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Impact of the Physical Environment on Knowledge Worker Performance

by: Sally Augustin, Ph.D. and Jay L. Brand, Ph.D.

This paper provides a case study of the design and development of two custom team rooms for Young & Rubicam in Irvine, California. The value impact of these intentionally collaborative environments for the client — although not easily captured by the set of metrics used — dramatically influenced successful communication with clients, overall branding strategy, and new employee orientation as well as more general recruitment and retention strategies.

It is striking that organizations have undergone various transformations without these changes being linked to considerations of the built environment. For instance, even though the emphasis on teamwork in organizations is increasing, and an environment built to encourage teamwork will look different from one built to enhance individual status or to facilitate private meetings, we have yet to understand fully what it means to have a team-oriented physical setting. (Pfeffer, 1998, p. 764)

Pfeffer's (1998) comments in *The Handbook of Social Psychology* were a prescient summary of the status of research on team-oriented physical settings. To better understand team environments, data from the fields of cognitive, social, and environmental psychology were integrated by Haworth, Inc. and two team rooms were developed at a major advertising agency. The team spaces were produced and installed by a group of industrial designers led by Iain Thorp and Ronna Alexander of Haworth, who have considerable experience creating innovative workplace environments. Ralph Reddig, also of Haworth, finalized the design of the team spaces. Arnold Wasserman, at the time Senior Fellow for Design at the Idea Factory in San Francisco, was project leader and lead designer in initial client interactions, project overview, and project specifications, spearheading pre-planning, planning, and schematic design. Arnold also contributed initial user observations and created the work practice model that guided the definition of functional requirements and specifications for the team spaces. The participants in this study were brand teams composed of knowledge workers. Knowledge workers were defined as individuals engaged in creative problem solving and management tasks after relevant professional training. Each brand team involved was multidisciplinary and each individual team member identified more with their brand team

than with the other practitioners of their discipline working on other brands at the agency.

The team rooms were developed to facilitate desired changes in organizational culture that mirrored recently introduced changes in organizational structure and to achieve several related behavioral objectives. It is generally accepted that the form of the physical environment can support an organization's culture. This point was suggested by Sundstrom and Sundstrom (1986), among others. Sundstrom and Sundstrom state that "In effect, the workplace is a medium for the expression of the 'personality' of the organization" (1986, p. 358). The association of a team room with higher levels of teamwork follows logically from the literature on the relationship between the physical environment, cohesion, and productivity reported by researchers such as Sundstrom and Sundstrom (1986) and extends this research to a knowledge worker environment. During the year immediately prior to the introduction of the new team rooms, the organizational structure of the advertising agency had been modified to create the teams that participated in this study and many employees were relocated from Detroit to Los Angeles. The team rooms were built in the Los Angeles area. The primary reason for these changes was the development of a more collegial yet entrepreneurial orientation among employees.

Team rooms were initially planned in this setting not only because of their apparent consistency with a desired organizational culture of entrepreneurial collegiality, but also because of the associations between team rooms and desired work practices that could ultimately impact productivity. As Wineman and Serrato state (1998, p. 282): "Working groups of any type should have easily accessible space available for the group to meet face-to-face...such spaces encourage collaboration across boundaries within the organization. Available, easily reserved, and well-equipped meeting spaces facilitate impromptu meetings." Dedicated team rooms also encourage individuals to form cohesive groups because the boundaries of these dedicated spaces clearly illustrate who is a group member and who is not (Wineman and Serrato, 1998). A positive relationship has been found between performance and cohesion, although performance seems to have a stronger effect on cohesion than vice versa (Levine and Moreland, 1998). Behavioral objectives for the team spaces included the use of cognitive artifacts by team members to spur idea generation and development, effective discussion among meeting participants, and the use of displayed thinking to support team

coordination and synergy.

