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WHERE DO WE LEARN TO DESIGN? A CASE STUDY ABOUT CREATIVE SPACES

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Abstract: Based on a research approach with cultural probes, we analysed the work environments of a German design school. We identified five different types of spaces on the university's campus and within the classrooms—the "solitary space", the "team space", the "tinker space", the "presentation space", as well as "transition spaces". Each of these space types is able to provide certain functions that may support the creative working and learning process, such as stimulation, knowledge repository, culture, social interaction, and process manifestation. We analyse positive and negative aspects of the respective educational institution, and derive suggestions on how to improve the spatial learning environment. The work presented in this article may be used as a foundation for design educators and practitioners to analyse and improve their creative workspaces.

Keywords: *creative space, learning environment, cultural probes, creativity support*

1. Introduction

If you think of creativity support tools, you would usually come up with computer-based applications that e.g. facilitate brainstorming, or you would think of specific creativity techniques. However, the space around you can also have a big impact on your creative productivity. Rooms and furniture can facilitate team work or provide a sheltered space for solitary thinking. Textures, smells, and sounds can be a source of stimulation. Information can be stored on walls or whiteboards and retrieved by other students or teachers. And the space can demonstrate a specific culture by semantic indications—here you are allowed to play, and there you should be silent. Some spaces simply enforce a specific workflow, e.g. chairs that are mounted on the floor in a lecture hall do not allow teamwork. However, such capabilities of creative spaces are not well analysed, yet.

In this article, we provide an analysis of an educational work environment for design students within a German design school (Anhalt University of Applied Sciences in Dessau), based on a qualitative research with cultural probes (Gaver, Dunne, & Pacenti, 1999). We were able to identify different types of creative spaces, as well as different functions such a space may incorporate. This article is focussing on the evaluation of the case study. A detailed description of the research setting and the used cultural probes, as well as an analysis and evaluation of the used research method is described in (Thoring, Luippold, & Mueller, 2012). This article is structured as follows: Section 2 provides a brief overview of related work. Section 3 continues with a summary of the identified types and functions of creative spaces. Section 4—the main part of this article—covers the evaluation of the campus and classrooms of the analysed university, including the differentiation of positive and negative spaces, as

indicated by the participants of the study. We conclude by discussing our findings and providing an outlook to future work.

2. Related work

Even though technology and the Internet seem to diminish the importance of distance, space is still an important factor for collaborative creative work. However, there is limited scientific research on the effect of the work environment on creativity (Amabile, 1996). Jankowska and Atlay (2008) distinguished three types of learning spaces: S-space (Social Learning Space), F-space (Formal Space), and C-space (Creative Space). They found that C-spaces enhance creativity by visual and aesthetic features, writable walls, flexible layout, and special technologies. Haner (2005) looked at two cases of innovative office layout: the Interactive Creativity Landscape and the Learning Garden. They analysed both cases for their properties for supporting divergent and convergent thinking of teams and individuals. Kristensen (2004) analysed one case of an innovation space according to the support of different phases in the creative process. They found that the preparation and incubation phases require a combination of private and communal space. The incubation and insights phases require a more private space. By combining questionnaires, open interviews and field experiments, Magadley and Birdi (2009) analysed the impact of the physical space on creativity in innovation labs. Snead and Wycoff (1999) mentioned some ideas for creative spaces. A creative space should allow interaction and movement so that people and ideas can be grouped and moved. Therefore small tables for 4-5 people are preferable to large conference tables. Whiteboards, Post-it notes and coloured pens should encourage visual thinking. A creative space should be beautiful, encourage fun and create an atmosphere of abundance. Von Thienen et al. (2012) analysed the role of space in Design Thinking. They asked students of the HPI Design Thinking program about spaces that created a similar feeling like the HPI D-School spaces. Martens (2011) found in a literature review that most of the papers focus on the support of space for communication. The effect of space on other dimensions of creativity like culture or processes is ignored (Martens, 2011).

