Advantages and Disadvantages

of the open work space

Submitted by Richard Duvall

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QAS 515 Human Factors in Quality Assurance

Dr. Jim Clauson

Introduction:

What are the advantages and disadvantages of an open office? My company has cubicles that are 7' square with 4' walls and fairly high density work areas. As a result, privacy is at a minimum. Is this good or bad? I intend to:

1) Discover the reasons for the design

2) Survey employees regarding their opinions about key aspects of this environment.

3) Suggest HFE based improvements that will work within the confines of the physical plant.

Background:

Honda designs their offices to allow for maximum communication between employees and to encourage the equality of each associate. In Japan headquarters, many associates will share a wide desk with one other associate and have a single set of drawers for their personal items or work files. There are not dividers between desks and the conditions can be best described as cramped. In the manufacturing plants there are similar layouts, however in the manufacturing plants there are many conference rooms used by employees to discuss work topics. Often, associates spend much of their time in conference rooms, design centers or on the manufacturing floor, so they do not spend a bulk of their time at the shared desks.

There is a cultural difference in America that does not work well with shared desks. In our old facilities, in Gardena CA., there were 65" dividers and free standing desks. Before our move to the new facilities in 1990 our facilities group started to experiment with the cube design that we currently use. It was decided that the 4 foot high walls and more open design was appropriate for the idea of open communication.

Cubes are of equal size for most associates. Managers get cubes that are twice as large as the average associate. Even the executive management have cubes that have the same height walls as other associates with the size of the cubes being the double size or 4X average cube. While executive management does not have private offices per se, the president of the company has his own conference room that he frequently uses when discussing important company business. This room has comfortable chairs and all of the AV equipment that is necessary for presentations.

The original design for office cubes is generally attributed to Robert Probst. He worked for Herman Miller, an office equipment manufacturer and the design that he suggested for Intel took off. The design was referred to as an Action Office design. Herman Miller is currently a 1.5 Billion dollar business.

American Honda's current design was adopted for a number of reasons. It is fast an easy to build or install and changes in design and layout are quick. As mentioned, it supports the notion of all associates being equal. According to one study the advent of the open office has altered the fundamental structure of what constitutes a typical work environment so greatly it could, quite reasonably be comparable in magnitude to the industrial revolution of the 18th Century. The ability to make a phone call without interruption, hold a private meeting, concentrate on a task or even quietly consider ones own thoughts are nearly impossible in a typical office environment.(8)

Typical Honda Office Design

Analysis:

Employee Survey:

As part of my project I sent surveys to 135 employees that I know work in the typical cubicle in the American Honda Headquarters office. I received 63 responses. The mix of responders was 29 female and 34 male with an assortment of management, clerical staff and other support workers. The survey consisted of 20 questions in 4 categories; Sound, Light, Ergonomics and Hygiene. The Questions were as follows:

Noise
1)There is too much background noise in my immediate working area
2)   People around me frequently speak loud enough to distract me
3)   I sometimes wear headsets or ear plugs to address noise around me
4)   I often hear other people's phone conversations while at my workstation
5)   I have had to ask others to lower their voices. ___

Light
6)   There is too much light in my immediate working area. ___
7)   I am bothered by the amount of reflected sunlight where I work. ___
8)   There is not sufficient light in my immediate working area. ___
9)   The light level in my immediate working area varies greatly during the day. ___

10) I have had to adjust the blinds near my work area because of the light level. ___
11) I would benefit from having a desk lamp. ___

Ergonomics

12) I know that there is a person at Honda who has expertise in ergonomics.___
13) I have had an ergonomic consultation from HR.___
14) I feel that my chair, desk, and computer screen are adjusted properly. ___
15) I sometimes get neck strain during my normal work duties. ___
16) I sometimes get wrist strain during my normal work duties. ___

Hygiene

17) I feel that an employee should not come into work if ill. ___
18) I feel that I have gotten sick from other employees who sit close to me. ___
19) I have had others in near by cubes cough or sneeze without covering their mouths. ___
20) We have a policy about hygiene in my department.

I asked for the recipients to respond on a scale from 1-10 with 1 being strong agreement with the question and 10 being strong disagreement.

I received responses from 63 associates as well as some unsolicited comments from a few of the employees.

Noise – I had 5 questions having to do with noise.

The first question was; is there too much background noise in my immediate working area? 40% of the respondents thought that there was excessive noise in their areas. The second question asked if the noise was sufficient to be a distraction to them and 50% of the respondents said that the noise level is a distraction to them.