The concepts of stress, territoriality, and control were instrumental in the design of the team rooms. Territories have beneficial implications for regulating social systems and presenting identity (Brown, 1987). Each team assigned to a particular team room had control of that space. A team could use its room whenever desired, in whatever ways they desired. They could use curtains to visually isolate each room from non-team members but could not restrict the flow of noise into, or out of, the team area. Users could not only control their social interactions by minimizing the number of undesired interruptions they experienced, but could also use a wide assortment of tools available in the environment to configure it to their needs. Individuals using the team rooms were able to control the amount of sunlight entering the team areas. Control over these environmental factors was anticipated to reduce stress among users of the space and thereby increase positive affect (Evans and Cohen, 1987). Positive moods have been linked by Isen (1990) and others to improved decision making, better memory function, greater job satisfaction, increased organizational commitment, and creative problem solving. These positive moods are theorized to improve mental processing because, when people are in positive moods, little of their cognitive power is dedicated to dealing with difficult or potentially dangerous situations and more of their processing power is available to creatively resolve the issues at hand, etc. Providing users with the tools to maximize the amount of sunlight in the team rooms also was prompted by Cunningham's work (1979) directly linking sunlight to good moods. On an individual level, having a dedicated workplace territory has been positively linked to organizational commitment (Sundstrom and Sundstrom, 1986).

The establishment of group-controlled territories for each team was expected to generate the positive ramifications of a shared social identity including streamlined interactions between teams and increased cohesion among team members (Fischer, 1998). Sundstrom

and Sundstrom proposed the positive relationship between status and group cohesion in 1986. At the advertising agency, where not all pairs of management and creative groups could have team rooms, the presence of dedicated team rooms was felt to indicate — to themselves and to the rest of the organization — the higher status of teams with these dedicated spaces.

Meeting room design has long been acknowledged to have a significant effect on the conduct of meetings by influencing the development of group cohesion and promoting a collaborative, idea-sharing work environment. Wineman and Serrato formally outlined this position in their 1998 review of the literature relating workplace design and high performance teams: "The success of group meetings is affected by the size, furnishings, and environmental conditions of the meeting space. The furniture arrangement within a meeting space also affects the nature of interaction and participation among group members, which in turn determines the social influence of certain members of the group and ultimately how decisions are made (p.283)." Sommer's work has illustrated that sociopetal arrangements of chairs (facing each other, as in a circle, promoting eye contact) positioned at culturally appropriate interaction distances, promote free conversation (Sommer and Ross, 1958; Mehrabian and Diamond, 1971). Sociopetal furniture arrangements in an organizational setting are endorsed by Sundstrom and Sundstrom (1986), who are particularly enthusiastic about the use of round arrangements, such as those in the team rooms developed. The University of Brighton has prepared guidelines for brainstorming, and specifications they identified that could be addressed through room design were incorporated into the team rooms (University of Brighton, 1998). To support brainstorming, the team rooms each maintained a relaxed atmosphere and accommodated five to seven people in a sociopetal seating configuration.

Previous, unpublished research conducted by Haworth, Inc., indicated

the general value of cognitive artifacts (for example, memory cues such as visuals created jointly by a group) as memory aids. Research by others confirms that cognitive artifacts support useful mental models of valuable thought processes (Norman, 1994). As Brand (1999) describes, most of the activities people engage in while in office environments involve cognitive processes, such as attention, perception, decision making, and interpersonal assessments. Providing tools like cognitive artifacts that support these activities facilitates workplace productivity. For example, research on cue-dependent learning or situated learning indicates that the recall context has a significant impact on what is remembered (Metzer, Boschee, Haugen, and Schnobrich, 1979; Godden and Baddeley, 1975). Users of the team rooms had access to several tools for the creation and use of cognitive artifacts.

The team rooms were designed so that the affordances of each piece of furniture and tool provided would be intuitively obvious to users, as proponents of cognitive ergonomics would suggest (Norman, 1988). For example, whiteboards in the team rooms moved in intuitively obvious ways and handles used to relocate movable chairs resembled the handles on push lawnmowers.

