



After the fire

New ways of working in an academic setting

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Abstract

Purpose – This purpose of this paper is to present the research findings of a Post-Occupancy Evaluation of new ways of working in the Faculty of Architecture of the Delft University of Technology and the lessons that can be learned from this particular case in connection with research findings from similar cases.

Design/methodology/approach – The paper is based on an internet survey among 266 daily users, additional interviews with decision makers and other participants involved in the implementation process, analyses of documents and personal observations.

Findings – The new office plan scores highly on possibilities of meeting other people. Work spaces are considered to be functional, but employees also reported a lack of spaces suited for confidential (telephone) conversations and insufficient visual and auditory privacy. Employees are unable to control sufficiently the climate of their direct work environment and the way the environment looks. Security of the workplaces is rated below average. People want more rooms equipped with doors, and doors that can be locked. Another important complaint was lack of personal and collective filing and storage possibilities.

Research limitations/implications – The paper focuses on office space; because of limited time and budget restrictions educational space was not included in this building-in-use study. There was no opportunity to conduct a zero measurement *ex ante*. Long-term effects on use and experience are not known yet, nor the effects of improvements that are being implemented this year.

Practical implications – The results can be used to support decision makers in implementing new office concepts in general and in particular in an academic setting, *ex post* or *ex ante*.

Originality/value – Much has been written about new ways of working, but research on this topic in academic settings is scarce.

Keywords Office layout, Social interaction, Business environment, Personal needs, Universities, The Netherlands

Paper type Research paper



Introduction

In the mid-1990s all over the world organizations started to experiment with new ways of working. Fast and mobile IT-facilities made it possible to work when and where people prefer to work. A new metaphor came up: “the office is where you are”. Offices of Steelcase, IBM, Johnson Controls, Chiat/Day and many other “early adaptors” became networks of activity-related non-assigned “hot” desks and additional external work places at home, at the client, in a restaurant etc. (Becker, 1993; Aronoff and Kaplan, 1995; Worthington, 1997; Duffy and Powell, 1997). It was expected that sharing of a variety of task-related workplaces would result in cost reduction, whereas the increased openness (compared to cellular offices) and dynamics (compared to personal desks) would improve communication and social interaction and exchange of knowledge (Bradley, 2001; Becker, 2004; Allen *et al.*, 2004).

Although from literature and Post-Occupancy Evaluations of office environments it may be concluded that most people can cope quite well with new ways of working, complaints appear as well (Van Wagenberg, 1996; Becker and Sims, 2001; Vos and van der Voordt, 2002; van der Voordt, 2003; Mallory Hill *et al.*, 2005; van der Voordt and Maarleveld, 2006). On average 10-20 percent of employees working in non-territorial offices don't like non-assigned desks at all. They miss their personal territory and the opportunity to personalize the work environment. More people complain about a lack of privacy and poor facilitating of work requiring concentration, or report insufficient storage space. Research in open plan offices shows a conflict between the standardized workspaces for communal use wanted by management, and universal human needs such as the need for a place of one's own, privacy, identity, status and the ability to arrange one's own work environment to suit one's own personal needs (Sundström *et al.*, 1982; Oldham and Fried, 1987; Allen and Gerstberger, 1973; Brennan *et al.*, 2002).

Whereas a lot of research has been conducted in the office sector, much less is known about open plan offices and flexible working concepts in educational settings, with a few exceptions. Van der Voordt and van der Klooster (2008) investigated new ways of working in an Institute for Higher Education. The extent to which the work environment supported productivity got a mean of 5.1 i.e. “unsatisfactory”. The accommodation concept scored about 5.5, while the organization and facilities scored about 6 (recognized as a “pass”). Only work process had a mean score corresponding to a good pass (6.6), though all aspects received also scores of 7 or 8 from individual respondents. The survey found 46 percent and 54 percent respectively of the respondents to be satisfied or highly satisfied about the spatial configuration of the work spaces and the openness and transparency of the work environment. But an appreciable minority (25 percent and 30 percent respectively) were dissatisfied or highly dissatisfied with these aspects. A lot of people complained about lack of storage space and lack of confidentiality because of the ambivalent public/private character of the staff zone, where students came to talk individually with their teachers. No fewer than 37 percent of the respondents were dissatisfied about lack of privacy; 23 percent were even highly dissatisfied. Similar levels of criticism were found concerning the extent to which the work environment allowed people to concentrate on a particular task. Most employees were quite satisfied about the attractive architecture of the building, the modern IT facilities and supportive conditions to enable communication.

Parkin *et al.* (2006) reported similar ambivalent results in research environments for higher education. Provisions for relaxation and informal socialization were highly

appreciated. Researchers appreciated the absence of partitions in open plan group offices to increase the opportunity for interaction that stimulates intellectual debate and group cohesion. On the other hand, people complained about poor conditions for concentration, lack of privacy and loss of storage space. Some researchers came into work early, or stayed late in order to work when there are fewer distractions; others choose to work from home if they need to concentrate. “Cubes” i.e. small study booths were not used very often, because people find them too small and find it impractical to move work from one’s desk to another location. Some people are less likely to engage their peers in conversations than when they worked in closed offices, because they don’t want to disrupt the concentration of those working nearby. Hot-desking was not always effective, in particular when researchers use their desk most of the time, or when the available number of desks does not necessitate desk-sharing and desk-rotating. In spite of the complaints, most researchers of a Club pilot (a test case with an open space to be used by 10-15 employees) did not want to revert to more traditional, cubicled research rooms; for those who did, dislike of hot-desking policy was the main reason.