An experiment in task completion tested different types of noise input; speech, office noise with speech, office noise without speech and quiet. It was found that speech was the factor that was most distracting and most affected performance. [8]

Only 20% of the respondents used headphones to minimize the distractions and improve their concentration. According to a study, many office workers adapt to unwanted conversation by playing music through personal stereos or work computers. One experiment with 256 company employees showed substantial increases in performance for the group which listened to music through headphones. [1]

A study by the American Society of Interior Designers showed that office productivity would increase if workspaces were less noisy [2]
The environmental psychologists found that the workers in the noisy office experienced significantly higher levels of stress (as measured by urinary epinephrine), made 40 percent fewer attempts to solve an unsolvable puzzle and made only half as many ergonomic adjustments to their workstations as did their colleagues in quiet offices. Typing performance, however, was not affected.

This study found that stressed employees were less likely to adjust their chairs, foot rests, document holders and white boards. The thought is that under stress people have a tendency to concentrate on the task at hand without considering alternatives. Another interesting finding of this study was that the workers themselves did not feel that they were in a higher stress environment. (3)

To reduce environmental distractions, managers and consultants recommend blocking cubicle entrances with stop signs or ribbons, and checking e-mail at scheduled times only. "The major complaint for people in cubicles versus offices is no door," says David Javitch, an employee management columnist for Entrepreneur.com and president of Massachusetts consulting firm Javitch Associates. "That stop sign is comical, yet it's very powerful."
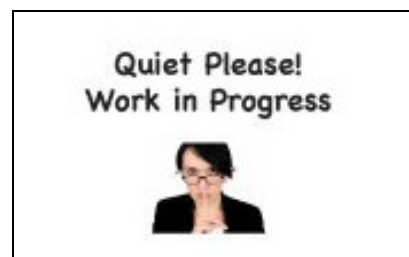
Javitch, who retains his focus by answering e-mail only every hour or two, also recommends scheduling employee breaks around individual biorhythms and placing a phone in the lunch room to compartmentalize personal business. For people with ADD/ADHD, Javitch says a noise-emitting egg timer that provides a minimal distraction may improve concentration by making the brain work harder.

Another question asked if other people's phone conversations could be overheard. Well over 50% of the respondents said that they do overhear their co-workers conversations. Follow up with employees that reported hearing conversations said that although the content of the conversations overheard are not offensive, they do not like overhearing what is being discussed by other employees.

In a study by Justin Mardex from Cornell University there were a number of noises inputs identified. There are noises from office equipment and computers as well as noise from colleagues Sound from colleagues was considered to be the most annoying as it was variable in pitch and not predictable in nature. Noises that are consistent and remain the same in pitch and volume are more easily adapted to than noise that is variable.

While only 10% of the respondents have actually asked the offenders to lower their voices, a number of employees said that they would like to.

To test the noise levels in the office I used a decibel meter to test the levels in the office. Over a 4 day period I tested the levels throughout the office. In my immediate area the noise level was in a sustained range of 40 – 60 Db.

Throughout the rest of the office the range was similar. In the more open areas of the office the range was a little on the higher side. What I do not know is what frequencies these readings came in at. Humans tolerated noises at higher and lower frequency more than noises in the mid range at the same volume level. I registered peaks of over 80Db when people coughed or sneezed or were talking across a number of cubes.   These spikes were fairly regular, but the effect of such spikes is unclear.

 Light –
 The types of lights we have in the office are florescent bulbs in fixtures with diffusers over the bulbs. Depending on the location of the cubes, a light may not be directly over the cubicle. Lights are changed when they go out, once the facility department has been notified. This sometimes leaves a light blinking on and off for an extended period of time waiting for them to be changed. Large blinds cover all windows and can be raised or lowered based on need. There is some corporate direction to keep the blinds down to save on energy costs; however individual departments will open them to satisfy employee needs.

   Lighting conditions under different conditions are shown in the following table [4]

Condition	Illumination level (lux)
Sunlight	107,527
Full Daylight	10,752.7
Overcast Day	1,075.3
Very Dark Day	107.53
Twilight	10.75

I included 6 questions about light levels in the office. I personally thought that this would be a bigger issue amongst employees than it was. My first question asked if there was too much light in the office. Most felt that the light levels were not excessive. Consistent with that, employees said that they are not bothered by the amount of light in the workplace. There was one more question to support the light adequacy in the office. I asked if there was not sufficient light in their areas and most answered that they disagreed with the statement, in other words that they though there was sufficient light in the office. I was surprised by this finding. I do not feel that the lighting is sufficient in the office.
I asked if employees have had to adjust the blinds in their areas and the answers were split between definite yes and definite no. My last lighting question had to do with whether or not associates want desk lamps. Most employees do not feel that desk lamps would be of any benefit to them.