It was important that users could leave material in the team rooms between meetings and also on the extensive systems of whiteboards in each room. These presentations are known as "displayed thinking". Many experts in workplace design including Sims, Joroff, and Becker (1998) have endorsed these sorts of display opportunities. Displayed thinking is generally believed to help group members become familiar with the activities of their teammates while developing a shared knowledge base, as well as permitting serendipitous introductions to the work of other teams within the same organization. Lalli believes that "By displaying both individual and team ideas, a message is sent that concepts are acknowledged and under discussion" (1998, p. 24).

Team rooms were located near the team members' individual workstations. The distance between the team rooms and the workplaces of the most frequent users of these spaces was minimized to reduce the amount of cognition-supporting material that would be lost as teams transitioned from their individual workspaces to the group work area. Wineman and Serrato (1998) state that locating group work areas near the work stations of individual group members encourages problem solving effectiveness as well as user job satisfaction, participation, cohesion, ability to communicate, and willingness to continue to work together.

Method

Before the new team rooms described below were constructed, agency employees worked in a very difficult environment. Meeting rooms were in extremely short supply -- often meetings were scheduled for the break room or more isolated sections of hallway space. In this original environment, each of what would become the experimental teams had been assigned a 72 square foot walled space that could be used as a work area. Former tenants had used these spaces as individual offices and they were not remodeled when the agency began to rent this space. Individual workspaces were extremely small -- approximately 16 square feet. The atmosphere in both the group and individual areas could best be described as "tense." Because of these unpleasant working conditions, the administrators of the agency decided to relocate the firm as soon as possible. The team rooms described in this article were created in the relocated workplace environment.

Several fundamental objectives were established for the team rooms. The rooms were to be used to accommodate team members in a variety of tasks, from brainstorming sessions to planning media campaigns to group meetings to client presentations. They needed to be transformed easily from one use to another. The ability to leave works-in-progress and other similar items in the

team rooms between meetings was also a design objective. Administrators at the advertising agency also wanted the rooms to promote a desired more entrepreneurial culture, communicate the firm's organizational culture to employees, clients, and potential clients, and provide a center for team-related activities.

The team rooms were carefully designed. Each of the rooms had 625 square feet of useable space and was decorated using birch veneer, frosted glass and acrylic, charcoal and black fabrics, and tackable surfaces. Two sides of each room were full walls with windows, and two walls were formed with white curtains that could be used to visually isolate the team room. A 4 x 15 foot theater marquee above the entryway to each room communicated information of value to the user team. Three sides of each team room were covered with moveable systems of whiteboards and tackboards. Four sets of boards, each composed of two dry erase boards and one tackboard that could slide across each other, were used in each team room. Each of these whiteboards and tackboards was 3 x 10 feet. A long, curved tackboard could be raised and lowered in the focal corner of each team room. Behind this board was another tackboard equipped with flexible cloth shelves that could be used to present artifacts. Each room had an extensive system of shelves under each set of whiteboards and tackboards as well as wheeled tables of various sizes. The rooms combined the analog whiteboards and tackboards with an extensive system of LAN and power hook-ups located throughout the built structures in the rooms. Several sets of hook-ups could also be pulled down from each room's ceiling. Auxiliary trays on simple posts that could be attached to the shelving system or seating cubes provided position flexibility. Each room was equipped with a lounge chair and a couch as well as six adjustable-height stools and four cubes that could be used for seating, as well as storage areas, including horizontal or vertical shelves that could be positioned under a cushioned seat.

A round table with frosted glass was also included. A projection screen attached to the ceiling of each room could be moved throughout the room using a track laid on the ceiling. This screen could process a variety of inputs, from videos of test commercials to material on the agency's LAN. Each team room contained computer and A-V equipment appropriate for a work and presentation space at a major advertising agency. The construction of the team rooms was completed in December, 1999, although the agency relocated in October, 1999.