In 2007 the Delft Faculty of Architecture started a few pilots with new ways of working. In 2008 a non-territorial office concept has been introduced faculty wide. This paper aims to discuss why the faculty moved from a traditional cellular office concept to a non-territorial office concept, which experiences came to the fore and which lessons can be learned from this particular case in connection to the ambivalent research findings that haven been discussed above.

New ways of working in the Faculty of Architecture in Delft

In 2006 the Faculty of Architecture of the Delft University of Technology got a new dean. One of the first ideas of this former architect and governmental architectural supervisor was to upgrade the old faculty building (taken into use in 1970) in order to stimulate communication and social interaction within and between different departments. The old concept of cellular office spaces for administration, research and coordinating or preparing teaching activities was perceived as not very functional and inefficient. Data from the late nineties showed average occupancy rates of 31 percent for staff rooms and 65 percent for administrations (van der Voordt, 2001). Apart from informal meetings in the faculty restaurant and at social events, cross-departmental contacts were limited to formal meetings. Students primarily came to the faculty for lectures and design studios and worked at home on conducting their design exercises. For this reason the dean started a “bubbling building” project. The “faculty street” – the ground floors’ central corridor with common facilities such as the library, restaurant and helpdesk – got a facelift and a number of new student workplaces had been realized. When a new architectural design professor came in, all walls between the one and two person rooms had been broken down in order to create an open office space that supports social interaction. In 2007 a group of ten people started a pilot to share a group office with eight workplaces, partly personal desks and partly non assigned desk. Then the fire came, May 13, 2008. The faculty building burnt down completely (see Plates 1 and 2).

Already at the day of the fire a steering group including the dean, the CEO of the University and the DTU Real Estate and Facility Management Department started to look for other accommodation. Teaching restarted after five days in big tents. Staff

After the fire



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Plate 1.
The Faculty of
Architecture building
on fire



Plate 2.
The Faculty of
Architecture building after
the fire

members were accommodated temporarily in other faculty buildings. At the end of May the decision had been made to move the faculty community to the former head building of the Delft University of Technology (at that time vacant and being converted into residential apartments), until a new faculty building would be available. The present accommodation should be “a platform for intellectual debate” and “a community building with well defined identities and improved interaction between staff and students”. Because the available space was 30 percent less than in the old situation, two additional glasshouses have been built. Still the available space is insufficient to accommodate personal desks for all staff members and sufficient work places for students. This situation offered the dean the opportunity to introduce new

ways of working for the whole faculty. A so-called flex-team started to elaborate a new office concept “From your own office to an office of your known”, with Fokkema architects who were also involved in upgrading the former faculty building. Apart from personal desks for supporting staff, desk sharing for everyone and clean desk policy had been introduced in different settings with a variety in scale (2, 4, 6 or over six desks in one space) and openness. Personal storage space is limited to 1.2 m per person. In addition, extra storage is available for direct support (secretariats) and by shared bookshelves in the living rooms. Figures 1 and 2, Plates 3-5, and Figure 3 give an impression of the old Faculty of Architecture Building in Delft and the “new” faculty building “BK City”.

Need for evaluation research

The main objectives of the new office concept are increased flexibility, space reduction and stimulation of social interaction across staff and students of different departments. Possible disadvantages have not been considered very carefully. When 30 staff members send a joint letter to the dean to express their worries about having to give up their personal desks and rooms with positive conditions for privacy and concentration and plenty of space to store books and other documents, he characterized this response as “cold feet” and asked them to wait until the building was taken into use. However, at the request of the representative advisory board the steering group and the flex-team jointly commissioned an external research group to conduct a sound ex-post evaluation of the new working environment (Gorgievski *et al.*, 2009). The team agreed on five leading research questions:

- RQ1. How do the faculty’s employees experience and assess the new situation with desk sharing of a variety of activity-based workspaces?
- RQ2. Do different staff groups (with regard to job function, age, sex, department, fulltime or part-time) assess the concept in a different way?
- RQ3. What is the impact on employees’ perception of social aspects of the working environment, wellbeing and motivation, and work performance?
- RQ4. What is the occupancy level of different types of hot desks?
- RQ5. Which improvements could be implemented within the concept of hot-desking?

This paper focuses on the answers on questions one and five. Students were not involved in this research.