This is one area that I do not believe most people know much about. Reflected light, glare on screens, insufficient light are all problems that I noticed throughout the facility.

To further test the light levels in the office I used a light meter to test the light levels in the office. At my personal workspace the average reading was about

400 Lux. This was the amount of light coming down directly on my work space. Others working areas were slightly lower at around 350 Lux whereas other areas were closer to 500 lux. Reflected light and direct sunlight through the windows were significantly higher though. Readings of sunlight through the windows were as high as1600 Lux. What I noticed throughout the facility was that people looked at their computer screens from different distances and different angles which may or may not be related to lighting conditions. I noticed very little use of screen filters on monitors. I think that it would take further study to determine what if any changes can be made in this area. I did have a little follow up from the employees regarding this subject and there are a few that find this as a real problem in the workplace but for the most part the lighting in the office is adequate according to recommendations.

Perhaps the most famous study regarding performance and lighting conditions was done at Western Electric's Hawthorne Plant in Chicago (Mayo 1933). The researchers found that when they increased light level, productivity increased. They also found that when they decreased the light level, productivity still increased. In fact, no matter how they changed the lighting, productivity continued to increase.

The term "The Hawthorne Effect" is now used to refer to the principle that making any change in a workplace can improve short-term performance. The improvement may be due to just "paying attention" to the workers.

Perhaps as a result of the Hawthorne experience, few field studies have measured performance under different lighting conditions. Hedge et al., (1995) found an increase in self-reported productivity of 2-3% for lensed-indirect lighting when compared with parabolic downlighting.

It's apparent that strong reflections in a screen reduce the ability to see the details on the screen. And if you can't see the details, productivity will suffer. Properly installed indirect lighting can eliminate glare as a performance-robbing factor.

Ergonomics – I asked a number of questions about ergonomics in the workplace. I did this after reading that employees are less likely to pay attention to their comfort when stressed, and assuming that employees in the cubicles would be classified as being stressed.

First, I had recently found out that we have an individual in the workplace whose job is to address ergonomic issues. I asked the question about associate's familiarity with this position. Over 80% of the respondents know that AH has an ergonomic specialist, but only 40 % have had an ergonomic consultation. Over one third of the respondents reported neck or wrist pain at their workstations, while about 50% reported no problems what so ever.

Ergonomics often refers to physical working conditions. Common reported problems are wrist strain, back problems and eye strain. I think that there are other human concerns in the workplace such as stress, and happiness in the workplace that are not always addressed. One goal of ergonomic improvements is to adapt the workplace to the workers. Cubicles do not offer much customization opportunities.

Proper ergonomics is an important issue in the workplace. According to a study by JAMA ergonomic issues resulted in increased costs of over 60 Billion dollars a year. Their study found that 13% of the total workforce experienced a loss in productive time during their two week study time.

Hygiene – Finally I survey associates about Hygiene in their areas. It has been my observation over the years that when people work in close proximity to one another they have a tendency to pass around illnesses. I observed just this year a spreading of a cold from one associate to another through my entire department. We have 12 employees in the department and 10 of the 12 got ill, one after the other over a period of a few weeks starting on one end of the department and ending at the geographic opposite end of the department.

The first question had to do with employees coming in when ill. Over half of the respondents said that they employees should not come into the office when ill. This is very difficult to monitor and often people are most contagious when they are showing no symptoms, however it is very easy to see when someone is very ill and showing signs of being ill such as sneezing and coughing. If nothing else, an employee who comes into the office while ill is a distraction to those employees who are not ill.
While half of the employees did not feel that others should come in ill, even more felt that they had become ill because of other employees who had come in ill. Different people handle this differently, but some have complained to their managers about it while other just figure that it is going to happen. Because of a particular individual in my area I asked associates if there were some around them who coughed or sneezed without covering their mouths. It turns out that about 50% employees have had this occur in their areas. Regardless of what is happening in employees work areas and in spite of the displeasure with what I refer to as hygiene issues, virtually all of the employees report that there are no policies about hygiene in any of the departments.

There were a couple of items that I did not survey about, but one that I believe would get a lot of comments is that of odors in the workplace. We have discussed the use of perfumes and lotions in the workplace. In addition to this is the smell of food from the various cubes. We have a diverse workplace and there are many different food likes and dislikes in the open work area. These smells can be distracting to be sure, but could actually lead to illness.