Two researchers gathered data on-site before and after the teams moved from one address in California to another and the team rooms were created. The objective of these efforts was to learn more about the users of the pre-existing and new spaces as well as how employees of the agency were responding professionally to the environments in which they were working after the move and renovation. Information was also gathered from a control group that was relocated to the same location as the test teams but was not assigned a team room. The control group was demographically and professionally equivalent to the test group. The initial visit to the test area was in June, 1999 and the second visit was in January and February, 2000.

The researchers made ethnographic observations during each visit, using an observation guide created in conjunction with this project. About 40 man hours of observations were completed before and after the team rooms were installed. These observations were used to determine how spaces were actually used and to add depth to descriptions of how users felt they utilized the spaces available to them for teamwork.

Surveys and interviews were also used to gather data. Confidential surveys collected information related to space utilization, work practices, individual and group performance, organizational climate, and organizational culture. Interviews collected information on

space utilization, work processes, and organizational culture and climate. The researchers were interested in interviewing and surveying each member of the groups with team rooms -- about 20 people in each set. Unfortunately, scheduling conflicts and similar issues prevented this goal from being achieved.

Four members of the control group were interviewed before the relocation and assignment of the team rooms and six members were interviewed after these changes. Nineteen interviews were conducted with test subjects before any environmental changes were made and 16 individuals were interviewed after changes were implemented. Written surveys were distributed to 11 members of the control group and 29 test subjects before environmental changes were made -- five were returned by members of the control group and 10 by members of the test group. After environmental changes were made, 15 surveys were distributed to the test group (five returned) and 38 members of the test group (12 returned).

The observation guide, interview guide, and survey were developed for this study. All material included was original. Some questions on the survey asked participants to rate their own impressions of their current productivity in comparison to their previous performance. The value of these types of questions was confirmed by Kruger and Dunning's recent work (1999). Their findings indicated that individuals can objectively determine their own personal abilities to perform cognitive tasks. They have difficulty, however, accurately comparing their performance to the accomplishments of others and determining their relative skill levels..

Results and Discussion

Several general results derived from the content analysis of the interview and observation data were unequivocal:

The team rooms met the performance objectives established for them.

One of the most positive features of the

rooms was that they had been created. They made user teams feel special, which resulted in the positive effects hypothesized.

- The introduction of the team rooms was concurrent with changes in the organization's culture that were consistent with the design of the team rooms.
- The most popular aspects of the team rooms were the whiteboards, tackboards, and the portability of the furniture.
- Users felt the display areas available made it easier to analyze data for trends, patterns, and comparisons.
- Meetings in the team rooms seemed more focused on the work-related tasks at hand than similar meetings observed before the move.
- The rate of participation in meetings seemed higher in the team rooms than in the conference rooms previously utilized.
- Users felt it easy to shift conversations from one topic to another in the team rooms.
- The design of the rooms promoted eye contact among meeting participants.
- Users found materials left in the team rooms to be useful memory cues and task-related tools.
- Each team used their team room in a slightly different way. One group used their area as a sort of living library or place where plans for the brand were generated and related information was stored. The other group tended to use their room as a workroom for the completion of their next important project. This difference mirrors differences in the culture and climate in these two groups — one group appeared to be more oriented toward planning tasks than the other.
- The existence of the team rooms in the new facility meant that individuals could schedule meetings in

rooms that were conducive to the objectives they had for a meeting. For example, formal meetings could be scheduled in more formal conference rooms.

- Participant reports indicated that role ambiguity decreased over the course of the study, even though a number of new employees joined the agency during this period.

One of the most positive features of the team rooms was that they existed. They provided employees with an opportunity to work in a certain type of environment and they also communicated messages to employees, potential employees, clients, and visitors. One of these messages was that group and brand are important. The team rooms supported other social aspects of the organization such as streamlined problem-solving sessions.