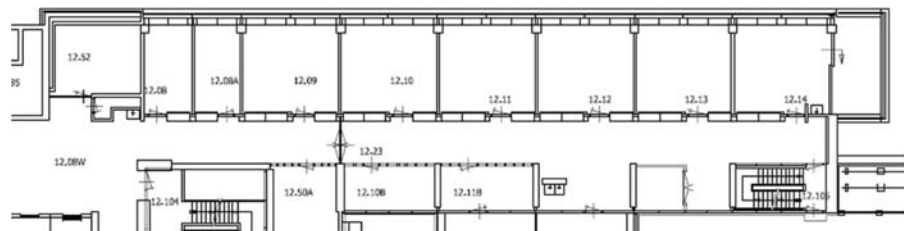


Figure 1.
Floorplan of one of the
wings of the old building

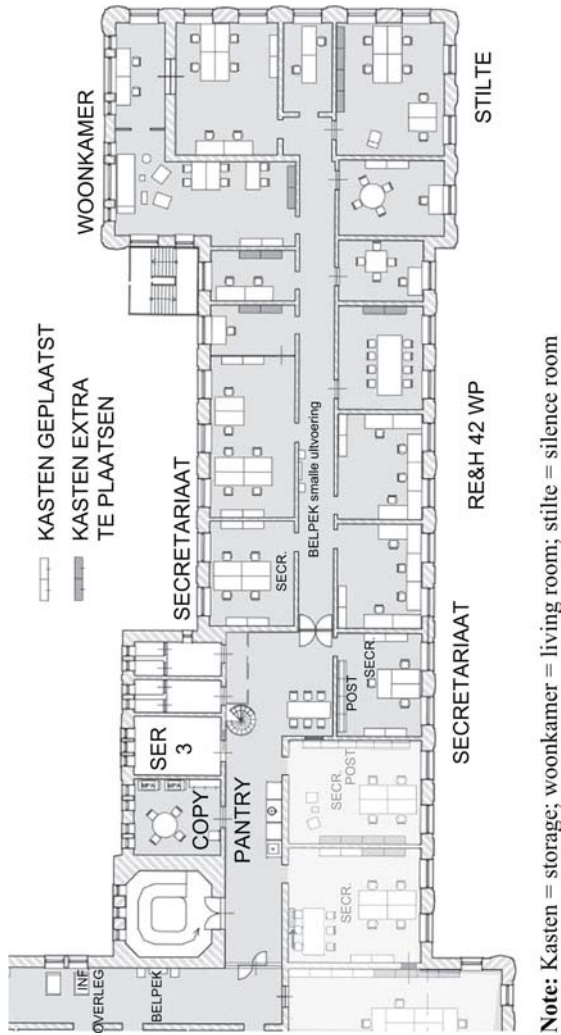


Figure 2.
Floorplan of one of the wings of BK City

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28,3/4

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Plate 3.
Images of the pilot with a
group office – old
situation



Plate 4.
Open office with
non-assigned desks, new
situation



Research methods

A total of 266 employees participated in an internet survey (response rate = 26.4 percent). Overall, participants are a representative sample of the University's population, but student-assistants and visiting professors were under-represented in the sample. Because of this reason, the sample differed significantly from the population concerning gender (54 percent male compared with 60 percent in the population, ($\chi^2_{(1df)} = 7,00, p < 0.01$), mean age of the sample = 42.23 years (sd = 12.09) compared with 39.89 years



Plate 5.
Workspace for students,
new situation

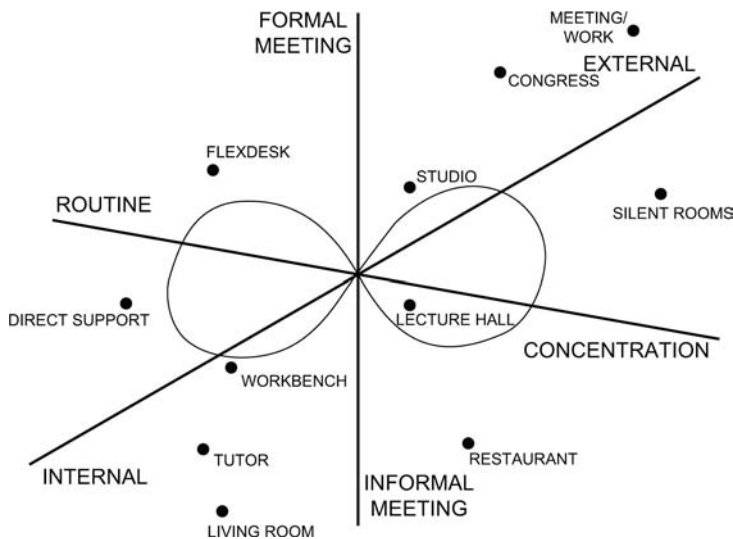


Figure 3.
All possible working activities are being supported by 486 desks + 349 extra work spaces and 44 meeting rooms for about 850 employees (450 f.t.e.), 688 BSc studio desks for 1,420 BSc students, 832 MSc student desks for 1,675 MSc students and five lecture halls. Total net floor space = 37,525 m²

($sd = 12.58$; $T_{(988df)} = -2.61$, $p < 0.01$), tenure (on average 17.44 years ($sd = 15.18$) compared with 7.21 years ($sd = 13.06$; $T_{(403,40df)} = -9.70$, $p < 0.001$); and number of hours worked per week (on average 30.80 hours ($sd = 11.56$) compared with 15.92 hours ($sd = 14.72$; $T_{(589df)} = -16.49$, $p < 0.001$).

Employees were told about the goals and method of research in an e-mail signed by the management, and personally invited by e-mail to participate in a survey on a secure web site of an independent research bureau. The data were automatically written to an external file. Employees were first invited to fill out a general questionnaire once, and

subsequently to fill out a quantitative diary for three different days asking them about specific experiences of the day. Reminders were sent regularly during a two-week period of data collection, until the diary had been filled out three times. Questionnaires could be filled out in Dutch or English. In total, 83 employees (response rate = 8.2 percent) filled in the diary at least once (175 diary entries).

The questionnaires were constructed by the researchers for the purpose of this study. The content of the questionnaire was based on a review of the scientific literature (especially Brennan *et al.*, 2002; Carlopio, 1996; Parkin *et al.*, 2006; van der Voordt and van der Klooster, 2008; and Vischer, 2006), results of in-depth interviews with key-informants, and document analysis of open letters on the faculty's web site, articles in the faculty magazine, minutes of department meetings on experiences with the new office plan, etc. The question and answering formats in the general questionnaire follow recommendations of Drenth and Sijtsma (2004) and Bradburn *et al.* (2004).

