

Discussion and Collaboration: In addition to presenting work results, there should be an opportunity to collaborate on them and discuss content together.

Common View of Documents: While students can open documents individually on their mobile devices and work on them individually, it's crucial to ensure a common view of documents within the group. For example, when working on a text file collectively, each student on their laptop might be focusing on a different section. Looking at a shared screen makes it easier to gesture or follow others viewing angle.

Ergonomics: To comfortably view a shared screen, students should be able to sit or stand without straining, and the content should be large enough for easy visual processing without the eyes being too close to the screen.

Gestures: Students communicate intensively with gestures and other forms of non-verbal communication during physical presence. The ability to share a common screen enhances the understanding of each other's focus.

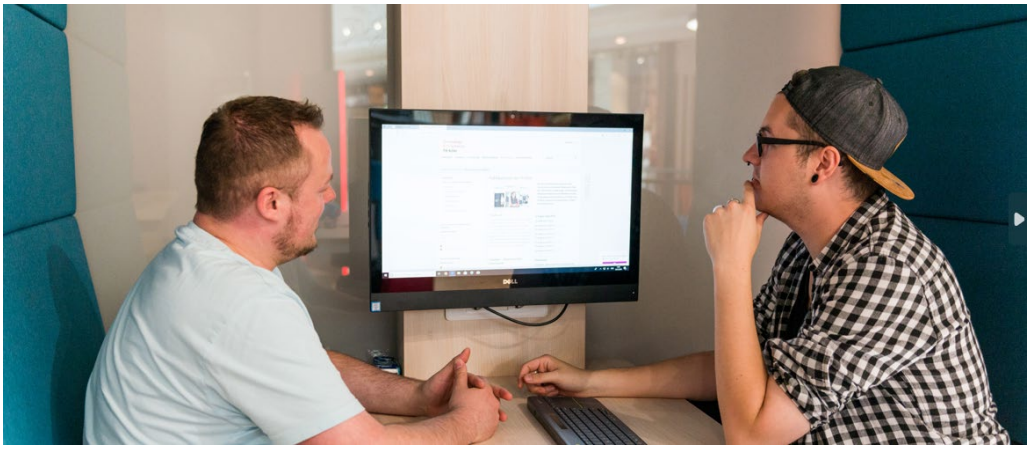
Physical Proximity: Depending on the team dynamics, it's essential to ensure that students don't need to be too close to each other to view content together. Leaning over someone else's screen can lead to unintended closeness.

Solution

Team workplaces can be equipped with a large display, allowing students to connect their laptops and share the screen. The display must be visible from all seats. To promote group discussion and collaboration, the workstation table is placed near the display, enabling students to continue looking at each other and share materials on a work surface.

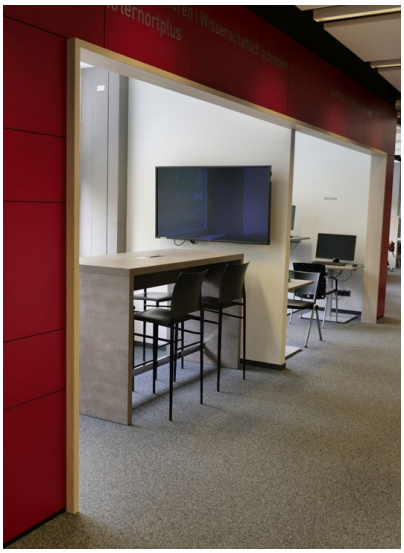
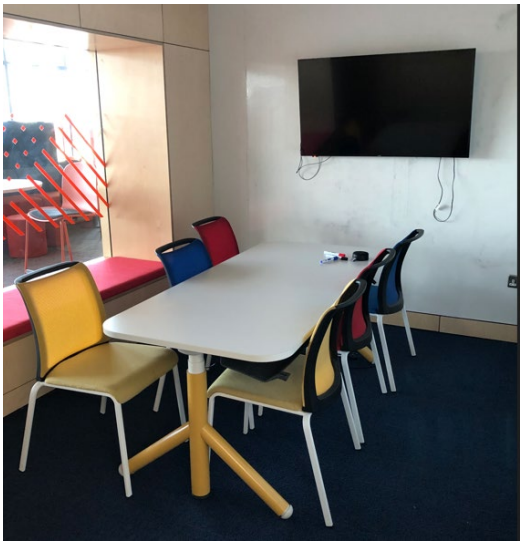
Details

For small groups of 2-3 participants, a small monitor, similar to those found on office desks, is suitable. In learning alcoves, such a screen can be wall-mounted and, in many cases, swiveling for adjustable viewing angles.