Another item not specifically survey, but a subject that came up a few times is that of temperature. Complaints about too hot or two cold are common, but certainly difficult to control because of the amount of glass in the office.

Intervention:

So what have I learned about the advantages and disadvantages of cubilcles and what can be done to address Human factors in the office?

The goal of workplace design is to provide spaces that allow people to do their jobs with maximum utility and comfort.

First, the advantages. I see very few advantages to the cube design.
1) The company benefits in that they can place many people into a small space, compared to giving everyone a private office.
2) Cost. Utilizing the same equipment from one facility to another allows Honda to minimize costs compared to allowing each department or facility to order their own furniture.
3) Moving work areas is easy with the current design. I have moved a number of times since coming to this facility. I pack my stuff, mark the box and it is moved to the new location which looks just like the other location. I unpack and put my stuff back into drawers. It is easy as can be.
4) Compared to the environment at the factories the cube offers the opportunity to personalize the working area to an individual's likes and dislikes.
5) Communication can be easier in a number of ways. It is possible to see if someone that I need to speak to is at their cubicle. If I need to speak to a number of people in the same department, it is easy to speak to a number of people in a common area. Collaboration between employees is easier when working on common projects. Along these lines, our department manager can speak to all of the department employees at the same time without moving to a conference room.
6) For management it is much easier to monitor their employee's activities.
7) The company philosophy of equality of employees is supported by everyone being in similar working areas.
8) Movement through the office is a little easier with more routes and easier visibility of routes than would be the case with tall walls.

Fortune writes of Cubicles
Reviled by workers, demonized by designers, disowned by it's very creator, it still claims the largest share of office furniture sales 3 billion or so per year and has outlived every office of the future meant to replace it. It is the Fidel Castro of office furniture. (5)

According to Fast Company (6) "there has been no defining Frederick Taylor-esque research on knowledge-worker productivity" But is has been found that

three factors determined white-collar performance: management and organization, information technology, and workplace design. The last, he says, has a measurable effect -- for good and ill. "Open offices do lead to more unstructured communication," he says. But "those same offices can lead to problems of concentration. If you value reflection or deep thought, it gets tough." Call it the attention-deficit office.

Dis-advantages of the cube.
Some of the advantages of the cube are also disadvantages.
1) There are a lot of people crammed into small spaces. What I inferred from my survey was that people do not like the close proximity to other employees and the loss of privacy due to the layout of the cubes.
2) It is difficult to keep others from interrupting others that are working, either intentionally or unintentionally which can have a negative impact on productivity.
3) Monitoring by supervisors can feel intrusive.
4) For those prone to distraction, it is easy to be distracted by all of the other activity that is so obvious in the workplace.
5) As mentioned earlier, it is easy to pass colds or flu from one employee to another in such close confines.
6) Some of the cubes contain fax machines and copy machines which create noise pollution and distractions by people walking back and forth to and from the machines.
7) One size does not fit all. Even with adjustable chairs, the cube design is not ideal for every employee.

The bottom line to improving working conditions in the workplace is to make it easy to work. The easier it is to work, the more productive employees will be.

In talking to fellow associates and after performing the survey of the employees I think that some strategies can be developed to improve conditions around Honda.

Most of the problems can be addressed through education and behavior modification. I do not believe that many people really understand how much their conversations can bother others around them. I think that people need to be reminded to take conversations to more private areas. Conversations that will last a long time can be taken to conference rooms where the conversation will be less likely to bother others. People need to be reminded to take conversations to the individual cubicles or taken to a conference room to assure that they will not bother other employees. Signage can be distributed throughout the facility to promote better habits and awareness of some of these issues. Awareness can also be increased on the company intranet, which many people access a number of times per day.

Equipment such as printers, fax machines etc should be housed in cubes with higher walls that have the best sound deadening characteristics possible.

As was mentioned, the use of headphones can add to productivity, yet many people do not use them. I think that if employees know that they may be more productive, that they will be more likely to try this strategy. There are also software programs that run in the background of office programs, or electronic devices that emit white noise to mask disturbing sounds.

We have online training available and to support this there were signs that were made available to signal to others that training was going on. These signs were criticized by most, but I think that this is an excellent idea. There needs to be some way to indicate to others that it is not OK to disturb a person who is otherwise involved in productive work. I think that this idea can be promoted and used to the advantage of the company. Various productivity studies about the office indicate that employees spend as little as 1.5 hours per day actually working to around 3 of 5 days spent in productive work activities. Minimizing distractions and maximizing productive time is definitely worthwhile.