The questionnaire asked respondents about their satisfaction with the accommodation of their faculty as a whole; their department; their personal work space and the concept of flexible work spaces. Answers ranged from 1 "not at all satisfied" to 7 "very satisfied". In addition, questions were asked about the extent employees felt their housing situation and personal work spaces fulfilled physical, task related and psychological requirements, such as privacy, security and direct and indirect control over the environment (Vischer, 2006). Answers ranged from 1 "totally disagree" to 5 "totally agree". Finally, the data file contains information on demographic variables, such as age, gender, tenure, number of working hours per week and number of hours worked at home. The quantitative diary asked respondents to list the tasks they had been performing during the day and at what time; in what type of workstation the tasks had been performed; and how functional they considered this working environment to be for the task at hand (1 "not at all functional" to 5 "very functional") (the Day Reconstruction Method of Kahneman *et al.*, 2004). Data were analyzed with SPSS version 16. Analyses include univariate and multivariate descriptive analyses (Chi Square and paired and independent sample *T*-test).

Results

Analyses show that employees are overall satisfied with the new accommodations for the Faculty, their own department and their own office situation (Figure 4). They are somewhat less satisfied, however, with the concept of a flexible office plan (Figure 4).

When comparing their current work situation with the old situation in which they worked in traditional cellular offices, employees are less satisfied with their own work situation (Paired $T_{(241df)} = 5.560, p < 0.001$) as well as the accommodations for their department (Paired $T_{(241df)} = 2.991, p < 0.005$), but they are as satisfied with the accommodations for their Faculty as they were before.

The new office plan has several advantages (Figure 5). It scores high on possibilities to meet other people and have informal face-to-face conversations. The environment is not very crowded; the preferred workplace is generally available. Work spaces are considered to be functional. Employees also reported weaknesses and disadvantages, in particular a lack of spaces suited for confidential (telephone) conversations and insufficient visual and auditory privacy. Employees can insufficiently control the climate of their direct work environment and the way the environment looks like. They

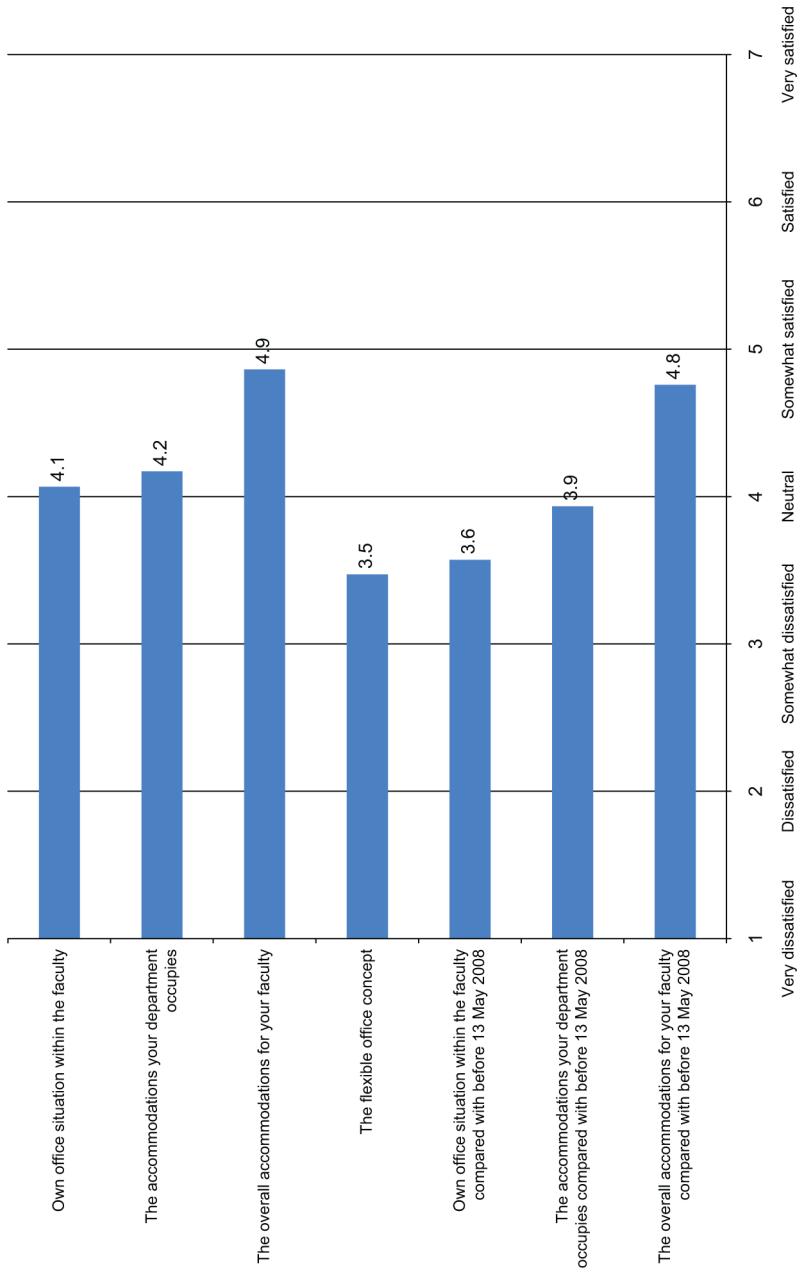
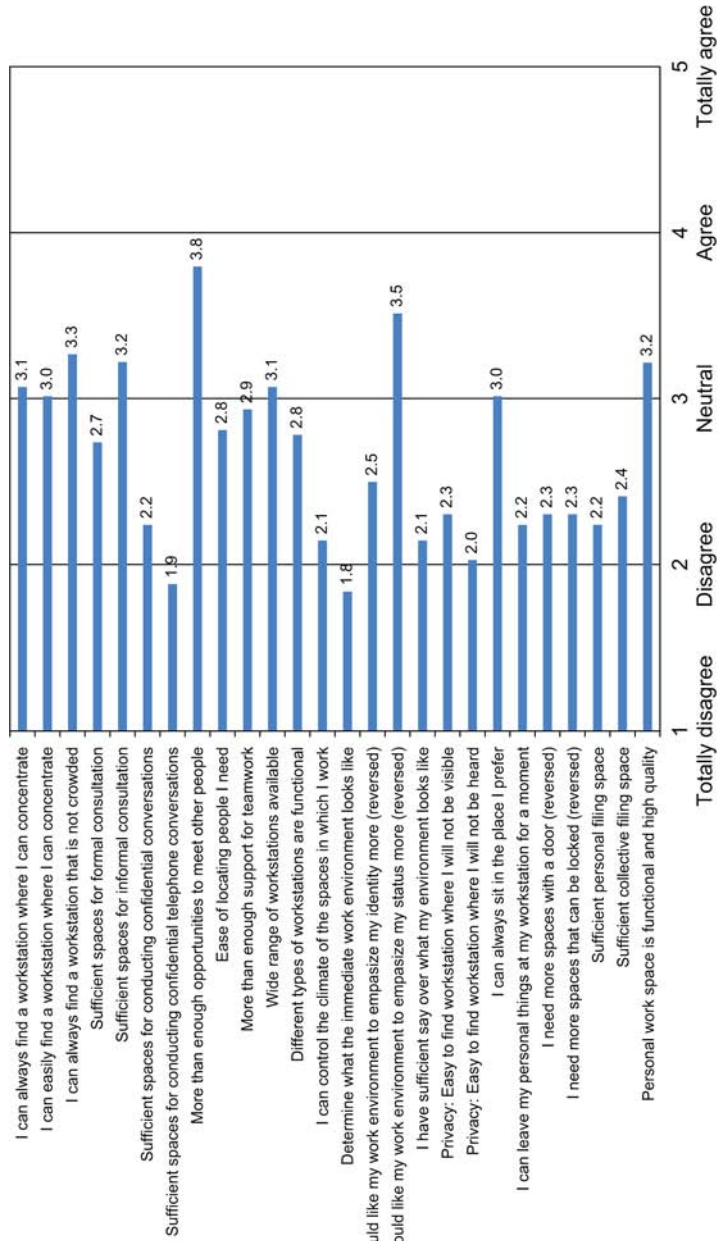