Small group with display

For groups of 4-6 participants, a larger display directly mounted at the end of the table is suitable. Students sit in a U-shape around the table, allowing everyone to see the display. For interactive displays, a small distance between the display and the group table is recommended.

Left: Elevated group workplace with display, TH Mittelhessen
Right Group workplace with display in a learning box, University of Glasgow.

Larger groups of 7-12 participants require a big display (55'' to 84'') mounted on the wall or available on a rolling stand. Adequate distance (approximately 1.5-2m) between the display and the work table ensures a comfortable viewing angle.


Left: Group workroom with table and display, HTW Saarland.
Right: Group workplace with a large display and easily accessible monitor cable, University of Strathclyde.

To connect their laptops or other mobile devices to the display, an HDMI cable or at least an easily accessible HDMI input should be provided. Many displays now offer standardized options for wireless connections through Wi-Fi. Older displays can be retrofitted with external devices for this purpose.

Pitfalls

Some laptops may require additional adapters for HDMI connection. HDMI cables must be securely fastened to prevent theft or accidental removal. Cable clutter can be distracting, especially when the display is not in use.

When you install the display, avoid placing frontal to all workplaces, turning it into a mere presentation tool. Instead, it should serve as a tool during collaborative work sessions. However, flexibility for presentations (e.g., project or thesis presentations) should be maintained for versatile room usage. If the display is too close to the table, it may restrict participants' movements.

Choose a display with user-friendly controls for input signal selection and screen settings, preferably without relying on a remote control, which can be easily lost.

Advantages

- Groups have a shared view of digital documents, facilitating collaborative work and discussions.
- Group workplaces with displays create a communal workspace for team members.
- Groups can work comfortably and ergonomically.
- Easy access to digital resources, such as online research, is enhanced.
- Remote participants can be easily integrated.
- The intensity of exchange in collaborative on-site work is strengthened.

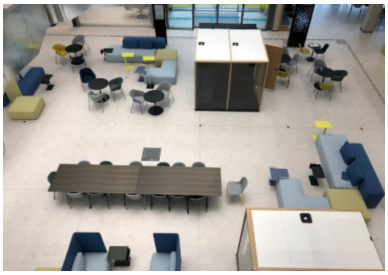
Disadvantages

- Observers may see what the group is working on, potentially limiting creative freedom.
- Connection issues with personal laptops can lead to frustration and delays, impacting the learning process.
- Displays take up space and may encourage specific, often presentation-oriented, work styles.

3 Overview of related patterns

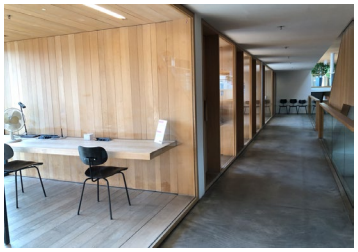
The pattern of this paper, TEAM WORKPLACES WITH (INTERACTIVE) DISPLAYS, relates to several other patterns of our collection.

LEARNING LANDSCAPE

A learning landscape is a large, connected area that combines various, overlapping spatial areas with each other. The entire area is openly accessible and can be used flexibly. The learning landscape provides zones for different noise levels, and the individual spatial areas also differ in their equipment and the amount of space available for groups and forms of activity.

LEARNING BOX

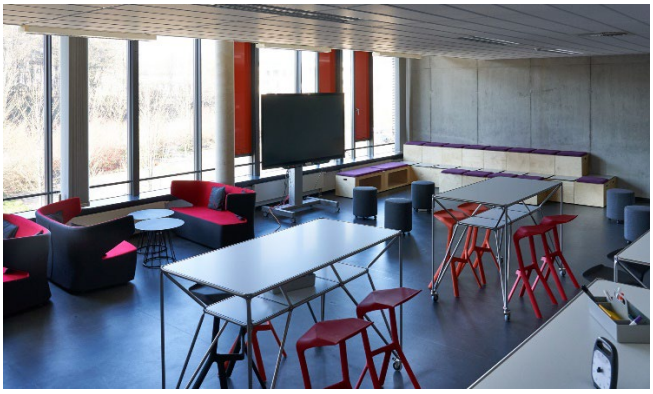

A learning box is a separate working area where small student groups can work undisturbed. It is equipped with electrical outlets for laptops and possibly with a (interactive) display, so that results can be presented and information can be researched together.

Learning Alcove



A learning alcove is an open but still protected workspace for 2-6 people, which can be used ad hoc by learning groups and project teams. The learning alcove is seamlessly integrated into the environment so that others can easily join, but it still offers privacy.