As far as lighting goes, it seems that, based on my survey, that there are no problems here. I would like to see some efforts made to see if any changes in the lighting would help. My concerns have to do with the aging workforce in my company and the knowledge that lighting needs change as employee's age. For those that would like desk lamps, I believe that they should be encouraged to get them. AH depends on employees to speak up about poor lighting conditions. There needs to be an active study of current lighting conditions.

Given the importance of ergonomics in the workplace I believe that encouraging the employees to customize their workspaces to themselves can be beneficial. Many people have benefited from this activity and continued promotion of this activity should be encouraged. Within the set dimensions of the work environment, this can be challenging. I stand 6'4" and have different needs than my co-worker who stands only 5"1". I do not feel that the cube fits me well and as a result often feel uncomfortable in my cube area prompting me to take more frequent breaks than I might otherwise take. I think that the activities of the Ergonomics specialist should take a more active role in associates work environment. There are many changes taking place in this subject. New views about proper seating height and position as well as keyboard and mouse placement can bear some scrutiny.

The subject of hygiene is a trickier subject than some of the other issues. This is an important subject that requires more attention. It is clear, based on the survey that illness in the workplace costs the company money in terms of lost productivity. Employees miss an average of 1.5 days per year which costs American business over 20 billion dollars according to David Williams with CNN (is your desk making you sick, November 13, 2006). We need to encourage

employees to not come into the facility if sick and that if they must, they should limit their contact with other employees. Other suggestions would be to offer flu shots more frequently at work at little or no cost (they currently charge $25) and encourage the cleaning crew to do a better job when cleaning the facilities. We should encourage use of hand wipes or sanitizing hand lotion in the office space. Additional remedies to this would be face masks that employees can wear, either when they are sick or when someone in their area is sick. This may seem silly, but it could work. My local grocery store offers wipes at the cart pick up area so that I can wipe down the handle before I grab it. This can be done at the grocery store, why not the workplace? This information can be distributed via the company intranet and also be the subject of in house classes. Many employees have lap-top computers and can therefore carry on work from home on days when they can not show up due to illness. Virtually all of the employees who answered this question said that there is no policy about the issue of sickness in the office. The cube environment is too cramped to not make this an important issue.

Conclusion:

When I sent out this survey I was actually cautioned by the HR department about such activities. I had not gotten approval in advance of the survey and thought that since it was part of a school project and there was not in my opinion anything inflammatory about it, that it would not be a problem. I found out a number of things that point out weaknesses in the system that probably have some liability attached to it. Questions about ergonomics may support that there is not enough being done to foster safe and comfortable working conditions in this office. Questions about privacy bring to light subjects that are difficult at best to address and speak to the very culture of the company. Other HFE issues such as light or temperature are also very difficult to address and while trying to find the most economical way to run the facility, there will be outliers that will be too hot or too cold, or have too much light or not enough and pleasing everyone is impossible. The issue of too much noise in the workplace seems to have ruffled more feathers than other subjects however. The company has a lot invested in the current office equipment and may be unwilling to experiment with new ideas in office design. Their current method is set in stone so to speak.

What I intend to do with the information that I gathered is to set up what we call an NH circle to further study the issue(s). I want to work closely with our HR department to both, bring information to them developed during the survey of employees as well as information learned during the writing of this paper and to learn more about the actions being taken by the company to address these and other issues related to Human Factor issues. This is a continuous improvement activity developed at Honda many years ago. With all of the loss in productivity due to distractions in the workplace that I have read about I believe that the study of this issue will be well worth the effort. One of the core principles within Honda is respect for the individual. I believe that it is disrespectful to act in a way that is

distracting to fellow associates. Through an NH Circle we may find that we can phase in different building materials as we purchase or lease new equipment, or that may be a supplement to the existing equipment we have to help make it quieter.

(1) G. Oldham, A. Cummings, et al, "Listen while you work? Quasi-experimental relations between personal-stereo headset use and employee work responses," Journal of Applied Psychology, 80: 547-565, 1995

(2) NFIB online 3/12/02
(3)Journal of Applied Psychology (Vol. 85, No. 5, pp. 779-783, 2000).
(4) Engineering tool box. Com – Illuminance –Recommended light levels

(5)By Julie Schlosser, FORTUNE Magazine (online)
March 22, 2006

(6)Fast Company
Death to the Cubicle!
By: Linda Tischler

(7)JAMA
Vol. 290 No. 18, November 12, 2003
(8) J Mardex /Auditory Visual and physical distractions in the workplace (2004)