Figure 4. Satisfaction with the working environment; $n = 266$ employees



Note: n = 266 employees

Figure 5.
Extent to which work places fulfil task and psychological requirements; n = 266 employees

did not have sufficient say in the way the offices are furnished. Security of the workplaces is rated below average; people can often not leave their belongings behind at their work station for a minute and want more rooms equipped with doors that can be locked. Finally, an important complaint was lack of personal and collective filing and storage possibilities.

The diary data show that especially large flexible offices of more than six persons are experienced as less functional (Figure 6). Also silence rooms, which are usually somewhat larger in size, and meeting rooms scored below the scale's average of three (not agree/not disagree).

The functionality of different work environments is perceived to be similar across tasks for supportive and administrative personnel, namely on a scale from 1 to 5 the accommodations scored on average 3.06 ($sd = 1.26$) for supportive and 2.59 ($sd = 1.41$) for administrative personnel. However, employees in an academic position experienced that functionality of the office situation differs across tasks. The accommodations are perceived to be least functional for coordinating tasks, making phone calls, filing material and information and teamwork (Figure 7). It came out that small team meetings are perceived to be insufficiently facilitated, whereas less complaints came up with regard to lack of confidentiality in meetings with students.

In the flexible office concept employees have the opportunity to change work places for different tasks. The question is whether people actually use this opportunity. The diary data (85 people, 175 days) shows that at least within one workday the number of times people change work places is very modest. The modus lies at working only at one workstation (45 percent = 79 days). The maximum number of changes is fourteen times. Most changes of work place are related to going into meetings, teaching responsibilities, taking a break at the cantina and working at home. Only 19 days could be qualified as "real flex working" days, characterized by changing from one office environment (e.g. a small flexible office) to another (e.g. a large flexible office or silence room).

Finally, in the new situation employees work a larger percentage of their time at home than they did in the old situation. The 232 people who answered this question worked on average 26.60 percent of their time at home, compared with 15.55 percent in the old situation (Paired $T_{(231df)} = 8.374, p < 0.001$).

Respondents did not often make use of the opportunity to add additional remarks in the box "space for additional comments" and if they did, primarily to explain negative responses. Employees miss the opportunity to make phone calls and use their computer at the same time, small work places for confidential conversations, and instant workplaces to check their e-mail. Complaints are made on the absence of doors: "doors are no obstacles to prevent openness but means to lock a room in case you need it" and "I have too many belongings in order to be able to store them temporarily when I leave the room". Hot-desking is not appreciated, for example because "I am too old to carry around heavy books and a laptop". A negative affect of clean desk is that "it leads to clean rooms, sterile, impersonal" and "waste of time because of the need to log in several times per day". In spite of problems with concentration, people hesitate to address colleagues who cause disruptions by speaking too loud or making phone calls. Positive remarks have been made about the increase of social interaction ("more contact with other chairs") and the nice architecture of the building, though also remarks have been made such as "The main objective is beauty, how staff wants to