Only few prior literature focuses on creative spaces for design education. Most of the papers used interviews, direct observation, or surveys as a research method and focused only on a limited aspect of creativity, especially communication. None of the papers used cultural probes (Gaver, et al., 1999) to gather qualitative data about creative spaces. This leads us to our research question: What types of creative spaces could be identified in design education, based on the actual creative behaviour of students analysed with cultural probes?

3. Typology of creative spaces

In our study we tried to identify different types and functions of creative spaces in an educational setting. A cultural probes box with a single use camera, several floor plans and maps of the campus and the main buildings was handed to nine selected design students from different terms. The nine participants were supposed to indicate which spaces they find positive or negative and to take up to 27 photos of these spaces. Additionally they could provide some explanations for their choices, as well as their reasons for judging a space as good or bad, on a list. The source material was analysed by three researchers. The quotes were transcribed and written down on post-it notes and clustered according to their similarity. Data, codes and clusters were compared constantly with each other and merged, split, named and renamed if necessary. This procedure was repeated until no further categories were emerging, which would indicate a theoretical saturation (see (Thoring, et al., 2012) for a more detailed description of the used culture probes box and the research method).

We were able to identify five types of creative spaces, as well as five functions these spaces may have. We classified these types of spaces as the “solitary space” for personal withdrawal, the “team space” for group work, the “tinker space” to build stuff, the “presentation space” to present the work or to get input, and as “transition spaces”, such as hallways or student’s cafés, which were somehow involved in the creative process, without being intended for that purpose. All of these types of spaces can provide specific functions to support the creative workflow. E.g. they can allow social interaction with other students or teachers; they can serve as a knowledge repository by capturing and displaying information; they can represent a specific culture how one should behave in that space; they can

provide a source of stimulation; and finally they can determine a particular working process by supporting a workflow or providing different spaces for different kinds of work.

The types and functions seemed to be orthogonal to each other, which means, one space could incorporate several functions, and one function could be allocated in several types of spaces. Table 1 shows an overview of the alignment of types and functions, as indicated by our findings. Of course, in theory each space could provide each function, but in reality, particular functions were more common for specific types of spaces. The plus signs indicate the degree of coverage of functions for a specific type of space.

Table 1: Typology of creative spaces

Function: / Type:	Solitary Space	Team Space	Tinker Space	Presentation Space	Transition Space
Knowledge Repository	+	+ +		+ +	+
Social Dimension		+ +	+	+	++
Culture Indicator	+ +	+ +	+ +	+ +	+
Stimulation		+ +	+ +	+ +	
Process Manifestation		+	+ +	+ +	+

no coverage [ ] partial coverage [+] full coverage [++]

4. Case study

The following section provides a description of each type of space, along with exemplary photographs, provided by the participants as part of the cultural probes. Figure 1 shows a map of the university's campus with identified spaces that are positive or negative for creativity, aggregated from all 9 participants. Each dot represents a photo taken by the students.

Figure 1. The university's campus with identified positive and negative creative spaces (aggregated from all nine participants).

The map shows that there are spaces identified as positive by most of the students (such as the library, the Master program's building, or the greenfield in front of the main building), indicated by the green (light) dots. Other spaces got predominantly negative ratings indicated by red (dark) stickers, such as the Mensa or the photo studio. Based on the additional information provided by the participants on the

photo lists, and the yellow icon stickers we were able to understand why some spaces were rated as positive or negative for creative work. These results will be discussed in the following section.

Similar to the campus map, we were able to analyse the main buildings of the study program based on floor plans on which the students indicated their positive and negative creative spaces. Figure 2 shows two exemplary maps of the first and second floor of the main study building. Also here, we could evaluate the reasons for the judgments based on the yellow icons and the additional explanations provided on the photo lists. Interesting here is the fact that classrooms that looked very similar at first sight, got quite different ratings. We discuss these findings in further detail in the upcoming section.

Figure 2. Two exemplary floor plans with identified positive and negative creative spaces (aggregated from all 9 participants).

In the following we present selected photographs of some of the university's spaces, provided by the students within the cultural probes. Each student was able to shoot 27 pictures of relevant spaces for them, limited by the capacity of the single use cameras. According to the above-mentioned typology, we assigned these spaces to the "solitary spaces", the "team spaces", the "tinker spaces", the "presentation spaces", and the "transition spaces". Additionally, we provide explanations for the positive and negative ratings of the respective spaces, based on the information the participants provided within the cultural probes, as well as based on follow-up interviews.