A new employee orientation session was observed. The factors discussed with the new employees could be seen as those that were most salient to existing members of the organization. The organizational culture was described at this new employee orientation using phrases such as "You have a voice," "integrative," "interactive," and "team emphasis." The slogan "Best alone -- Better together" seems to indicate how the firm viewed its employees. At the orientation meeting, the team rooms were described for new employees. The team rooms were described as:

- For everyone, and to be explored by all
- Theater of the brand
- Where the brand lives and breathes
- Total immersion in the brand
- Examples of the agency's collaborative approach

Thus, the team rooms meshed with an organizational culture that was conceptualized as fast-paced and innovative. The general atmosphere at

the agency was fast-paced and avant garde, thus the team rooms also seemed to be consistent with the general climate at the advertising agency.

Social interaction was facilitated by the new team rooms. The team rooms were seen by their users as promoting collaboration, facilitating the integration of information from many different teams and individuals, producing beneficial synergies, and being natural and organized. The team rooms were described as dynamic, stimulating, and flexible environments. They were seen as supporting activities not possible in a traditional conference room and increasing a team's control over its performance. Observations indicated that meetings in the team rooms seemed more focused on the work-related tasks at hand than similar meetings observed before the team rooms were created or meetings of the control group after the new physical environments were in place. Redundant work was mentioned as a problem in the old environment but not in the new environment. The rate of participation in meetings also seemed higher in the team rooms than in meeting rooms used before the team rooms were created. These changes may be due to the fact that the team rooms were a different behavior setting, without the baggage of traditional conference rooms. These effects might also have been generated by the fact that users were very excited to have access to the team rooms and all of the tools provided in these spaces and were, therefore, more involved in their work. Several of those interviewed indicated that their most successful collaborative experiences had been in the team rooms, which is very interesting considering that the team rooms had only been available for a couple of months when users were interviewed. It is unclear if meetings in the team rooms were longer, shorter, or the same length as meetings held in either previous or more traditional conference rooms. Both before and after the move, planned and unplanned meetings of widely varying lengths were observed.

Responses to open-ended survey

questions illustrate the effect of the team rooms on collaborative behavior. The team rooms:

- "Provide useful, integrating desirable space for collaboration."
- "Create an atmosphere of free-flowing ideas."
- "More interesting, interactive, informal meeting space designed to get people to think about things in a new way."
- "Encourage group discussions and an open, approachable environment."
- "Facilitate more interactive discussions."
- "A destination for everyone working on our major initiative -- it serves as a creative outlet by having stimulating and comfortable seating. It brings different departments together more easily for the sharing of ideas."
- "More relaxed, comfortable atmosphere removes barriers and opens idea sharing."
- "Good for brand immersion and create a less sterile environment for creative thinking."
- "Provide a home base for anyone interested in learning what's going on and an opportunity to display and share information relevant to areas of expertise."

The consensus among interviewees was that the work being done in the team rooms was of a higher quality than similar work done in other environments, and that projects may have been proceeding more quickly than they would in other physical environments. The primary causes for this improved quality were felt to be the more casual atmosphere in the team rooms as well as the ability of the area to retain and present information that was useful to team members.

Only one client meeting was observed. The client was very impressed with the attention that the advertising agency

gave to their brand, as evidenced by the existence of the team room and all the materials in it that indicated concern about the present and future states of the client's brand. The advertising agency felt that the team rooms indicated to nonemployees that the agency was very innovative and illustrated for clients how the brand teams worked and thought.

The tools for displayed thinking in each team room seemed useful. The display of team thinking in the team rooms seemed to make creators feel proud of their work.

The opinion was expressed that the multi-dimensional rooms taught about the brand, etc., through osmosis and reduced the amount of information that must be included in more formal types of presentations. The display areas available were felt to make it easier to analyze data and to identify trends and patterns in the data. In response to an open-ended survey question, one participant indicated that the team rooms "Are a living, breathing means for communication among the various groups in the office, with other offices, and with clients. These rooms have forged a stronger communication process in this office and enabled us to approach projects and meetings in a more creative way."