Flexible Furniture

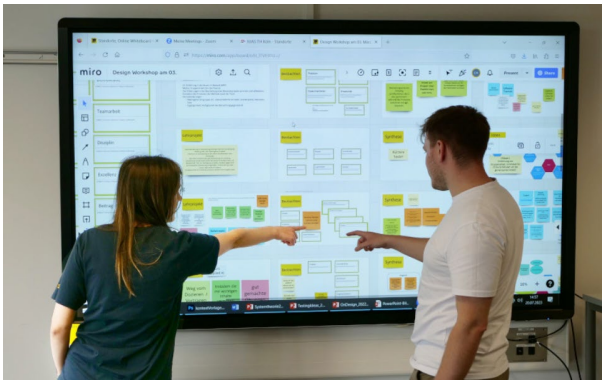



Flexible furniture enables the rapid reconfiguration of a room. This increases the functionality of the room (flexible educational rooms), enables more participation in the design of learning spaces (teaching-learning-experiment spaces) and seamless switching between different didactic settings.

Mobile video conferencing

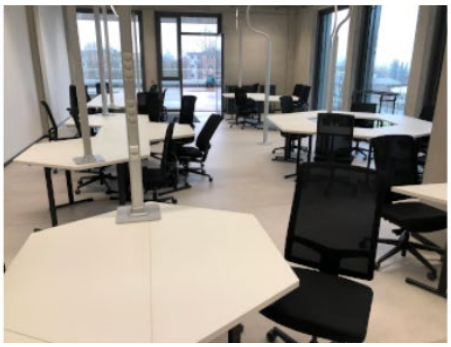
A portable video conferencing system allows for video conferences with up to 25 participants in the room without the need for a fixed installation system.

Online-Whiteboard on Campus



Online whiteboards can be used in face-to-face meetings to leverage the many editing advantages of digital tools. To do this, rooms must be equipped with large displays or projection screens so that the online whiteboard is clearly visible to all participants. Participants can access the same whiteboard on their mobile devices and directly contribute. Additionally, they can independently navigate the whiteboard and view the section they prefer or work simultaneously on different areas of the whiteboard.

Power Supply



Learning and working spaces all over the campus must be equipped with electrical outlets so that students can use their mobile devices over longer periods and thus access digital learning resources and participate in hybrid formats.

Hiding Technology

a) 

b) 

c) 

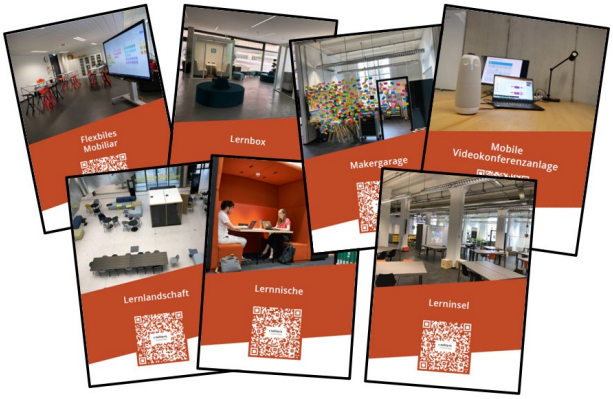
Make the complexity of technology disappear by hiding cables, choosing better devices, and, if possible, completely hiding or even removing the device. Anything that cannot be made invisible, should be integrated into the environment in such a way that it no longer has any negative effects (e.g., no distracting eye catcher or potential pitfall).

4 Using patterns and pattern cards in design worksshops

We have experimented with using the patterns in design workshops and planning processes for re-designing campus spaces. The patterns have helped both to communicate and collaborate with peers, as participants felt empowered to express their needs and ideas more precisely. Moreover, the detailed pattern descriptions were used to explain and justify investments for re-designing several learning spaces.

A card deck with brief overviews and pictures of the patterns can further improve the collaboration process in workshops. The selection and combination of cards makes it easier to express complex setups for learning spaces.

A subset of the patterns is available as a card deck:



Card deck (in German) download:
https://www.e-teaching.org/etresources/pdf/kartenset_2023_hybride-lernraeume-gestalten_doppelseitig.pdf

5 Conclusion

Of all the patterns we have mined in our research project, the TEAM WORKPLACES WITH DISPLAYS is a solution that is found at many universities. We found instances of this pattern at more than 20 universities.

As we have now written 99 patterns for hybrid spaces, we can now make the next step and evolve the collection to a language. So far, we have already provided references to related patterns. However, as all the patterns are available now, we can increase the cross referencing in the pattern descriptions.

References

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