4.1. Solitary Spaces

Just like a monastery, the "solitary space" allows thinking and meditation and is characterized by a silent atmosphere. People use these spaces for personal withdrawal. Examples for such spaces, extracted from the students' answers, included the university's library and the personal work desk at the student's home (see Figure 3).

Figure 3. Solitary Spaces: a) university's library (left), b) work desk at home (right)

Library (Figure 3a). Aspects that the students indicated as positive in terms of the creative space included the silent atmosphere (reduced stimulation), access to inspiring books (stimulation), the possibility to work alone while being in company (social dimension), and that everybody works silently (culture). Negative aspects were not mentioned by the students.

Work desk at Home (Figure 3b). Students enjoyed the personal freedom to do whatever they wanted at their homes (culture). For some of them who were living in a shared flat, the exchange with their roommates was mentioned as a positive aspect (social dimension). It was either possible to find one's individual stimulation such as music, or to relax in a silent atmosphere (reduced stimulation). On the negative side was the problem that one could not do specific kinds of work at home, e.g. spray painting (process manifestation), and that one might sometimes be distracted by other kinds of everyday household work (process manifestation).

4.2. Team Spaces

This is a creative space that invites people to work together as a team, and to exchange ideas and communicate with each other. It is characterized by noise, playfulness and team interactions. In an ideal team space, students can leave their interim work and the layout of the room allows group work and discussions. Except for some of the classrooms, there were not many dedicated team spaces on the analysed campus. Figure 4 shows three different classrooms within the same building, which look quite similar at the first sight, but got rather different ratings by the students. Other than the classrooms there were no spaces indicated for teamwork by the students, which can be considered a drawback of the university's creative space setting.

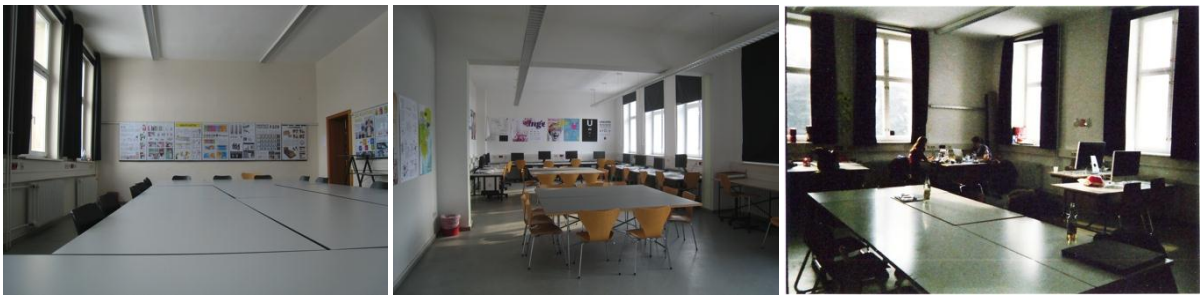

Figure 4. Team Spaces: different classrooms (a, b, and c, from left to right)

Classroom 302 (Figure 4a). Positive in terms of supporting creativity was the display of former students work on the walls, such as posters (knowledge repository, source of stimulation). However, this room was rated predominantly negative, because of the layout of the tables and chairs, which were indicated as too large and too many for the room size, which prevents group work and discussions (process manifestation, social dimension).

Classroom 205 (Figure 4b). Although the second classroom looks quite similar to the first one, this one was predominantly rated as a positive creative space by most of the students. The main difference was the layout of tables and chairs. Several smaller groups of tables allowed for a better team work in this room (social dimension, process manifestation). Posters of former students displayed on the walls were rated as positive as well (knowledge repository, source of stimulation). The only drawback of this room was its accessibility. Students indicated that the door of this room was often locked, leaving them with no possibility to enter (process manifestation).