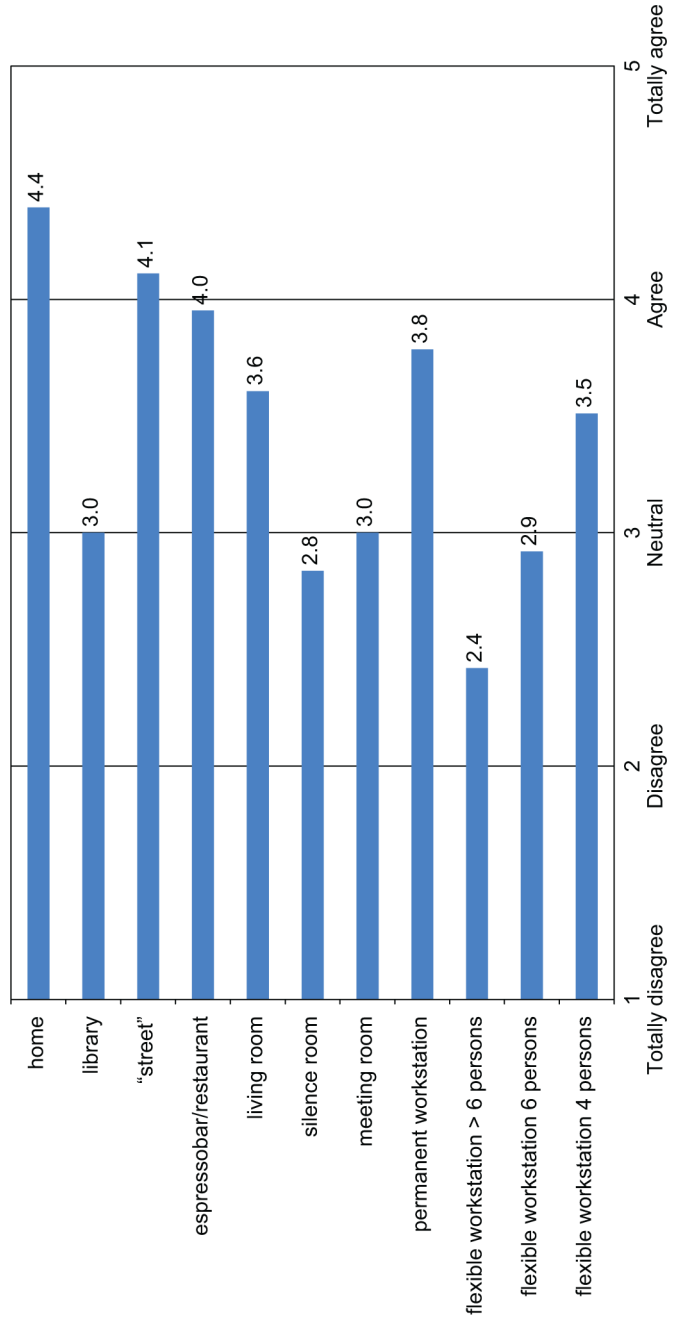


Figure 6.
Functionality of different
types of workstations (83
employees, 175 diary
entries)

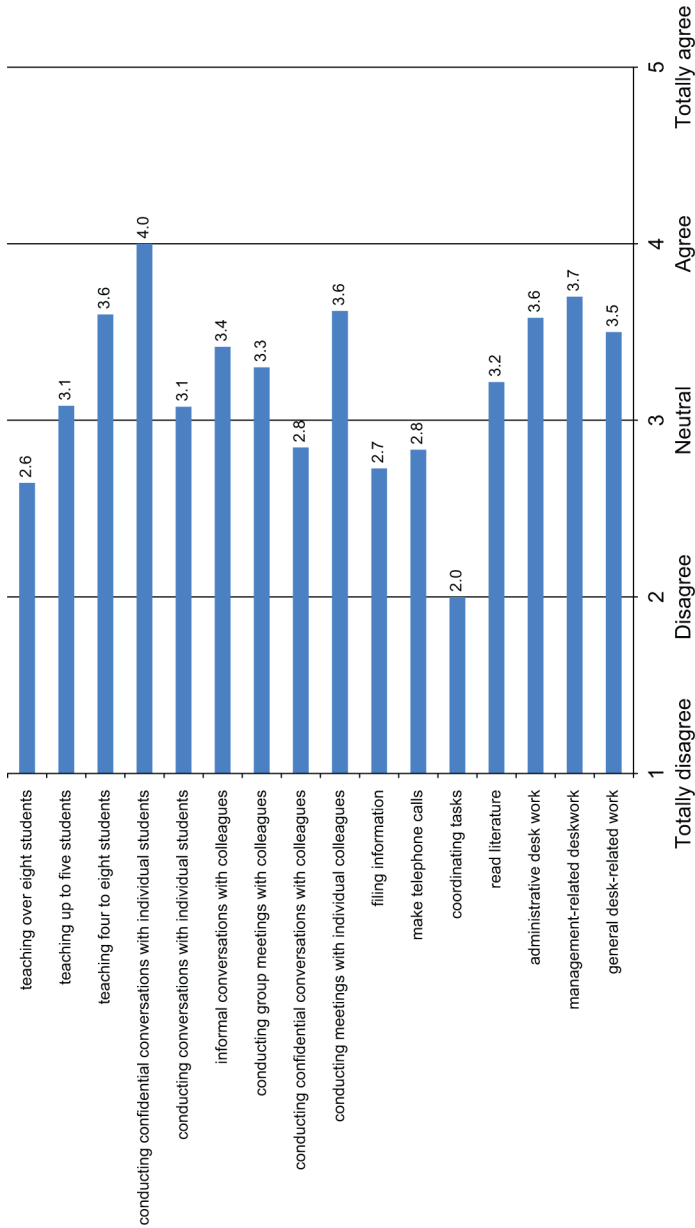


Figure 7.
Extent to which the work environment was experienced as functional per task. Answers from 69 employees on 554 tasks over 131 days

work plays a minor part". One of the respondents is extremely negative: "The one who invented this concept does not have the slightest idea how education, research and different work styles should be facilitated. It is clear he does not need to work here himself. One size does not fit all" and "I don't need many workspaces, I need one good one".