Materials left in the team rooms were used to explicitly or implicitly communicate important information to other team members and to people passing by. People who wrote things on the boards and who left materials pinned to the tackboards knew this material would be read by others and welcomed this mechanism to broadcast their ideas. All thoughts written down during the course of a meeting were not left in the team rooms by their creators -- only the items that would be useful to their creators or others at a later date were retained. Each group determined for itself how it would preserve information in its team room and subsequent uses of the room may have precluded all recorded information from being left for future display. For

example, one team prepared for a client visit by modifying certain material on the whiteboards in its team room and by making changes in the décor. They did not want to “freak out” client visitors. Subsequent users of the rooms often gestured toward artifacts left by previous users in a shorthand that called a complex series of details instantly to the minds of the participants. This illustrates that effective cognitive artifacts had been created. Subsequent users of the team rooms also appeared to feel free to place additional relevant notes on whiteboards, etc., created by others.

The information stored in the team rooms was frequently accessed. Impromptu meetings that started outside of the team rooms were sometimes moved into the team rooms so that information in them could be referenced. Individuals were observed on numerous occasions visiting the team room used as a brand library to retrieve information written on the walls -- they were a quick reference guide for many team members.

The sociopetal seating plans developed did appear to encourage conversation. Exchanges in the team rooms appeared to be more complete, free, and open than they were in meetings observed before the team rooms were created. In response to an open-ended survey question one respondent stated that the team rooms “facilitate more communication, freer flow of communication.” It was also easy to shift conversations from one topic to another in the team rooms. In both the team rooms and their predecessor meeting rooms, individuals could be seated during meetings in ways that facilitated eye contact, as long as the groups using the areas were small enough so that individuals could seat themselves so that they could see each other’s faces. Thus, the communication dynamics related to eye contact among meeting participants could have been basically the same in the team rooms and in the previous rooms used. Since a great deal of the discussion that took place in the team rooms seemed to be related to information that was placed somewhere on one of the walls, referencing these

“wall-written” materials kept participants’ heads up, where they could continue to make eye contact with each other. The dynamic was significantly altered and interaction was clearly reduced when individuals worked through a handout that required they keep their eyes focused on a piece of paper placed on a tabletop, as they did in meetings held when the team rooms were unavailable. The fact that materials were displayed on all of the walls of the team rooms kept participants shifting in their chairs, which encouraged individuals to remain active, in eye-contact, and engaged in conversation.

Activity in the team rooms was focused around the circular round table that was placed approximately in the middle of each room. When individuals came into the room, they arranged their chairs around this table and would generally pivot their chairs (if they were not on the lounge chair or couch) from this table in order to see information being recorded on the whiteboards, tackboards, etc. Participants seated on the lounge chair or on the couch, however, would generally pivot themselves and not their seats to view additional sections of the room.

The introduction of the team rooms in a facility that also had more formal conference rooms enabled users to choose to work and meet in areas that were appropriate for their needs. In the new environment, there were formal meeting rooms available for certain types of meetings and the team rooms were available for less structured and impromptu meetings. Thus, the introduction of the team rooms had little, if any, impact on formal meetings held in traditional conference rooms but had an impact on impromptu and more casual sorts of interactions.

Impromptu meetings in the team rooms took many different forms, just like planned meetings. For example, during some impromptu meetings individuals wrote on the whiteboards and during some they did not. During more relaxed periods in the office, such as Friday afternoon, individuals appeared

to congregate in the team rooms and interacted informally in a way that certainly built team camaraderie and cohesion but did not necessarily result in a particular work-related issue being discussed or resolved. A large percentage of the impromptu meetings observed consisted of only work-related discussion.

The flexibility of the furniture in the team rooms was prized. When giant worksurfaces were needed, the furniture could be rolled out of the way and people worked on the floor. Users reported working on the floor.