Classroom 104 (Figure 4c). Positive about the third classroom was the possibility for students to work on their own and leave interim work materials (process manifestation). The tables could be moved and arranged in groups of different sizes (process manifestation). There was nothing negative about this room, except that it was only accessible to the Master students (culture, process manifestation), and that there were no more rooms with these characteristics available.

4.3. Presentation Spaces

This is a term for a creative space where people passively consume input (such as lectures) or actively give input themselves (such as presentations). Usually such lecture rooms do not allow (active) teamwork, due to their chair and table layout, but provide the possibility to give and get feedback. Also, this type of space includes passive display of work results in an exhibitionary manner, e.g. models in showcases, or posters on walls. Figure 5 shows some examples of presentation spaces.

Figure 5. Presentation Spaces: a) lecture room (left), b) auditorium (middle), c) showcases (right)

Lecture Room (Figure 5a). Negative about this lecture room was that the arrangement of the tables allows only lecture-style teaching but no team work (process manifestation). Also, this room did not show any work examples of other students (lack of knowledge repository, process manifestation). As a positive aspect the students mentioned the lectern, which they found inspiring (process manifestation, culture).

Auditorium (Figure 5b). Positive about this room was the separation of the lecture space and storage space through an interim wall, which can also be used as a projection surface (process manifestation). The students mentioned as a negative aspect that the windows were too high to look outside. On the other hand this guarantees to focus on the presentations—people are not distracted by outside activities (process manifestation, culture).

Showcases (Figure 5c). To see the work results of other students was indicated as very positive by most of the participants (stimulation, knowledge repository). However, the location of the showcases in the hallways with no possibility to sit down and study the work was mentioned as negative (process manifestation).

4.4. Tinker Spaces

This is a term for a creative space that allows people to experiment and try things out, and also to build stuff. Examples include the university's workshop, print shops, photo studio, and partly also the students' homes or some of the classrooms.

Figure 6. Tinker Spaces: a) metal workshop (left), b) wood workshop (middle), c) print studio (right)

Metal Workshop (Figure 6a). As positive aspects students mentioned that every tool and machine had its place (process manifestation), and the possibility to experiment, to try things out, and to

produce noise and dirt (culture). Also, the help and advice by the workshop tutors was appreciated (social dimension). On the negative side there was a lot of noise by the machine work (stimulation).

Wood Workshop (Figure 6b). The students liked the smell of the woodwork (stimulation), as well as the possibility to experiment (culture). Similar to the metal workshop, they appreciated the arrangement of workstations and machines (process manifestation). Also here, the noise was mentioned as negative (stimulation).

Print Studio (Figure 6c). Similar to the other workshops the students indicated the helping hands from tutors as positive (social dimension), as well as the good facilities (process manifestation). As negative they indicated that the workspaces were too small and that they allowed only to work while standing (process manifestation).

4.5. Transition Spaces

There were some spaces that were not intended for working (such as restrooms, parking lots, or hallways), but seemed to be of some importance for the students and which were somehow involved in their work process. Students e.g. mentioned that they would find the time for personal withdrawal at the parking lot outside the university building or at the restrooms. In hallways they liked the displayed work examples, and they used the Mensa and students' café for exchanging information with classmates. However, we did not classify the restrooms as a solitary space, the hallway as a presentation space, or the Mensa as a team space. The reason for this decision is, that these spaces were obviously not intended for the respective types of workspaces. On the contrary, the fact that students mentioned these for the respective functions may be an indication for a lack of such spaces within the dedicated work spaces of the university. (See Figure 7 for examples).