Recommendations

First, in flexible office plans, safe and secure work spaces need special attention. Common lockers showed to be insufficient. People should have the possibility to leave personal belongings behind in the office without running the risk of theft. Offices that cannot be locked or closed by a door, and large, impersonal open offices where many people have easy access, may be particularly prone to thefts (quite a number of laptops have been stolen yet!). People also need to feel safe subjectively. Subjective feelings of fear and uncertainty also relate to the extent people can give their environment its own identity. This does not need to be on individual level, but may also be accomplished at the level of the group.

Second, the work environment needs to provide sufficient visual and auditory privacy. This includes spaces for formal and informal telephone calls and face-to-face meetings, but also adequate space to process, print and store personal information about students and employees. Spaces allocated for personal face-to-face conversations and telephone calls need to be multifunctional, and for example provide easy access to (electronic) personal documents.

Third, large office spaces in particular (in our study more than 6 workstations) may be accompanied by physical discomfort (e.g. noise, temperature). This can be improved by dividing larger spaces into smaller units using plants or filing facilities.

Fourth, personal and collective filing and storage capacity need to be well organized. Employees should be able to store their personal belongings and work material close to their preferred work space.

Fifth, the functionality of work spaces depends on the tasks employees need to perform there. In this study, scholars indicated that their flexible office environment did not sufficiently support all of their tasks. Hence, work spaces need to be sufficiently differentiated, and the types of work spaces provided need to be based on careful job analyses.

Finally, the best way to ensure a fit between work environment and employees' needs is to give employees sufficient direct influence in the way the office is designed and furnished. It might be considered to allow departments and sections to adapt "their" working environment more made-to-measure, including few personal desks for people that are in the office quite often and/or who are not able to cope with non assigned desks ("I work 40 years in the same way and can't change that anymore").

Discussion and concluding remarks

Overall the new accommodation of the Faculty of Architecture seems to be a success. Many employees are positive about the appearance of the old building with its characteristic expression, spacious rooms and high windows, and the overall building lay-out, colours, materials, and furniture. Social interaction and communication is well supported and stimulated. The occupancy level is still low (average 27 percent, with a few exceptions: service desk 82 percent, secretariats 52 percent, and temporary peaks

of 60-70 percent), so employees can often choose a preferred work place. But it is striking that percentages satisfied employees decrease according to the scales of the building as a whole, the department domains, and the individual working environment.

Complaints that have been reported in the literature about lack of privacy and concentration, loss of storage space, and not being able to express ones identity by personalization of the workspace appeared in the Faculty of Architecture case as well. One of the employees responded that “everything has been organized according to the design view of the architect, everything is open, without any subtle distinctions “. Another one remarked that “the building has been designed like an architectural office, but we are not all architects”. As a consequence, people work more often from home than in the old situation (27 percent of the work time versus 16 percent). Because of hot-desking, staff members lack a place of their own (“we are always on the way”) and people have to drag laptops and documents from one place to another. Staff are more difficult to find than in the old situation with personal desks and assigned rooms and often have to be phoned or mailed to know where they are. In group spaces phone calls cause disruptions, whereas going outside to a “phone spot” is difficult because one does not have digital information to hand. Lack of safety showed to be another important issue, probably due to the semi-public character of an educational building. This had already been predicted by employees during the introductory presentations.

It should be taken into account that the negative response may be coloured by the moment of evaluation. Some of the applied functional and technical improvements (e.g. acoustics) were still under construction at that time. Another factor with a negative impact on employee satisfaction is the lack of user participation during the conceptualization and implementation of the new office concept. For this reason, the decision making process has been characterized by some employees as authoritarian (Kooijman and Sierksma, 2009). One might question if this lack of user involvement is a consequence of the dean’s management style or an inevitable consequence of tough time pressure. Most employees labelled the information about the process “quite well”. In addition, the response rate among part-time working temporary employees (e.g. student assistants, visiting professors) was quite low. These employees may typically have fewer problems with hot-desking, and the results might have been more positive if a larger percentage of these temporary employees had responded.

The research findings are being used now to improve the present building. The Faculty of Architecture still intends to build a new building. Many ideas have been collected by an open international ideas competition (Faculty of Architecture, 2009). Hopefully, the lessons learned from this Post-Occupancy Evaluation will also be used to write a sound and “evidence based” brief for the following design competition.

A comparison of the research findings with the findings from Parkins *et al.* (2006) and ongoing research at Loughborough (Parkins *et al.*, 2010) raises some interesting issues. Possible conflicts between the managers’ views and ambitions, organizational requirements and individual needs also emerged as a key theme in the English cases. The comments that Delft staff made about the flex office (e.g. how time consuming it is to keep setting up their workstations etc) are very similar to the issues that have been raised in response to the hot-desking provision for research students at Loughborough. Interestingly, in a recent case study at Warwick University of a graduate facility with hot-desking, none of the users raised the lack of allocated desks as an issue - which might suggest that at least some of the dissatisfaction found with hot-desking at

Loughborough is linked to users' expectations of space provision. A further elaboration of cross case comparisons - nationally and internationally, between and across educational settings and other settings like banks, insurance companies and public organizations – might help to improve our understanding of the impact of the organizational context, different working processes and different cultures.