At the agency, areas in which teams could gather were highly valued. Even groups without one of the team rooms that were the focus of this study created ad hoc team rooms for their groups. Items were left on display in these places and impromptu meetings were conducted there, as well. These rooms lacked the systems of whiteboards and other amenities present in the team rooms.

There was a significant problem with noise inside and outside the team rooms, which is not surprising because these rooms did not have walls to the ceilings, doors, or any sort of soundproofing on two of their four walls. In addition, the team rooms contained an assortment of potentially very loud A-V equipment. There was no white noise used in the building. In addition, speakerphones were often used in the open office areas. Workers’ cubes were very close (within inches) of the team rooms. On one occasion, during a very important meeting with a client, a high-ranking executive had to leave a team room (where the curtains were drawn) and signal the people outside the team room to quiet down. On another occasion, an individual was observed asking a group watching a video in one of the team rooms to turn down the volume -- the individual observed asking for the volume to be reduced was seated several rows of cubes from the team room. One individual suggested that the rooms be equipped with “on air” signs that could be illuminated during crucial meetings to quiet individuals outside the team

room. The agency planned to move the cubes located closest to the team rooms to transfer the noise generated by the people in these cubes to an area farther away, and also widen walkways around the team rooms so individuals walking by them would not brush against the curtains. The noise problems associated with the team room would be significantly reduced if white noise were used in open office areas.

Information preservation was a potential problem in the team rooms. One individual was observed stating in the course of a general conversation, "What would I save in case of a fire? The whiteboards?" This indicates the extent to which one team has become dependent on information on their whiteboards. There does not seem to be any protocol in place for the information on the boards to be "saved" periodically. The remark quoted, plus the loss of the whiteboard text during the Christmas holidays (the boards were completely erased, in error, by a cleaning crew), indicates the importance of some sort of system to archive information in the team rooms.

User training was necessary for full utilization of areas like the team rooms. During the observation period, people were seen inquiring if certain pieces of furniture were tables and on other occasions they were seen making similar comments about seats. The tools provided in the team rooms, with the possible exception of some of the A-V equipment installed, were not difficult to operate — once they are noticed and understood. For example, some employees were unaware that the auxiliary trays could be relocated and that the layout tables were nested with the media carts and worktables.

Appropriate assortments of task and casual seating must be provided in future team rooms. The assortment of furniture in the team rooms had too many task chairs and not enough casual seating, so brainstorming and other similar interactions for which comfort is important were impeded.

Analysis of the data from the written surveys produced no significant results of interest. The small sample size and relatively low survey response rate significantly impeded statistical analyses. This was particularly true when paired sample tests were considered. Only four members of the control group and five members of the experimental group returned surveys before and after the physical environment was changed.

The quasi-experimental design of this project presented several threats to the validity of the results obtained. Not only were many aspects of the physical environment changed simultaneously, but also the nature of the agency evolved during the test period. Personnel changes occurred during this time and slightly different tasks were engaged in before and after the changes to the physical environment because of the activity cycles of the brands managed by the test teams. The control group could not be completely isolated from the test group and not only the team room environments were changed, but individual workspaces were modified as well.

It is unlikely that the effects observed were created through a Hawthorne Effect because the periods of naturalistic observation were prolonged. Participants were also very frank in their discussions of the team spaces and did voice criticisms of these areas, as discussed above. Users were also unaware of the types of data gathered by researchers..

Conclusion

The data gathered and analyzed has several implications for workplace design. The positive implications of group workplace assignments should encourage organizations to devote dedicated spaces to each team in their organization. Features of these rooms that encourage sociopetal seating arrangements and eye contact among all of the individuals in the team area are also clearly beneficial.

The casual atmosphere in each room also seemed to have favorable effects on team functioning. The ability to store and present information and perform several different types of tasks in the team rooms streamlined team operations and encouraged synergistic interactions between specialized groups of employees working to plan and coordinate brand-related activities

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