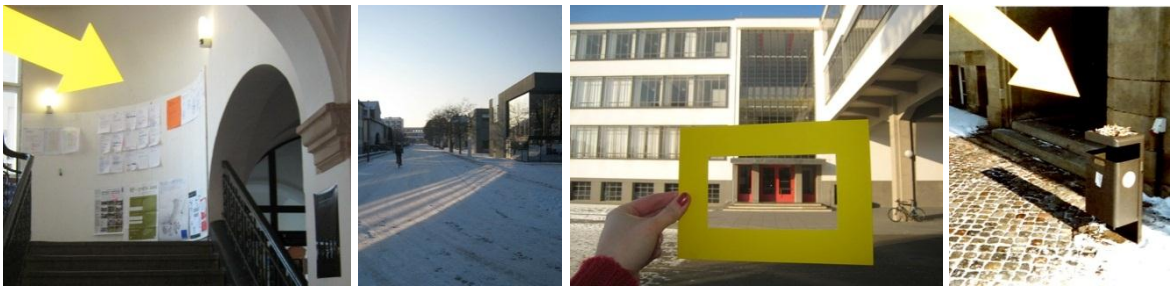

Figure 7. Transition Spaces (from left to right): a) hallways, b) pathways between buildings, c) stairs, d) smoking spot at entrance

Hallways (Figure 7a). The possibility to incidentally run into each other was one of the positive characteristics of the hallways (social dimension). Message boards on the walls provided useful information (knowledge repository). Work examples of other students in showcases were mentioned as a source of inspiration (stimulation). On the other hand the lack of spaces to sit down was mentioned as negative (culture, process manifestation).

Pathways Between Buildings (Figure 7b). The students liked to walk from one building to another, because it offers them the possibility to clear the mind (reduced stimulation), and also to incidentally run into each other (social dimension). On the other hand, the long distances between different buildings, such as between workshops and lecture rooms, were mentioned as negative for the workflow (process manifestation).

Stairs in Front of a Building and Smoking Spot at Entrance (Figures 7c and 7d). Entrances were mentioned as positive meeting points (social dimension). However, these spaces were also predominantly used for smoking which is also a possibility to exchange information (social dimension), but for non-smokers this space is not a pleasant one (negative stimulation).

5. Conclusion

This article presents a case study of the creative workspaces in a design educational institution. Based on a research approach with cultural probes we collected qualitative data about positive and negative characteristics of creative spaces within the university's campus and classrooms. We present selected photographs of some workspaces, provided by the students, while they were reflecting on the suitability of the spaces for their creative design process. Subsequently we classified the provided examples according to a typology of creative spaces. We were able to extract some interesting insights from the cultural probes study: Overall, all five types of creative spaces were able to contribute to a creative workflow. Initially, there is no prioritization or judgement of the different space types by the students. The question whether a creative space was identified as positive or negative seems to be defined by its functions, instead. Another surprising insight was the fact that even transition spaces like hallways or parking lots were actively involved into the creative working process of the students, although not intended for that purpose. On the other hand, the students expressed their wish for sofas or comfortable chairs in niches, to be used for casual chats or focused teamwork. Also, they mentioned the lack of spaces with the possibility to leave interim pieces of work and to store materials and tools. This might be interpreted as a symptom for the lack of dedicated team spaces. Such team spaces could only be found in the classrooms—most of them with some serious drawbacks, though, in terms of their capability to facilitate team discussions, or to store interim work materials. The lack of permanent workspaces with the possibility to store interim process steps of a project forces the students to work at home. Furthermore, the university's transition spaces seem to replace the (missing) solitary spaces. Students find the space for personal withdrawal primarily at their homes—at the university transition spaces, such as parking lots and toilets, facilitate this need. Interesting was also that tinker spaces could only be found in the workshop facilities. Experimenting and building stuff was not encouraged in the other space types, such as the team spaces. The results of our study demonstrate the importance of space for the creative workflow, especially in educational settings. It is not enough to provide rooms and facilities—a specific "culture of space" may have a positive (or negative) influence on the work results and therefore on the overall quality of the design education.

The analysed university is one of average to higher standard with modern facilities, but nothing out-of-the-box, though. The design school was integrated into existing architecture, and furniture seemed to be chosen predominantly for pragmatic reasons. The salient lack of dedicated team spaces and solitary spaces was somehow astonishing. The question, whether this situation is typical among design schools in general, warrants further research. We are planning to compare our findings with the spatial situation in other educational institutions and in corporate settings, in the next step. Additionally, we want to analyse whether specific types of spaces play a more important role in different phases of a design project. And finally, we would like to design a hypothetical "perfect" creative space—what do we have to consider if we can design a creative workspace from scratch?

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