References

- Allen, T.J. and Gerstberger, P.G. (1973), "A field experiment to improve communications in a product engineering department: the non-territorial office", *Human Factors*, Vol. 15, pp. 488-98.
- Allen, T., Bell, A., Graham, R., Hardy, B. and Swaffer, F. (2004), *Working without Walls*, DEGW, Norwich; HMSO, London.
- Aronoff, S. and Kaplan, A. (1995), *Total Workplace Performance. Rethinking the Office Environment*, WDL Publications, Ottawa.
- Becker, F. (1993), *The Ecology of New Ways of Working: Non-Territorial Offices*, Cornell University, Ithaca, NY.
- Becker, F. (2004), *Offices at Work. Uncommon Workspace Strategies that Add Value and Improve Performance*, Jossey-Bass, San Francisco, CA.
- Becker, F. and Sims, W. (2001), *Offices That Work. International Workplace Studies Program*, Cornell University, Ithaca, NY.
- Bradburn, N.M., Sudman, S. and Wansink, B. (2004), *Asking Questions: The Definitive Guide to Questionnaire Design, for Market Research, Political Polls, and Social and Health Questionnaires*, Jossey-Bass, San Francisco, CA.
- Bradley, S. (2001), "What's working? Briefing and evaluating workplace performance improvement", *Journal of Corporate Real Estate*, Vol. 4 No. 2, pp. 150-9.
- Brennan, A., Chugh, J.S. and Kline, T. (2002), "Traditional versus open office design: a longitudinal field study", *Environment and Behavior*, Vol. 34 No. 3, pp. 279-99.
- Carlopio, J.R. (1996), "Construct validity of a physical work environment satisfaction questionnaire", *Journal of Occupational Health Psychology*, Vol. 3, pp. 330-44.
- Drenth, P.J.D. and Sijtsma, K. (2004), *Testtheorie, inleiding in de theorie van de psychologische test en zijn toepassingen (Test theory, introduction in the theory of the psychological test and its applications)*, Bohn Stafleu Van Loghum, Houten.
- Duffy, F. and Powell, K. (1997), *The New Office*, Conran Octopus, London.
- Faculty of Architecture TU Delft (2009), *Building for Bouwkunde – Open to Ideas*, Open International Ideas Competition and Think Tank, Delft.
- Gorgievski, M., van Herpen, S.G.A., Zijderwijk, L. and Hermus, P.W. (2009), *Ervaring met flexibele werkplekken op de Faculteit Bouwkunde, TU Delft. Rotterdam (Experiences with flexible workplaces at the Faculty of Architecture TU Delft)*, RISBO Research-Traning-Consultancy, Erasmus Universiteit Rotterdam, Rotterdam.
- Kahneman, D., Krueger, A.B., Schkade, D., Schwarz, N. and Stone, A.A. (2004), "A survey method for characterizing daily life experience: the day reconstruction method", *Science*, Vol. 306, pp. 1776-80.
- Kooijman, D. and Sierksma, R. (2009), "Flexible workspace and authoritarian surveillance", *BOSS Magazine*, Vol. 35, March, pp. 44-9.

- Mallory-Hill, S., Van der Voordt, T.J.M. and Van Dortmont, A. (2005), "Evaluation of innovative workplace design in The Netherlands", in Preiser, W.F.E. and Vischer, J.C. (Eds), *Assessing Building Performance*, Elsevier, Oxford, pp. 160-9.
- Oldham, G.R. and Fried, Y. (1987), "Employee reactions to workplace characteristics", *Journal of Applied Psychology*, Vol. 72, pp. 75-80.
- Parkin, J., Austin, S. and Landsdale, M. (2006), *Research Environments for Higher Education*, Loughborough University, Loughborough.
- Sundström, E., Herbert, R.K. and Brown, D. (1982), "Privacy and communication in an open-plan office – a case study", *Environment and Behavior*, Vol. 14 No. 3, pp. 379-92.
- van der Voordt, T.J.M. (2001), "Efficient ruimtegebruik" ("Efficient use of space"), Internal report, Faculty of Architecture, Delft University of Technology, Delft.
- van der Voordt, T.J.M. (2003), *Costs and Benefits of Innovative Workplace Design*, Center for People and Buildings, Delft.
- van der Voordt, T.J.M. and Maarleveld, M. (2006), "Performance of office buildings from a user's perspective", *Ambiente Construído*, Vol. 6 No. 3, pp. 7-20.
- van der Voordt, T.J.M. and van der Klooster, W. (2008), "Post-occupancy evaluation of a new office in an educational setting", CIB report 315, *Proceedings of the CIB-W070 Conference in Facilities Management, Heriot-Watt University, Edinburgh, 16-18 June 2008*, pp. 579-88.
- Van Wagenberg, A.F. (1996), "Redesign and evaluation of experimental Dutch office layouts", *Proceedings of World Workplace 1996, Salt Lake City*, pp. 715-25.
- Vischer, J.C. (2006), "The concept of workplace performance and its value to managers", *California Management Review*, Vol. 49, pp. 1-18.
- Vos, P.G.J.C. and van der Voordt, D.J.M. (2002), "Tomorrow's offices through today's eyes: effects of office innovation in the working environment", *Journal of Corporate Real Estate*, Vol. 4 No. 1, pp. 48-65.
- Worthington, J. (1997), *Reinventing the Workplace*, Butterworth-Heinemann, Oxford.

Further reading

- Balkin, D.B., Tremblay, M. and Westerman, J. (2001), "Workplace innovations in large, unionized Canadian organizations", *Journal of Business and Psychology*, Vol. 15 No. 3, pp. 439-48.
- Parkin, J. (2010), "Briefing paper: The case for new academic workspaces", Loughborough University, Loughborough (forthcoming).
- Parkin, J., Austin, S., Lansdale, M. and Baguley, T. (2010), *Evolving Research Environments: A Case Study*, Loughborough University, Loughborough (forthcoming).
- Van der Voordt, D.J.M. (2004), "Productivity and employee satisfaction in flexible offices", *Journal of Corporate Real Estate*, Vol. 6 No. 2, pp. 133-48.

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